

# Exploring the Quality of Work Environment at Saudi Aerospace Engineering Industries (SAEI)

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## Abstract

This study aims to evaluate the Quality of Work Environment (QWE) in Aircraft Maintenance Sector of Saudi Aerospace Engineering Industries (SAEI). It covers safety climate (safety, hazard, and injury), employee satisfaction about their jobs and employee satisfaction about management practices. For that purpose, 314 questionnaires were collected and analyzed. The study revealed that SAEI employees have neutral evaluations regarding safety climate in the organization and have neutral evaluations regarding their jobs at SAEI as well. On the other hand, the overall values statically indicate that SAEI employees are unsatisfied regarding SAEI management practices. In conclusion, SAEI employees are unsatisfied about the quality of work environment in general with overall median equal 2 and 95% of confidence. The majority of respondents (60.1%) were between unsatisfied and strongly unsatisfied regarding the QWE. Also, the study indicated that there were statistically significant differences in the employees' evaluation regarding the QWE according to their job grades, job title, and their departments. These differences can be concluded as following; employees with higher grades were more satisfied with QWE at SAEI, managers, instructors, and auditors were more satisfied with QWE at SAEI and finally TQA employees were the most satisfied employees with QWE at SAEI while Hangar employees were the most unsatisfied. The study suggests some practical recommendations based on the outcomes of this study.

**Keywords:** environment, quality, work, safety climate, hazard, injury, practices, satisfaction, SAEI, aircraft maintenance sector, Saudi Arabia

## 1. Introduction

Quality of Work Environment (QWE) is the existence of a certain set of organizational conditions and management practices. Therefore, a high quality work environment exists when management practices are used, employees are satisfied about their jobs and safe working conditions exist (Srivastava & Kanpur, 2014). Saudi Aerospace Engineering Industries (SAEI) that deals with the maintenance of Saudi Airlines aircraft employs more than 4000 employees across the kingdom. Therefore, its working environment poses a concern to decision makers fearing of the consequences of bad or unhealthy work environment to employees. In the aviation industry, there is a need to have a stable and healthy work environment since there is a danger of fatigue or stress that might lead to vital mistakes that would have server and destructive consequences to the well-being of the industry. SAEI as a government run organization impose very strict regulations in terms of safety and engineering that was driven mostly from its establishment and training by the Federal Aviation Administration (FAA) in its beginning life. However, SAEI now as a branch of Saudi Airlines are restricted by the regulations of the government from the dismissal of unproductive employees due to labor regulations of the Saudi nationals. Hence, the study of the work environment that includes safety climate and employee satisfaction might help enlighten both SAEI and Saudi Airlines to the well-being of this important sector. The diagnosis of the problem of work environment can lead to the proposal of some practical and constructive recommendation and solutions.

## 2. Statement of the Problem

Work environment in the Aircraft Maintenance Sector of any aerospace industry is important since it affects the performance of employees in this sensitive and stressful job that handle very risky functions. In some aviation industries, many weaknesses in the work environment including poorly designed workstations, excessive noise, poor ventilation, insufficient safety resources, inappropriate lighting and lack of personal protective equipment.

People working in such environment are disposed to occupational disease and it impacts on employee's performance. Thus productivity is decreased due to the workplace environment. For aviation industry, the quality of work environment should be at the highest level. Therefore; this study would attempt to identify the quality of work environment in the Aircraft Maintenance Sector at Saudia Aerospace Engineering Industries (SAEI) by evaluating safety climate (safety, hazards and injuries), employees' satisfaction about their jobs and employee satisfaction about management practices.

### **3. Significance of the Study**

This study is considered an important for both organization and staff members. For organization, it is the QWE that improving organization performance, reducing negative organizational stress, enhancing commitment to values and goals of the organization and increasing personal productivity, accountability and commitment. For staff, it is the QWE that most impacts on their level of motivation and performance, level of innovation and collaboration with other employees, how well they engage with the organization and how long they stay in the job. This study presents the analysis of safety climate and employees satisfaction among SAEI staff members and aims to provide better work environment. Thus contributing to know the weaknesses in the work environment and thus possibility of processed and improved to be an attractive company. Also, it seeks to come up with a strategy to improve quality of work environment at SAEI which lead to minimize the workplace hazards and to reduce current rate of work injuries.

### **4. Research Objectives**

This research aims to investigate Quality of Work Environment (QWE) at SAEI and to suggest some solutions to provide better work environment. On that matter, this study investigates three matters; safety climate that covers safety evaluation, hazards and injuries; employee satisfaction about their jobs and employee satisfaction about management practices. Therefore, the research would seek to fulfill the following objectives; evaluation of the safety climate at SAEI, identification the workplace hazards, findings the main reason of the work-related injuries, measuring employees satisfaction about their jobs, determining employees satisfaction about SAEI management practices and suggesting some recommendations to improve the quality of work environment at SAEI.

### **5. Limitations of the Study**

The study is restricted to those employees who are currently working at SAEI and does not include employees who had left the company due to issues about work environment. In addition, this study focused only on the factors which are connected with work environment aspects, it has not concentrated on employees' requirement about their work. Also, results of this study cannot be generalized to all SAEI workstations because the majority of respondents were from Jeddah workstation (87.6%) which is the main station while other stations are represented in smaller scales.

### **6. Literature Review**

#### *6.1 Introduction*

ISO defines quality as: "the totality of features and characteristics of a product or service that bears its ability to satisfy stated or implied needs." Another ISO definition of quality is "the degree to which a set of inherent characteristics fulfills requirement" (ISO, 2005). While ISO 14001 defines the work environment as "surroundings in which an organization operates, including air, water, land, natural resources, humans and their interrelation" (ISO 14001, 2004). The "work environment" term generally refers to the place, conditions and surrounding influences in which people carry out an activity. The characteristics of the work environment affect the quality of work both directly and indirectly. Therefore, it plays a critical role in ensuring both the supply of the workforce and the enhancement, effectiveness and motivation of that workforce (Wiskow et al., 2010). The work environment has three aspects; physical environment such as work load, technology and facilities where social environment includes interpersonal relations, teamwork and autonomy among others. The third aspect is administrative environment comprises matters such as organizational structure, goals and policies.

