

A Case Study of Using Importance-Agreement Analysis to Analyze Patient Safety Culture Based on the Safety Attitudes Questionnaire in Taiwan

Yii-Ching Lee, Chih-Hsuan Huang, and Hsin-Hung Wu

Abstract—This study uses the Chinese version of safety attitudes questionnaire (SAQ) as a basis to assess the patient safety culture from the entire staff's perceptions for a regional teaching hospital in Taichung, Taiwan. Importance-agreement analysis is applied to separate twenty three items in SAQ required by all of the staff into four categories. The results show that eight items are found to be the major strengths, and four items are the minor strengths. On the contrary, eight items belong to the minor weaknesses. Most importantly, three items are classified into major weaknesses. In order to relentlessly improve the patient safety culture, the hospital management needs to pay much attention to the negative items (major weaknesses and then minor weaknesses). The major focus is to take immediate actions to improve the major weaknesses, while to maintain the major strengths to gain competitiveness in order to provide better medical services to its patients.

Index Terms—Safety attitudes questionnaire, importance-performance analysis, importance-agreement analysis, patient safety culture.

I. INTRODUCTION

Reducing medical errors and improving patient safety is essentially important for healthcare organizations [1]. Studies have shown that better attitude toward patient safety results in positive influences on shorter stays, fewer prescription errors, less ventilator-associated pneumonia, fewer blood-stream and urinary tract infections, and lower mortality [2]-[4]. In addition, a better patient safety culture could reduce the number of accidents and failures and provides better services to patients [5], [6]. That is, the patient safety culture plays a critical role for healthcare organizations to improve patient safety continuously [7].

In order to assess the patient safety culture, it is essentially important for healthcare organizations to measure employees' perceptions toward patient safety regularly. A positive patient

safety culture implies that patient safety has been placed as one of the highest priority in a healthcare organization [3], [5], [8]. Safety attitudes questionnaire (SAQ) developed by Sexton *et al.* [9] has been widely used to assess the patient safety culture [10]. On the other hand, importance-performance analysis (IPA) has also been applied to identify the advantages and deficiencies in medical service quality. For instance, Lee *et al.* [11] used importance-agreement analysis based on IPA to identify critical factors, such as major strengths and weaknesses of the patient safety culture.

Lee *et al.* [10] further stated that using IPA can track the advantages and disadvantages of the patient safety culture that enables the hospital management to observe the trends of the changes of the patient safety culture on a timely basis. By combining SAQ and IPA, the advantages and disadvantages in the patient safety culture can be found. The hospital management can address the deficiencies to improve the patient safety culture. Moreover, the advantages existed in this healthcare organization can be strengthened. In doing so, the healthcare organization can establish a positive patient safety culture to provide patients with excellent medical services.

II. LITERATURE REVIEW

A. Safety Attitudes Questionnaire

Safety attitudes questionnaire was originally developed by Sexton *et al.* [9] to assess the patient safety culture for healthcare organizations. Shie *et al.* [3] and Ulrich and Kear [5] concluded that regularly conducting the surveys to measure the staff's perceptions toward safety attitudes is important to improve patient safety as well as to reduce medical errors. Moreover, the hospital management can initiate safety management strategies based on the survey results to strengthen the advantages and improve the deficiencies of the patient safety culture. In 2008, Taiwan Joint Commission on Hospital Accreditation developed the Chinese version of safety attitudes questionnaire based on the short form of SAQ in 2006 by forward and backward translation to check the quality of the translation and the pilot-testing and discussion for intelligibility and applicability of the items by an expert panel [12], [13]. The development of the Chinese version of SAQ allows the healthcare organizations to regularly evaluate the patient safety culture on a yearly basis to monitor the progress of patient safety during the healthcare processes.

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There are six dimensions and thirty questions depicted in Table I in safety attitudes questionnaire. The definitions of dimensions are summarized below [14]. Teamwork climate is the perceived quality of collaboration between personnel. Safety climate is defined as the perceptions of a strong and proactive organizational commitment to safety. Perception of management is the approval of managerial actions. Job satisfaction is defined as the positivity about the work experience. Stress recognition is to measure how performance is influenced by stressors. Working condition is from the perceived quality of the work environment and logistical support such as staffing and equipment. Each staff is required to rate each question based on a five-point Likert scale ranging from strongly agree to strongly disagree [11], [14].