#### *6.2 Quality of Work Environment*

The academic literature shows a great similarity in the meaning between the Quality of Work Environment (QWE) and the Quality of Work Life (QWL). Both phrases used to describe employees surrounding conditions at the workplace. They have the same aspects that include physical, Social, and management nature. QWE is regarded as a multidimensional concept that is made up of several interrelated factors and has different aspects and definitions. Mirvis and Lawler (1984) measured quality of working life in terms of satisfaction with wages, hours and working conditions, describing the "basic elements of a good quality of work life" as safe work

environment, equitable wages, equal employment opportunities and opportunities for advancement. This definition linked the QWE with employees' satisfaction and well-being at the workplace. Safe work environment is an essential need for all employees to feel safe and secure at the work site and to keep them working efficiently. However, QWE does not focus on an individual employee or on the job characteristics; instead, it is a concept that encompasses the physical aspects, psycho-social and organizational surroundings of work (Markey et al., 2012). Based on a study of high-quality work, job satisfaction, and occupational injuries, Barling et al. (2003) found that QWE will affect occupational injuries directly, as well as through job satisfaction. Another study of army hospital employees, Mosesman (1996) found that job satisfaction differentiated significantly between injured and non-injured workers. The Federal Aviation Administration (FAA, 2015) considers Safety Management System (SMS) as being the formal, top-down business approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures. The long-term objectives of an SMS may include four elements; continuous improvement in the health and safety of employees and others, minimization of accidents and maximization of avoidable loss, reduction in risks through improved technology and finally, developing a positive safety culture or climate. A hazard is any condition, object, activity or event with the potential of causing injuries to people, damage to equipment or structures, loss of material, or reduction of the ability to do a prescribed function (European Commercial Aviation Safety Team (ECAST, 2009). The scope of hazards existing in an aviation operation environment is very wide. The following factors are examples of common hazard sources in aviation; design factors, procedures and operating practices, communications, personal factors, organizational factors, work environment factors, regulatory oversight factors and defenses (SKY brary, 2014).

### *6.3 Job Satisfaction*

Hoppock (1935) defined job satisfaction as a combination of psychological, physiological and environmental circumstances that causes employee satisfaction. Vroom (1964) described job satisfaction as an effective orientation of an employee toward his current work roles. In addition, Locke (1976) defined job satisfaction as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences". Based on these definitions, job satisfaction is influenced by a set of factors that cause a feeling of satisfaction. Therefore, job satisfaction is the feeling and beliefs that people have about their current job. Positive and favorable attitudes toward the job indicate job satisfaction while negative and unfavorable attitudes towards the job indicate job dissatisfaction. Job satisfaction can be influenced by a person's ability to complete required tasks, the level of communication in an organization, and the way management treats employees (Boundless, 2015). Job satisfaction has many different theories which explained how people find contentment and fulfillment with their occupations. The most common theories of job satisfaction are; Affect Theory, Two-Factor Theory, Dispositional Theory, and Job Characteristics Model.

### *6.4 Management Practices Satisfaction*

In organizations, management practices are the mediator between management strategies and management outcomes. Management practices are viewed as a personalized commitment to employees by the organization. The employees then reciprocate positive attitudes and behaviors to the organization (Mudoor & Tooksoon, 2011). Most of job satisfaction studies are concerned about the employees job outcomes, while few studies are concerning about the influence of management practices on the employees satisfaction. Stavrou-Costea (2005) argued that the effective management practices can be the main factor for the success of a firm. In addition, Ostrom (1993) has found that safety performance is affected by an organization's socially transmitted beliefs and attitudes toward safety. Vredenburg (2002) stated six management practices: training, rewards, hiring, communication feedback, participation and management support. Finally, management practices influence the employees' feelings of commitment and satisfaction towards their organization. However, to improve QWE, managers must try to treat employees in a fair and supportive manner which involve: open communication channels, offer employees opportunities to participate in decisions affecting them, effective training programs, career advancement opportunities, offer promotions, better appraisal procedures, support innovation at work, support recreation activities and improve the reward system.

### *6.5 The Need of Quality of Work Environment*

The Quality Work Environment (QWE) is an essential need for both workers and organizations. It satisfies workers needs and keeps them on task and working efficiently. As an organization, QWE satisfies organization needs in improving their viability in the competitive world markets and improves the organization performance. Organizations' attention has been focused on the quality of human experience in the work place and on their viability in increasingly competitive world markets. These dual concerns have created a growing interest in

redesigning the nature of the work environment to improve both productivity for the organization, and the quality of working environment for its members (Srivastava & Kanpur, 2014). Successful organizations enhance the QWE to maintain competitive advantage and to gain a lot of benefits to both management and workers. These benefits include: improving organization performance, increasing co-operation and teamwork within and across all the levels of the organization, increasing in personal productivity, accountability and commitment, improving the morale of employees, reducing organizational stress, improving employee satisfaction and improving the safety working conditions which will reduce the rate of work injuries. Furthermore, positive changes in the work environment result in a higher employee retention rate, which leads to better teamwork, increased productivity, and ultimately improvements in organizational outcomes. Also, QWE demonstrates a commitment to safety in the workplace, leading to overall job satisfaction. Hence, when workers are satisfied with their jobs, rates of absenteeism and turnover decrease, staff morale and productivity increase, and work performance as a whole improves. On the other hand, low quality (unsafe or unhealthy) work environment affect employees physical and psychological health through the stress of heavy workloads, long hours, low status, difficult relations in the workplace, problems carrying out work roles, and a variety of workplace hazards. The costs of these unhealthy and unsafe workplaces for employees include four aspects. The first aspect is that there is evidence indicates that long periods of job strain affect personal relationships and increase sick time, conflict, job dissatisfaction, turnover, and inefficiency. The second aspect is that management practices can damage the mental health of a company's employees; when unhealthy leadership harms the employees; it also harms their work performance (LaBier, 2010). The third aspect is that low QWE fuels emotional conflicts among the management and the employees. The fourth aspect is that the costs of unhealthy and unsafe workplaces are calculated in terms of absenteeism, accidents, rising drug benefits costs, higher health-care costs and lost productivity (Lowe, 2004).

## 7. Research Methodology

This current study is conducted at the aircraft maintenance sector of Saudi Aerospace Engineering Industries (SAEI). An on-line questionnaire was developed for collecting data on employees' evaluation towards the quality of the work environment at SAEI. The questionnaire was disseminated on-line to the majority of SAEI employees (about 4000 employee) by sharing the questionnaire link using SAEI official E-mail (saudiamro), and through employees' social private network (Yammer) and through social media application (WhatsApp). The period of collecting data was about a month. Data were collected from 316 respondents (7.9% of sample size) of which 314 responses were found to be usable for the analysis, which forms the basis of this study.

The questionnaire consists of three parts; personal information, safety climate evaluation and measuring employee satisfaction. Part one; personal information includes; nationality, age, education, workplace, duration of service, job grade, salary range, job title and their department. Part two; Safety climate evaluation part is designed according to the work of Carol et al. (2014). The safety climate evaluation covers three aspects; evaluating the quality of safety, hazard identification and the injury causes at the workplace. First, there were seven questions to evaluate the quality of safety at SAEI by using a five-point Likert Scales which started from Never to Always, as shown in Table 1.

Table 1. Likert scale for safety evaluation

| Statement           | Mean              | Median | Mode |
|---------------------|-------------------|--------|------|
| Never               | From 1.00 to 1.79 | 1      | 1    |
| Rarely              | From 1.80 to 2.59 | 2      | 2    |
| Sometimes (Neutral) | From 2.60 to 3.39 | 3      | 3    |
| Often               | From 3.40 to 4.19 | 4      | 4    |
| Always              | From 4.20 to 5.00 | 5      | 5    |

These questions asked about the priority of safety, safety resources availability, assuring employees health and well-being, availability of the Personal Protective Equipment (PPE), using the PPE while working, reporting incidents, and availability of safety training programs. Second, the respondents have been asked to identify all hazards that can be found in their work area from a list of ten common hazards such as Electrocution, Radiation, Chemicals, Noise, and others. Finally, the last question in this part was about the main cause of the work injuries at SAEI. The respondent has been asked to select the most common reasons from a list of four popular reasons of work injuries which includes: personal reasons, behavioral reasons, environmental reasons and management reasons. Part three of the questionnaire investigates the measurement employees' satisfaction about their jobs

and about management practices and includes thirteen questions by using a five-point Likert scale as shown in Table 2.

Table 2. Likert scale for employees' satisfaction

| Statement                                 | Mean              | Median | Mode |
|---|-------------------|--------|------|
| Strongly unsatisfied                      | From 1.00 to 1.79 | 1      | 1    |
| Unsatisfied                               | From 1.80 to 2.59 | 2      | 2    |
| Somewhat satisfied /unsatisfied (Neutral) | From 2.60 to 3.39 | 3      | 3    |
| Satisfied                                 | From 3.40 to 4.19 | 4      | 4    |
| Strongly satisfied                        | From 4.20 to 5.00 | 5      | 5    |

The first three questions of the employees' satisfaction were about their current jobs at SAEI which includes; current department, job fitness with skills and interest, and the workload. While the remaining ten questions were about the employees' satisfaction about SAEI management practices such as training, appraisal, promotions, participation in decision-making and other elements and designed on the light of Vredenburg (2002).

Data analysis has been carried out by using the Statistical Package for Social Sciences (SPSS), version 20. All questions of the questionnaire were pre-coded and analyzed concerning relevant variables. Some of demographic data such as age, duration of service, and job title were computed and recorded into different variables for analysis. In addition, dependent variables like safety climate, job satisfaction, and management practices satisfaction have been added, then, formed together as a new variable which was called Quality of the Work Environment (QWE). To meet the objectives of the study, different tests were performed such as Test of Normal Distribution of Variables and Homogeneity of Variance Test. Descriptive statistics are used to present data clearly and simply. Frequencies and percentages have been measured to describe the sample distribution according to the variables of personal information, safety evaluation, and employees' satisfaction. Also, median, mode, mean and standard deviation (SD) have been calculated to show evaluation results and to measure central tendency of data. However, the author used the median values to show the evaluation results because the median is less affected by outliers and skewed data than the mean, and is usually the preferred measure for ordinal variables and when the distribution is not symmetrical (Australian Bureau of Statistics, 2013). ANOVA test was used to check if there were significant differences in employees' evaluation of the QWE according to their age, education, workplace, duration of service, job grade, salary, job title, and department.

Validity and reliability have been observed in this current research. Validity has been done through pilot test among 28 employees from different departments and grades at SAEI before distributing the questionnaire to all employees. Some changes such as re-sequencing, editing, simplifying or deleting of some questions were performed to improve the questionnaire and to enhance the validity of this study. On the side of reliability, the Alpha Cronbach's coefficient was used to test the research reliability. As a result, reliability of the questionnaire was verified as shown Table 3. The overall value of Alpha Cronbach's coefficient indicates that the questionnaire achieved a high reliability (0.91), which leads to achieving the research objectives.

Table 3. Questionnaire reliability

| Dimension                         | No. of Items | Alpha Cronbach's Coefficient |
|-----------------------------------|--------------|------------------------------|
| Safety evaluation                 | 7            | 0.87                         |
| Job satisfaction                  | 3            | 0.76                         |
| Management practices satisfaction | 10           | 0.88                         |
| Overall Reliability               | 20           | 0.91                         |

## 8. Research Findings

### 8.1 Profile of the Questionnaire Respondents

Part one of the questionnaire asked the 314 respondents about information that includes nationality, age, education, workplace, duration of service, salary, job title, and department. Results are displayed in tables 4 to 7.

Table 4. Sample distribution according to nationality, age category and educational level

| Nationality                 | Frequency | Percent |
|-----------------------------|-----------|---------|
| Saudi                       | 310       | 98.7 %  |
| Non-Saudi                   | 4         | 1.3 %   |
| Total                       | 314       | 100 %   |
| Age Category                | Frequency | Percent |
| Youth ( 22 to 34 years)     | 74        | 23.6 %  |
| Middle-Age (35 to 47 years) | 118       | 37.6 %  |
| Seniors (48 to 60 years)    | 122       | 38.9 %  |
| Total                       | 314       | 100 %   |
| Education level             | Frequency | Percent |
| High school or lower        | 9         | 2.9 %   |
| Diploma                     | 155       | 49.3 %  |
| Bachelor degree             | 114       | 36.3 %  |
| Master degree and above     | 36        | 11.5 %  |
| Total                       | 314       | 100 %   |

Table 4 shows that the vast majority of respondents are of Saudi nationals where the remaining small figure are non-Saudi. This distribution does not signify any indications, it is the fact that the vast majority of SAEI employees are of Saudi nationality. In the same table, the majority of respondents were from seniors category (38.9%) and 37.6% of the respondents were from the middle-age category, while 23.6% of the respondents were from the youth category. SAEI in the last decade employed fewer employees than previous decades which inflicted in the results of age category. When it comes to education, the sample distribution reveals that the holders of diploma degree had the highest percentage 49.3%, followed by those with bachelor degree 36.3%, followed by those with a master's degree or higher 11.5%. In reading these figures related to the educational level of employees, SAEI usually attracts diploma holders candidates with technical and vocational studies than other degree sand since 1962, SAEI started sending young Saudi high school graduates to the USA for English language training and to obtain A&P and Avionics diploma certification (SAEI, 2014). Table 5 presents the results of sample distribution of SAEI employees according to workplace and duration of service to the company.

Table 5. Sample distribution according to workplace and duration of service

| Workplace           | Frequency | Percent |
|---------------------|-----------|---------|
| Jeddah              | 275       | 87.6 %  |
| Riyadh              | 13        | 4.2 %   |
| Dammam              | 8         | 2.5 %   |
| Medina              | 8         | 2.5 %   |
| Other Cities        | 10        | 3.2 %   |
| Total               | 314       | 100     |
| Duration of Service | Frequency | Percent |
| 13 years or less    | 107       | 34 %    |
| 14 to 26 years      | 111       | 35.4 %  |
| 27 years or more    | 96        | 30.6 %  |
| Total               | 314       | 100 %   |

Table 5 shows the results of the sample distribution according to workplace indicates where 87.6% of the respondents were from Jeddah work station while small fractions of respondents were from other stations. It can be concluded that the majority of the respondents were working at Jeddah work station which may be understandable since it is considered as the main station with full responsibility of managing the engineering and maintenance of Saudia fleet (SAEI, 2014). In addition Table 5 displays the sample distribution according to duration of service where that the majority (35.4%) of the employees served between 14 to 26 years at SAEI, followed by those employees with 13 years or less of service (34%), and 30.6% of employees have 27 years or more of service at SAEI.