TABLE I: SAFETY ATTITUDES QUESTIONNAIRE

Teamwork Climate	
1	Nurse input is well received in this clinical area.
2	In this clinical area, it is difficult to speak up if I perceive a problem with patient care.
3	Disagreements in this clinical area are resolved appropriately (i.e., not who is right, but what is best for the patient).
4	I have the support I need from other personnel to care for patients.
5	It is easy for personnel here to ask questions when there is something that they do not understand.
6	The physicians and nurses here work together as a well-coordinated team.
Safety Climate	
7	I would feel safe being treated here as a patient.
8	Medical errors are handled appropriately in this clinical area.
9	I know the proper channels to direct questions regarding patient safety in this clinical area.
10	I receive appropriate feedback about my performance.
11	In this clinical area, it is difficult to discuss errors.
12	I am encouraged by my colleagues to report any patient safety concerns I may have.
13	The culture in this clinical area makes it easy to learn from the errors of others.
Job Satisfaction	
14	I like my job.
15	Working here is like being part of a large family.
16	This is a good place to work.
17	I am proud to work in this clinical area.
18	Morale in this clinical area is high.
Stress Recognition	
19	When my workload becomes excessive, my performance is impaired.
20	I am less effective at work when fatigued.
21	I am more likely to make errors in tense or hostile situations.
22	Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure).
Perception of Management	
23	Management supports my daily efforts.
24	Management doesn't knowingly compromise patient safety.
25	I get adequate, timely information about events that might affect my work.
26	The levels of staffing in this clinical area are sufficient to handle the number of patients.
Working Condition	
27	Problem personnel are dealt with constructively by our unit.
28	This hospital does a good job of training new personnel.
29	All the necessary information for diagnostic and therapeutic decisions is routinely available to me.
30	Trainees in my discipline are adequately supervised.

Lee *et al.* [11] stated that not all of the staff in healthcare organizations needs to fill out the entire questions in the

Chinese version of SAQ. For instance, physicians and nurses are required to answer all of the questions, while technicians only need to fill out twenty six questions. In order to evaluate the perceptions of the entire staff toward patient safety, twenty three questions excluding 2, 3, 4, 6, 8, 26, and 29 that are required for all of the staff are used in this study. In addition, Item 11 is a reversed question such that the adjustment is required. If the original answer is strongly agree, the numerical value is adjusted from five to one and vice versa.

B. Importance-Performance Analysis

In 1977, Martilla and James [15] proposed importance-performance analysis to identify the strengths and weaknesses of an organization that can be used as references for the management to improve weaknesses and enhance strengths. Importance-performance analysis can be viewed as an effective tool that provides the management to explore different aspects of the marketing mix and then to deploy resources more effectively based on the identified strengths and weaknesses [16]. By constructing a two-dimensional matrix as shown in Fig. 1, importance and performance are labeled as an x-axis and a y-axis, respectively. The center lines to form the four quadrants in importance and performance can be established by computing the average values of importance and performance from all of the questions. With the use of IPA, each attribute will be allocated in one of the four quadrants [17]. The information provided by this matrix allows the management to identify the most critical attributes to the customers that have the highest impacts on customer satisfaction and the lowest performance attributes to be improved [18], [19].

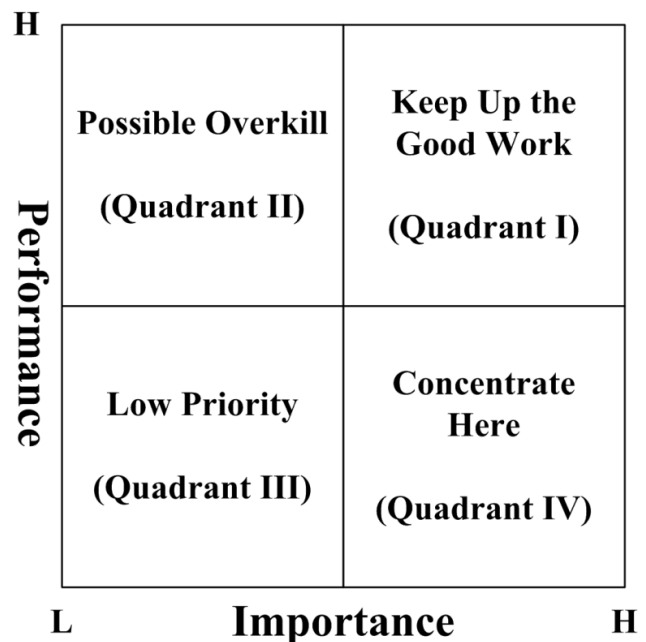


Fig. 1. Importance-performance analysis.