SAEI has two types of job grades; technical grades (from T1 to T7 grade) and salary grades (from grade 8 to grade 24). The job grade variable was computed into four levels; low grades level, medium grades level, high grades level and managers grade level. Shows of the job grades level are displayed in Table 6.

Table 6. Sample distribution according to job grade and salary range

| Job Grade level                   | Frequency | Percent |
|-----------------------------------|-----------|---------|
| Low grades                        | 72        | 22.9 %  |
| Medium grades                     | 59        | 18.8 %  |
| High grades                       | 147       | 46.8 %  |
| Manager grades                    | 36        | 11.5 %  |
| Total                             | 314       | 100%    |
| Salary Range in Saudi Riyals (SR) | Frequency | Percent |
| Less than SR 9000                 | 24        | 7.6 %   |
| SR 9000–15000                     | 89        | 28.3 %  |
| SR 15001–21000                    | 123       | 39.2 %  |
| More than SR 21000                | 78        | 24.8 %  |
| Total                             | 314       | 100 %   |

1 \$ US = 3.75 Saudi Riyals (SR).

In Table 6, the sample distribution according to job grade levels indicates that 46.8% of the respondents were from the high grades level, and 22.9% were from the low grades level. In addition, the respondents from the medium grades level were 18.8%, and the remaining 11.5% were from manager's grades level. Moreover, respondents were asked to determine their salary amount among four levels of salary. As shown below, the sample distribution according to salary range indicates that the salary of 39.2% of the respondents is between SR 15001–21000, and 28.3% of the respondents are between SR 9000–15000. In addition, 24.8% of the respondents' salary is more than SR 21000, while 7.6% is less than SR 9000.

Table 7. Sample distribution according to department

| Departments   | Frequency | Percent |
|---|-----------|---------|
| Shops   | 60        | 19.1 %  |
| Line  | 60        | 19.1 %  |
| Hangar  | 40        | 12.7 %  |
| Jet Propulsion Center (JPC)                                 | 36        | 11.5 %  |
| Planning  | 26        | 8.3 %   |
| Inspection  | 20        | 6.4 %   |
| Administration  | 19        | 6.1 %   |
| Engineering   | 14        | 4.5 %   |
| Material / Supply Chain                                     | 13        | 4.1 %   |
| Maintenance Control Center (MCC) / Aircraft On Ground (AOG) | 8         | 2.5 %   |
| Total Quality Assurance (TQA)                               | 7         | 2.2 %   |
| Others  | 6         | 1.9 %   |
| Training  | 5         | 1.6 %   |
| Total   | 314       | 100 %   |

In Table 7, the sample distribution according to department indicates that the respondents from shops and line have the highest percentage of 19.1%, followed by the respondents from hangar with 12.7%, followed by the respondents from JPC department with 11.5%. However, respondents from these four departments represent 62.4% of overall respondents, which is understandable since they are the major technical departments at SAEI.

### 8.2 Employees Evaluation of Safety Climate at SAEI

This section explores the employees' evaluation of safety climate at SAEI, which includes safety evaluation, identification of the workplace hazards, and defining the main work injury causes. Results are presented in the following three subsections (8.2.1, 8.2.2 and 8.2.3).

#### 8.2.1 Safety Evaluation

This part aims to evaluate the quality of safety by asking the respondents seven questions include different aspects such as the priority of safety, safety resources, assurance of employees health and well-being, availability of Personal Protective Equipment (PPE), the commitment of using the PPE while working, reporting incidents system, and availability of safety training programs. Results are depicted in Table 8.

Table 8. Employees evaluation of safety

| Items   | N            | R            | S            | O            | A            | Total        | Median | Mode | Average Mean | Standard Dev. |
|---|--------------|--------------|--------------|--------------|--------------|--------------|--------|------|--------------|---------------|
| Safety is a high priority for SAEI management                                   | 19<br>6.1%   | 57<br>18.2%  | 128<br>40.8% | 81<br>25.8%  | 29<br>9.2%   | 314          | 3      | 3    | 3.14         | 1.02          |
| There are enough resources (money/manpower) put into safety                     | 36<br>11.5%  | 90<br>28.7%  | 114<br>36.3% | 64<br>20.4%  | 10<br>3.2%   | 314          | 3      | 3    | 2.75         | 1.01          |
| Management seems committed to assuring my health and well-being                 | 82<br>26.1%  | 83<br>26.4%  | 89<br>28.3%  | 45<br>14.3%  | 15<br>4.8%   | 314          | 2      | 3    | 2.45         | 1.16          |
| Management provides all personal protective equipment that I need to do my work | 39<br>12.4%  | 89<br>28.3%  | 104<br>33.1% | 62<br>19.7%  | 20<br>6.4%   | 314          | 3      | 3    | 2.79         | 1.09          |
| I use personal protective equipment while working                               | 27<br>8.6%   | 44<br>14.0%  | 104<br>33.1% | 99<br>31.5%  | 40<br>12.7%  | 314          | 3      | 3    | 3.26         | 1.12          |
| Encouraged to report safety incidents   | 100<br>31.8% | 75<br>23.9%  | 85<br>27.1%  | 33<br>10.5%  | 21<br>6.7%   | 314          | 2      | 1    | 2.36         | 1.22          |
| Management provides safety training programs                                    | 74<br>23.6%  | 94<br>29.9%  | 84<br>26.8%  | 42<br>13.4%  | 20<br>6.4%   | 314          | 2      | 2    | 2.49         | 1.17          |
| Overall   | 377<br>17.1% | 532<br>24.2% | 708<br>32.2% | 426<br>19.4% | 155<br>7.1%  | 2198<br>100% | 3      | 3    | 2.75         | 0.84          |
| Overall without neutral responses   | 377<br>25.3% | 532<br>35.7% |              | 426<br>28.6% | 155<br>10.4% | 1490<br>100% | 2      | 2    | 2.66         | 1.01          |

N=Never, R=Rarely, S=Sometimes, O=Often, A=Always.

As shown in Table 8, the overall values of employees' evaluation regarding safety at SAEI statically indicate that the respondents have neutral evaluations with 95% of confidence. However, when respondents were asked to assess their evaluation about statement "Safety is a high priority for SAEI management", the result shows that SAEI management sometimes has an attention about priority of safety at workplace. In addition, when respondents were asked to offer their opinion about statement, "There are enough resources (money/manpower) put into safety," the result indicates that safety department sometimes has shortage in its resources. Moreover, the employees evaluation regarding statement "management seems committed to assuring my health and well-being" shows that management rarely committed to assure their health and well-being (median = 2). Also, when respondents were asked about statement "management provides all personal protective equipment that I need to do my work," result shows that SAEI management sometimes provides the required PPE or some of them. However, employees' perceptions regarding the statement "I use Personal Protective Equipment while working" indicate that sometimes the employees concerned about their safety and well-being by using the PPE. Furthermore, when respondents were asked to assess their evaluation about statement "encouraged to report safety incidents," the result shows the lowest evaluation values. Thus, it can be concluded that SAEI has an inefficient reporting incident system to encourage employees to report unsafe acts or conditions that may lead to an incident or an injury. Finally, employees' evaluation about statement "management provides safety training programs" shows that SAEI management rarely provides safety training programs for the employees.

### 8.2.2 Identification of Workplace Hazards

This part aims to know different types of hazards that may exist in each department of SAEI. Respondents were asked to identify hazards found in their area of work from a list of ten different hazards such as electrocution, radiation, chemicals, smoke, noise, carrying heavy loads, working in high or insecure places, working in confined or dark places, slippery floors or holes on the ground, and muscle strain. Therefore, the results of this part will be represented in two different points of view; hazard distribution according to hazards type and hazard distribution according to department.

#### Hazard Distribution According to Hazards Type



As shown in next Table (9), noise hazard comes at the first place of the most hazards that found at SAEI with percent of 15%, followed by the smoke hazard (bad air quality) with percent of 14%, while, the hazard of dealing with chemical products comes at third place with 13%.

Table 9. Hazard distribution according to hazard type

| Types of Hazards                       | Frequency | Percent |
|--|-----------|---------|
| Noise                                  | 233       | 15 %    |
| Breathing in smoke, fumes or dust      | 217       | 14 %    |
| Dealing with chemical products         | 196       | 13 %    |
| Carrying heavy loads                   | 145       | 10 %    |
| Muscle strain repeatedly               | 140       | 9 %     |
| Electrocution                          | 123       | 8 %     |
| Slippery floors or holes on the ground | 114       | 8 %     |
| Working in high or insecure places     | 104       | 7 %     |
| Radiation                              | 100       | 7 %     |
| Working in confined or dark places     | 85        | 6 %     |
| Other hazards                          | 48        | 3 %     |
| Total                                  | 1487      | 100 %   |

#### Hazard Distribution According to Department

In Table 10, the hazard distribution according to department indicates that hazards found at line maintenance department have the highest percentage (26.8%) of total hazards, followed by the hazards found at hangar maintenance with percent of 18.4%, followed by the hazards found at the shops with percent of 17.2%, and 12.4% of total hazards found at JPC department.

Table 10. Hazards distribution according to department

| ** Hazards         | Hazards* Department Cross Tabulation |      |      |      |     |     |     |     |     |     |     |     |     | Total |
|--------------------|--------------------------------------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
|                    | * Department                         |      |      |      |     |     |     |     |     |     |     |     |     |       |
|                    | 1                                    | 2    | 3    | 4    | 5   | 6   | 7   | 8   | 9   | 10  | 11  | 12  | 13  |       |
| Electrocution      | 40                                   | 18   | 24   | 10   | 5   | 10  | 2   | 2   | 3   | 1   | 3   | 2   | 3   | 123   |
| Radiation          | 17                                   | 22   | 29   | 4    | 6   | 9   | 4   | 2   | 2   | 0   | 0   | 3   | 2   | 100   |
| Chemicals          | 49                                   | 30   | 47   | 29   | 5   | 15  | 1   | 4   | 0   | 2   | 7   | 2   | 5   | 196   |
| Smoke / Dust       | 43                                   | 35   | 55   | 29   | 10  | 14  | 2   | 7   | 7   | 1   | 5   | 5   | 4   | 217   |
| Noise              | 38                                   | 37   | 59   | 29   | 13  | 18  | 4   | 12  | 5   | 2   | 7   | 4   | 5   | 233   |
| Carry Loads        | 25                                   | 28   | 43   | 21   | 5   | 7   | 1   | 3   | 1   | 0   | 4   | 3   | 4   | 145   |
| High / Insecure    | 7                                    | 24   | 35   | 12   | 1   | 8   | 1   | 4   | 3   | 0   | 2   | 3   | 4   | 104   |
| Confined / Dark    | 6                                    | 21   | 28   | 9    | 6   | 6   | 1   | 2   | 1   | 0   | 0   | 3   | 2   | 85    |
| Floor Slip / Holes | 11                                   | 22   | 29   | 18   | 7   | 9   | 1   | 4   | 4   | 1   | 2   | 2   | 4   | 114   |
| Muscle Strain      | 15                                   | 31   | 42   | 19   | 3   | 8   | 2   | 5   | 6   | 0   | 2   | 4   | 3   | 140   |
| Total              | 251                                  | 268  | 391  | 180  | 61  | 104 | 19  | 45  | 32  | 7   | 32  | 31  | 36  | 1457  |
| Percent            | 17.2                                 | 18.4 | 26.8 | 12.4 | 4.2 | 7.1 | 1.3 | 3.1 | 2.2 | 0.5 | 2.2 | 2.1 | 2.5 | %     |

Notes. \* Department 1 = Shops, 2 = Hangar, 3 = Line, 4 = JPC, 5 = Planning, 6 = Inspection, 7 = TQA, 8 = Engineering, 9 = Admin, 10 = Training, 11 = Material / Supply Chain, 12 = MCC / AOG, 13 = Other.

\*\* Other Hazards not included in this table (Numeric data only).

As a result, hazards distribution according to department (Table 10) can be summarized as the followings:

- 1) Shops: the most hazards found were chemicals, smoke, and electrocution respectively.
- 2) Hangar: the most hazards found were noise, smoke, and muscle strain respectively.
- 3) Line: the most hazards found were noise, smoke, and chemicals respectively.
- 4) Jet Propulsion Center (JPC): the most hazards found were noise, smoke, and chemicals evenly.
- 5) Planning: the most hazards found were noise, smoke, and slippery floors respectively.
- 6) Inspection: the most hazards found were noise, chemicals, and smoke respectively.
- 7) Total Quality Assurance: the most hazards found were radiation and noise evenly.

- 8) Engineering: the most hazards found were noise, smoke, and muscle strain respectively.
- 9) Admin: the most hazards found were smoke, muscle strain, and noise respectively.
- 10) Training: the most hazards found were noise and chemicals evenly.
- 11) Material / Supply Chain: the most hazards found were noise and chemicals evenly.
- 12) Maintenance Control Center (MCC) / Aircraft On Ground (AOG): noise was the most hazards found at MCC/AOG department.