These four quadrants in importance-performance analysis include “keep up the good work” (Quadrant I), “possible overkill” (Quadrant II), “low priority” (Quadrant III), and “concentrate here” (Quadrant IV) [20], [21]. Specifically, items that belong to “keep up the good work” have both high importance and performance and are viewed as competitive advantages for organizations. Items located in Quadrant II

have the characteristics of low importance but high performance, indicating that resources committed are excessive and should be deployed elsewhere. Items located in Quadrant III have both low importance and performance, showing that these items are placed in the low priority for improvement and do not require additional efforts immediately. Finally, items that belong to “concentrate here” have high importance but low performance and are considered as major weaknesses for an organization. Immediate improvement for these items is essential and required. In summary, attributes in Quadrant IV should be improved in the high priority to remove customer dissatisfaction, while attributes in Quadrant I is regarded as major strengths and should be maintained in order for an organization to relentlessly gain competitiveness in the market [22].

Importance-performance analysis has been successfully used in a wide variety of areas including medical areas [18]. For instance, Miranda *et al.* [16] utilized importance-performance analysis to assess the perceptions of patients and the management of healthcare centers. With different perceptions identified, the management can deploy the marketing resources more effectively to enhance the service quality of healthcare centers. Yeh and Wu [21] first identified critical factors of clinical psychology services by importance-performance analysis and then established standard operating procedures to relentlessly provide better and consistent services to patients. Wang *et al.* [23] also applied importance-performance analysis to identify critical factors of a hospital’s key success factors such that the hospital management can develop patient safety strategies to improve medical quality. Lee *et al.* [14] used importance-performance analysis to find critical dimensions and items based on the Chinese version of safety attributes questionnaire by focusing on physicians and nurses.

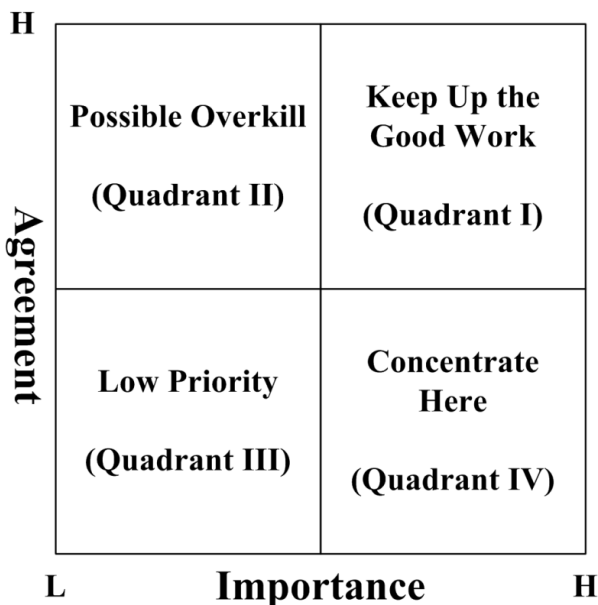


Fig. 2. Importance-agreement analysis.

Lee *et al.* [11] modified importance-performance analysis to evaluate the patient safety culture by identifying critical factors. Performance is replaced by agreement depicted in Fig.

2. In a patient safety culture analysis, the meanings of agreement for each respondent represent how the organization or individuals perform in these questions. That is, the level of agreement by a five-point Likert scale has the equivalent meaning of the level of performance in assessing the patient safety culture. Moreover, Lee *et al.* [10] applied importance-agreement analysis to track the performance of the patient safety culture by a longitudinal study in accordance with the Chinese version of safety attitudes questionnaire for physicians and nurses. Therefore, importance-performance analysis or importance-agreement analysis is a very effective tool that can be used to assess the patient safety culture in practice.