### 8.2.3 Employees Perceptions towards Injury Causes at SAEI

This part aims to investigate the main reasons for work injuries at SAEI. The respondents were asked to choose the main reason (only one reason) from four alternatives. The first alternative is worker personal reasons, such as; weakness in one of the senses, the psychological state of the employee and body weight. The second alternative is worker behavioral reasons, such as; low experience, the negligence of the employee to safety regulations and the improper use of the machines or equipment. The third alternative is reasons related to physical environment, such as; defective tools or equipment, high temperature, inadequate cleaning or lighting and high noise. The fourth alternative is management reasons, such as; deficiency of safety training programs, ignore the workers' complaints and suggestions and productivity before safety. Results are depicted in Table 11.

Table 11. Employees perceptions towards injury causes

| Injury Causes                           | Frequency | Percent |
|---|-----------|---------|
| Management reasons                      | 226       | 35 %    |
| Reasons related to physical environment | 196       | 30.4 %  |
| Worker behavioral reasons               | 181       | 28.1 %  |
| Worker personal reasons                 | 42        | 6.5 %   |
| Total                                   | 645       | 100 %   |

As shown in Table 11, the employees perceptions towards injury causes at SAEI indicates that the management reasons comes in the first place with the highest percentage (35%), followed by reasons related to physical environment with 30.4%, while the behavioral reasons represented 28.1%, and the personal reasons represented 6.5% of the respondents. Hence, it can be concluded that management commitment to safety is below the employees' expectations and become the most reason for work injuries at SAEI. However, this may be understandable since the management commitment to safety is a major factor affecting the success of an organization safety (Zohar, 1980).

### 8.3 Employees Satisfaction about Their Jobs at SAEI

This part aims to measure employees' satisfaction about their jobs at SAEI by asking the respondents three questions related to their current role. Results are displayed in Table 12.

Table 12. Employees satisfaction about their jobs at SAEI

| Determine your satisfaction degree about followings | SU          | U            | N            | S            | SS          | Total       | Median | Mode | Mean | Standard Dev. |
|---|-------------|--------------|--------------|--------------|-------------|-------------|--------|------|------|---------------|
| Working in your current department                  | 30<br>9.6%  | 48<br>15.3%  | 82<br>26.1%  | 130<br>41.4% | 24<br>7.6%  | 314         | 3      | 4    | 3.22 | 1.10          |
| Your job is fit with your skills and interests      | 29<br>9.2%  | 47<br>15%    | 69<br>22%    | 121<br>38.5% | 48<br>15.3% | 314         | 4      | 4    | 3.36 | 1.18          |
| Workload you handled                                | 30<br>9.6%  | 70<br>22.3%  | 84<br>26.8%  | 112<br>35.7% | 18<br>5.7%  | 314         | 3      | 4    | 3.06 | 1.09          |
| Overall   | 89<br>9.5%  | 165<br>17.5% | 235<br>24.9% | 363<br>38.5% | 90<br>9.6%  | 942<br>100% | 3      | 4    | 3.21 | 0.93          |
| Overall without neutral responses                   | 89<br>12.6% | 165<br>23.4% |              | 363<br>51.3% | 90<br>12.7% | 707<br>100% | 4      | 4    | 3.36 | 1.36          |

SU=Strongly Unsatisfied, U=Satisfied, N=Neutral, S=Satisfied, SS=Strongly Satisfied.

From table 12, the overall values of employees evaluation regarding their jobs at SAEI statically indicate that the respondents have neutral evaluations with 95% of confidence (median = 3). Also, when respondents were asked

to assess their evaluation about statement “working in your current department”, the result indicates that employees have neutral evaluation about their departments. Moreover, when respondents were asked about statement “your job is fit with your skills and interests,” the result shows that most of the employees are satisfied with that. Finally, the result of employees’ satisfaction regarding workload shows neutral evaluations regarding the workload at SAEI.

#### 8.4 Employees Satisfaction about SAEI Management Practices

This part aims to assess employees’ satisfaction about SAEI management practices. Results are shown in the next table (Table 13).

Table 13. Employees satisfaction about SAEI management practices

| Determine your satisfaction degree about followings | SU            | U            | N            | S            | SS         | Total        | Median | Mode | Mean | Standard Dev. |
|---|---------------|--------------|--------------|--------------|------------|--------------|--------|------|------|---------------|
| Opportunities for career advancement                | 125<br>39.8%  | 92<br>29.3%  | 60<br>19.1%  | 32<br>10.2%  | 5<br>1.6%  | 314          | 2      | 1    | 2.04 | 1.07          |
| Work-related training and development courses       | 95<br>30.3%   | 98<br>31.2%  | 62<br>19.7%  | 53<br>16.9%  | 6<br>1.9%  | 314          | 2      | 2    | 2.29 | 1.13          |
| Performance appraisal processes                     | 89<br>28.3%   | 95<br>30.3%  | 76<br>24.2%  | 48<br>15.3%  | 6<br>1.9%  | 314          | 2      | 2    | 2.32 | 1.10          |
| Promotion procedures                                | 148<br>47.1%  | 73<br>23.2%  | 54<br>17.2%  | 36<br>11.5%  | 3<br>1.0%  | 314          | 2      | 1    | 1.96 | 1.09          |
| Recognition and rewards                             | 168<br>53.5%  | 83<br>26.4%  | 38<br>12.1%  | 20<br>6.4%   | 5<br>1.6%  | 314          | 1      | 1    | 1.76 | 1.00          |
| Recreational activities                             | 190<br>60.5%  | 72<br>22.9%  | 43<br>13.7%  | 7<br>2.2%    | 2<br>0.6%  | 314          | 1      | 1    | 1.60 | 0.85          |
| Creativity and innovation at your department        | 138<br>43.9%  | 97<br>30.9%  | 50<br>15.9%  | 27<br>8.6%   | 2<br>0.6%  | 314          | 2      | 1    | 1.91 | 1.00          |
| Cooperation between departments                     | 77<br>24.5%   | 87<br>27.7%  | 101<br>32.2% | 44<br>14.0%  | 5<br>1.6%  | 314          | 2      | 3    | 2.40 | 1.05          |
| Staff participation in decision-making              | 124<br>39.5%  | 93<br>29.6%  | 70<br>22.3%  | 23<br>7.3%   | 4<br>1.3%  | 314          | 2      | 1    | 2.01 | 1.01          |
| Top management communication with employees         | 166<br>52.9%  | 88<br>28.0%  | 38<br>12.1%  | 19<br>6.1%   | 3<br>1.0%  | 314          | 1      | 1    | 1.74 | 0.96          |
| Overall   | 1320<br>42.0% | 878<br>28.0% | 592<br>18.9% | 309<br>9.8%  | 41<br>1.3% | 3140<br>100% | 2      | 1    | 2.00 | 0.71          |
| Overall without neutral responses                   | 1320<br>51.8% | 878<br>34.5% |              | 309<br>12.1% | 41<br>1.6% | 2548<br>100% | 1      | 1    | 1.64 | 0.80          |

SU=Strongly Unsatisfied, U=Satisfied, N=Neutral, S=Satisfied, SS=Strongly Satisfied.

Table 13 shows that the overall values statically indicate that employees are unsatisfied regarding SAEI management practices with 95% of confidence. However, it can be concluded that employees are unsatisfied with most management practices such as career advancement opportunities, training and development courses, appraisals and promotion procedures, innovation and creativity, departments cooperation and participation in decision-making (median = 2). While, they are strongly unsatisfied with practices regarding recognition and rewards system, recreational activities, and top management communication (median = 1).

#### 8.5 Quality of Work Environment at SAEI

This section concerns about the overall evaluation of quality of work environment (QWE). It is determined by calculating all evaluation values of safety, job satisfaction, and management practices satisfaction. Thus, employee’s perceptions towards these three factors will construct the overall values of QWE at SAEI. Results of this calculation are presented in Table 14.

Table 14. Quality of work environment at SAEI

| Quality of Work Environment       | SU          | U            | N           | S           | SS        | Total       | Median | Mode | Mean | Standard Dev. |
|-----------------------------------|-------------|--------------|-------------|-------------|-----------|-------------|--------|------|------|---------------|
| Overall                           | 52<br>16.6% | 139<br>44.3% | 98<br>31.2% | 22<br>7.0%  | 3<br>1.0% | 314<br>100% | 2      | 2    | 2.32 | 0.86          |
| Overall without neutral responses | 52<br>24.1% | 139<br>64.4% |             | 22<br>10.2% | 3<br>1.3% | 216<br>100% | 2      | 2    | 2.00 | 0.88          |

SU=Strongly Unsatisfied, U=Satisfied, N=Neutral, S=Satisfied, SS=Strongly Satisfied.

As seen above, the overall values statically indicate that SAEI employees are unsatisfied about the quality of work environment with 95% of confidence. In details, more than 60% of the respondents (16.6% + 44.3%) were between unsatisfied and strongly unsatisfied regarding the QWE. In addition, neutral evaluations disregarded to compare the percent of unsatisfied employees to satisfied employees. The result shows that the percent of unsatisfied and strongly unsatisfied employees reached 88.5% while 11.5% were the satisfied and strongly satisfied employees. These results support the findings of Kadasah (2015) in studying OHSAS 18001 implementation in Saudi Arabia where it was found that the occupational health and safety standings of the organizations in the country was not promising.

8.6 Testing Significant Differences

This part aims to test if there were significant differences between employees' evaluation regarding quality of work environment according to demographic variables, including nationality, age, education, workplace, duration of service, job grade, salary, job title, and department. ANOVA analysis of variances was used to test for variations related to age, education, workplace, duration of service, job grade, salary, job title, and department. As a result, there were significant variations in the employees' evaluation of QWE according to their job grades, job title, and their departments (Other demographic variable did not show significant differences).

8.6.1 ANOVA Test According to Job Grade

The job grade variable was computed into four levels; include low grades, medium grades, high grades, and manager grades. The results in Table 15, reveal that there were significant variations in the employees evaluation of QWE according to their job grades (p-value = 0.000 < 0.05).

Table 15. ANOVA test according to job grade

| ANOVA          |                |     |             |       |      |
|----------------|----------------|-----|-------------|-------|------|
| QWE            |                |     |             |       |      |
|                | Sum of Squares | Df  | Mean Square | F     | Sig. |
| Between Groups | 37.771         | 19  | 1.988       | 2.982 | .000 |
| Within Groups  | 196.015        | 294 | .667        |       |      |
| Total          | 233.787        | 313 |             |       |      |

\* The mean difference is significant at the 0.05 level.

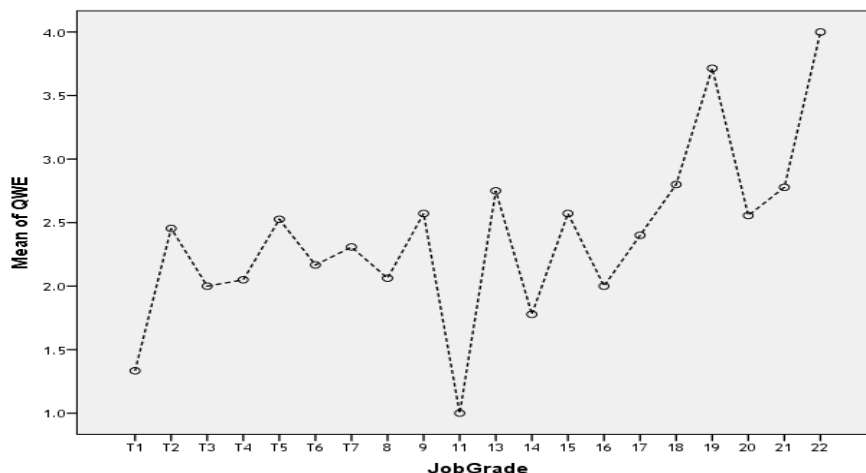


Figure 1. Means plots according to job grade

From Table 15, it was noted that there were statistically significant differences regarding the employees' evaluation of QWE according to their job grade level between the manager grades employees, and the employees from the other three levels of job grade at SAEI. Furthermore Figure 1 shows that the higher the employee grade, the more satisfied with QWE at SAEI.

8.6.2 ANOVA Test According to Job Title

Table 16 presented ANOVA test according to job title. It reveals that there was a significant variation in employees evaluation of QWE according to their job title (p-value = 0.002 < 0.05).

Table 16. ANOVA test according to job title

|                | ANOVA          |     |             |       |      |
|----------------|----------------|-----|-------------|-------|------|
|                | QWE            |     |             |       |      |
|                | Sum of Squares | df  | Mean Square | F     | Sig. |
| Between Groups | 21.825         | 11  | 1.984       | 2.827 | .002 |
| Within Groups  | 211.962        | 302 | .702        |       |      |
| Total          | 233.787        | 313 |             |       |      |

\* The mean difference is significant at the 0.05 level.

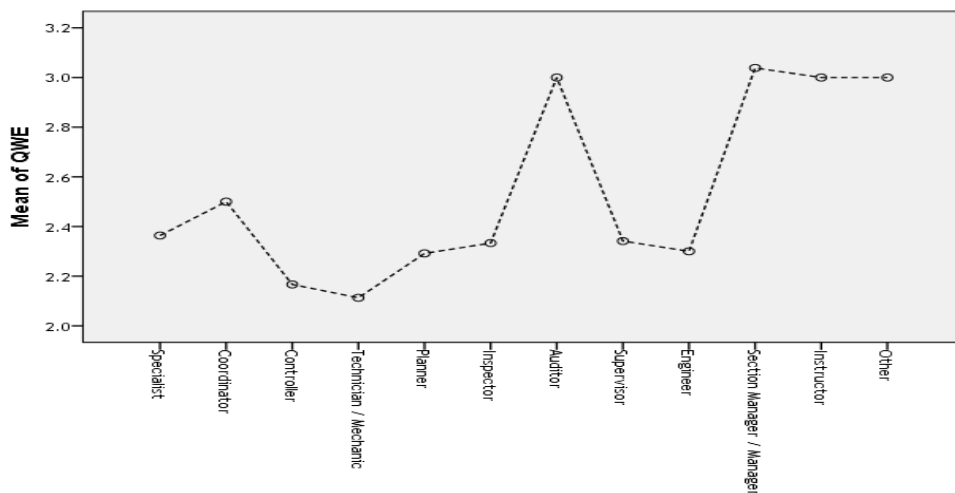


Figure 2. Means plots according to job title

Table 16 shows that there were statistically significant differences regarding the employees' evaluation of QWE according to their job title, while Figure 2 reveals that managers, instructors, and auditors were more satisfied with QWE at SAEI.