III. A CASE STUDY

TABLE II: DEMOGRAPHIC INFORMATION OF THE ENTIRE STAFF

Demographic Information	Category	Frequency (%)
Gender	Male	148 (18.5%)
	Female	653 (81.5%)
Age	Less than 20	13 (1.6%)
	21-30	297 (37.1%)
	31-40	297 (37.1%)
	41-50	159 (19.9%)
	51-60	33 (4.1%)
	61 or over	2 (0.2%)
Supervisor/Manager	Yes	80 (10.0%)
	No	721 (90.0%)
Respondents reporting events in the past 12months	0 event	471 (58.8%)
	1-5 events	285 (35.6%)
	6-10 events	33 (4.1%)
	11-15 events	11 (1.4%)
	16 events and above	1 (0.1%)
Job Position	Physician	53 (6.6%)
	Nurse	417 (52.1%)
	Technician	83 (10.4%)
	Pharmacist	35 (4.4%)
	Medical Administrator	141 (17.6%)
	Respiratory Therapist	17 (2.1%)
	Other	55 (6.9%)
Job Status	Full time	712 (88.9%)
	Part time	58 (7.2%)
	Agency	12 (1.5%)
	Contract	19 (2.4%)
Experience in Organization	Less than 6 months	87 (10.8%)
	6 to 11 months	36 (4.5%)
	1 to 2 years	139 (17.4%)
	3 to 4 years	123 (15.4%)
	5 to 10 years	182 (22.7%)
	11 to 20 years	214 (26.7%)
	21 years or more	20 (2.5%)
Experience in Position	Less than 6 months	98 (12.2%)
	6 to 11 months	47 (5.9%)
	1 to 2 years	161 (20.1%)
	3 to 4 years	132 (16.5%)
	5 to 10 years	199 (24.8%)
	11 to 20 years	153 (19.1%)
	21 years or more	11 (1.4%)
Education	Junior high school and below	5 (0.6%)
	Senior high school	34 (4.2%)
	College/University	696 (86.9%)
	Graduate school	66 (8.2%)
Direct Patient Contact	No	96 (12.0%)
	Rare	119 (14.9%)
	Very often	586 (73.2%)

A regional teaching hospital in Taichung, Taiwan is selected to assess the patient safety culture from the

perceptions of all of the staff. This study uses the internal survey data in 2013 with 801 effective questions from 881 staffs in this hospital. The demographic information is provided in Table II. The average values in agreement of twenty three questions that are required for all of the staff are summarized in Table III. It is worth to note that the adjustment of the numerical value is required since Item 11 is a reversed question. From Table III, Item 5 (It is easy for personnel here to ask questions when there is something that they do not understand.) has the highest agreement value followed by Item 24 (Management doesn't knowingly compromise patient safety.) and Item 9 (I know the proper channels to direct questions regarding patient safety in this clinical area.), whereas Item 11 (In this clinical area, it is difficult to discuss errors.) has the lowest agreement value followed by Item 18 (Morale in this clinical area is high.), and Item 27 (Problem personnel are dealt with constructively by our unit).

TABLE III: AVERAGE VALUES IN AGREEMENT

Item	Average Value	Item	Average Value
1	3.556	18	3.461
5	3.993	19	3.739
7	3.592	20	3.745
9	3.846	21	3.474
10	3.506	22	3.662
11	2.593	23	3.548
12	3.665	24	3.838
13	3.668	25	3.654
14	3.557	27	3.471
15	3.733	28	3.498
16	3.601	30	3.593
17	3.645	Grand Average	3.5946

The current survey on safety attitudes questionnaire only measures the agreement along with some demographic information but does not include the importance value for each question. In order to further apply importance-agreement analysis, the importance for each question is needed. Sampson and Showalter [24] stated that importance is a dynamic structure which changes as perceptions of performance change. Besides, importance, which is a causal function of performance, correlates with performance when the information of importance and performance (agreement) is from the same source [17]. In fact, the higher performance, the higher importance and vice versa.

To reduce the correlation effect, one possible approach is to have different sources for the information of importance and agreement. In this study, the agreement information comes from all of the staff in this case hospital in 2013 from the internal survey. In contrast, the importance information comes from the upper management who are responsible to monitor and improve the patient safety culture. Thus, a survey was conducted from October 2, 2013 to October 23, 2013 to ask the upper management in this case hospital to assess the importance of these twenty three items in the Chinese version of the safety attitudes questionnaire by a Likert five-point scale ranging from strongly importance to strongly unimportance. Sixty two questionnaires have been issued but only thirty nine questionnaires were valid, representing a 62.90% effective return rate. The demographic information regarding the upper management is depicted in Table IV.