8.6.3 ANOVA Test According to Department

The results in Table 17 reveals that there was a significant variation in employees evaluation of QWE according to their departments (p-value = 0.018 < 0.05).

Table 17. ANOVA test according to department

|                | ANOVA          |     |             |       |      |
|----------------|----------------|-----|-------------|-------|------|
|                | QWE            |     |             |       |      |
|                | Sum of Squares | df  | Mean Square | F     | Sig. |
| Between Groups | 17.934         | 12  | 1.495       | 2.084 | .018 |
| Within Groups  | 215.852        | 301 | .717        |       |      |
| Total          | 233.787        | 313 |             |       |      |

\* The mean difference is significant at the 0.05 level.

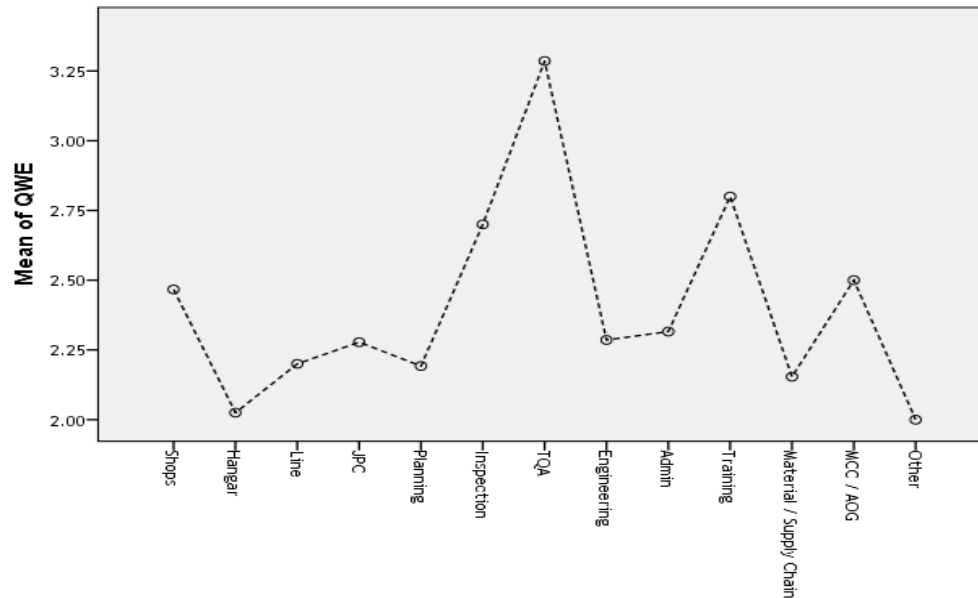


Figure 3. Means plots according to department

From Figure 3, Total Quality Assurance (TQA) employees were the most satisfied employees with QWE at SAEI (Average mean = 3.35). While Hangar employees were the most unsatisfied employees with QWE at SAEI (Average mean = 2.36). These results may be understandable since the big differences in the nature of work between working in the field or in a quite office.

### 9. Recommendations

Based on the research findings, the following recommendations are suggested:

- 1) Management commitment to safety must be result in an observable activity by SAEI management; they must support safety department with all resources and authorities they need, otherwise it will be as a useless department with no influence to others.
- 2) SAEI top management should have a standard operating policy which establishes a joint management/workers safety committee. This committee should meet on a regularly scheduled basis and have appropriate authority to review health and safety issues in the workplace and to mandate changes as necessary.
- 3) Management should enhance the hazard awareness and reinforce the reporting of hazards or unsafe acts in the maintenance environment which helps employees achieve an increased level of job safety which, in turn, increases performance and reduces the propensity for job-related illness and injury.
- 4) For critical jobs, written job responsibilities to be assigned to supervisors or managers which include maintaining a safe work environment and the mandatory use of safety equipment. Therefore, workers must maintain the protective equipment assigned to them, and they must use protective equipment properly when the maintenance action warrants.
- 5) Safety department with collaboration of the training department should develop and provide regularly the employees with affective safety training programs to instill the attitude of working safe and to provide employees with the best procedure for safety.
- 6) Hearing protection tools and technologies are highly required to prevent noise induced hearing loss among SAEI employees and to assure adequate communications for both safety and production, workers generally prefer to wear earplugs and earmuffs depend on the noise level. Both should be available for use in the workplace.
- 7) The quality of indoor air inside offices and other workplaces is important not only for workers comfort but also for their health. Poor Indoor Air Quality (IAQ) has been tied to symptoms like headaches, fatigue, trouble concentrating, and irritation of the eyes, nose, throat and lungs. Therefore, SAEI management should

prevent and fix IAQ problems by assuring the right ventilation, providing proper smoking area, and providing personal protective equipment such as air mask and eye goggles.

- 8) Chemical products may be the most important environmental issue affecting safety and health of the maintenance workers. Basically, all workers have the right to know the chemical name and properties of the hazardous substances they are working with and how to handle them safely. Therefore, supervisors must provide workers with necessary information include Material Safety Data Sheet (MSDS) overview, equipment awareness and correct procedures to use when handling chemicals.
- 9) Human Resource Management (HRM) policies need to be adjusted in order to make the employees more motivated. Improved employee motivation has several advantages, such as better service quality and improved competitive advantage. To have motivated employees, the HRM practices must fit the needs of the employees. Several aspects causing employee satisfaction include: career advancement opportunities, recognition and rewards for achievement, better performance appraisal processes, and support creativity and innovation at work.
- 10) SAEI managers/section managers must be more concerned to regularly schedule the employees for work-related training and development courses which they need to improve their skills and knowledge. Workers are the most valuable resource. If maintenance is to continue to improve, these workers must have the best training programs that can be provided.
- 11) For recreation activities, it is recommended that SAEI organizes sport events yearly including different recreational activities in which SAEI's teams compete with other teams from different firms. Thus, increase management-staff relations and enhance the loyalty of SAEI employees.
- 12) Top management communication with employees should be enhanced by establishing formal and non-formal open meetings and by encouraging the employees' participation in decision-making.

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