TABLE IV: DEMOGRAPHIC INFORMATION OF UPPER MANAGEMENT

Demographic Information	Frequency	Percentage
Gender		
Male	25	64.1
Female	14	35.9
Age		
20 years old and below	1	2.6
21-30 years old	1	2.6
31-40 years old	8	20.4
41-50 years old	14	35.9
51-60 years old	14	35.9
61 years old and above	1	2.6
Job Position		
Physician	20	51.3
Nurse	4	10.3
Technician	2	5.1
Pharmacist	1	2.6
Medical Administrator	10	25.5
Respiratory Therapist	1	2.6
Other	1	2.6
Experience in Organization		
6 to 11 months	2	5.1
1 to 2 years	4	10.3
3 to 4 years	2	5.1
5 to 10 years	5	12.8
11 to 20 years	21	53.9
21 years or more	5	12.8
Education		
Junior/Senior High School	4	10.3
College/University	18	46.2
Graduate School	16	41.0
Doctoral Degree	1	2.6

The average values in importance of twenty three questions based on thirty nine questionnaires are in Table V, where Item 7 has the highest importance value followed by Item 5, while Item 11 has the lowest importance value followed by Item 12. It is worth to note that Item 11 is the only item with the importance value of less than 4.0 out of a five-point scale. By using the data from Tables III and V, Fig. 3 and Table VI summarize how these twenty three items are allocated. Eight, four, eight, and three items belong to major strengths, minor strengths, minor weaknesses, and major weaknesses, respectively. Specifically, Items 5, 9, 13, 19, 20, 22, 24, and 25 are the major strengths for this hospital, indicating these items should be maintained in order to gain competitiveness in the medical service market. In contrast, Items 1 (Nurse input is well received in this clinical area.), 7 (I would feel safe being treated here as a patient.), and 21 (I am more likely to make errors in tense or hostile situations.) are the major weaknesses. Obviously, the hospital management needs to pay much attention to improve these three items.

TABLE V: AVERAGE VALUES IN IMPORTANCE

Item	Average Value	Item	Average Value
1	4.436	18	4.282
5	4.462	19	4.385
7	4.615	20	4.359
9	4.436	21	4.436
10	4.154	22	4.359
11	3.949	23	4.231
12	4.103	24	4.333
13	4.333	25	4.308
14	4.282	27	4.282
15	4.282	28	4.154
16	4.256	30	4.231
17	4.205	Grand Average	4.2988

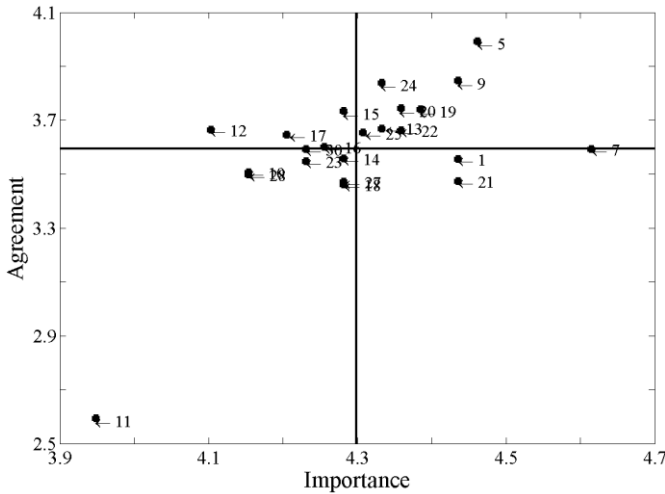


Fig. 3. Importance-agreement analysis of this case hospital.

TABLE VI: ITEMS LOCATED IN FOUR QUADRANTS

Quadrant	Item
I	5, 9, 13, 19, 20, 22, 24, 25
II	12, 15, 16, 17
III	10, 11, 14, 18, 23, 27, 28, 30
IV	1, 7, 21

IV. CONCLUSION

This study uses the Chinese version of safety attitudes questionnaire based on the SAQ developed by Sexton *et al.* [9] to assess the patient safety culture from the entire staff of a regional teaching hospital in Taichung, Taiwan. Importance-agreement analysis is applied to analyze the critical items in the patient safety culture. Eight items that belong to the major strengths should be maintained because these items are the niche for this case hospital. In contrast, three items are the major weaknesses from the entire staff’s perceptions. Specifically, the nurses’ input is not well received in this clinical area. The staff feels unsafe for being a patient in this hospital. Besides, the staff feels stressful. Without removing these negative factors, this hospital might not provide better services to its patients. Therefore, immediate improvement on these three items is critically important in order to relentlessly improve the patient safety culture in this case hospital.

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