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A Study on Total Quality Management and Safety measures in Maraica Industries at Palavakkam, Chennai

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ABSTRACT:

Total Quality Management (TQM) and safety measures are critical components in fostering a culture of excellence within organizations, ensuring both operational efficiency and the well-being of employees. TQM focuses on continuous improvement, customer satisfaction, and the involvement of all employees in the quality process, with an emphasis on processes and systems. The integration of safety measures within TQM ensures that workplace safety is maintained as a core organizational value, reducing accidents and enhancing productivity. By implementing robust safety protocols alongside TQM practices, organizations can create a safer work environment, prevent potential hazards, and optimize performance. This abstract explores the relationship bet ween TQM principles and safety measures, highlighting their synergistic effects in achieving long-term organizational success. Through a comprehensive approach that combines quality enhancement and safety management, businesses can improve both their product offerings and work culture, leading to better outcomes for employees and stakeholders alike.

Keywords :Quality management system (QMS),Quality control, Customer Satisfaction, Continuous improvement, Employee involvement,PPE (Personal Protective Equipment), Health and safety training.

INTRODUCTION

Human Resource Management (HRM)

Human Resource Management (HRM) is a strategic and comprehensive approach to managing people within an organization. It focuses on the effective acquisition, development, motivation, and retention of employees to achieve both individual and organizational goals. HRM encompasses a wide range of functions, including recruitment and selection, training and development, performance management, compensation and benefits, labor relations, and compliance with employment laws. The role of HRM has evolved significantly over time—from administrative and transactional tasks to a more strategic partner in organizational success. In today's dynamic business environment, HR professionals play a vital role in shaping organizational culture, driving employee engagement, and aligning human capital with business strategies.Ultimately, Human Resource Management seeks to create a positive work environment that fosters productivity, growth, and mutual respect between the employer and employees, contributing to the overall success and sustainability of the organization.

Total Quality Management (TQM)

Total Quality Management (TQM) is a comprehensive and organization-wide approach aimed at improving the quality of products, services, and processes through continuous efforts. It is based on the premise that every individual within the organization, regardless of their position, is responsible for contributing to quality improvements. At its core, TQM emphasizes customer satisfaction, ongoing employee involvement, and a structured system of process management.TQM practices focus on quality at every stage of the production process, from conception through to delivery. The philosophy behind TQM is that quality should not just be a final inspection but should be embedded within every aspect of the operation. It involves key principles such as customer focus, continuous improvement, employee involvement, process-centered approach, and data-driven decision-making. Through these principles, TQM helps organizations optimize their operations by reducing inefficiencies, eliminating waste, and improving product and service quality.Over time, TQM has been integrated into various industries, from manufacturing to service sectors, helping organizations improve operational efficiency and build stronger customer relationships. In sectors like healthcare, automotive, and manufacturing, TQM's ability to drive systemic improvements has led to significant gains in both quality and cost-effectiveness. However, achieving these results requires leadership commitment, a shared vision, and a strong organizational culture dedicated to excellence.

Safety Measures in the Workplace

While TQM focuses on quality, safety measures ensure that employees work in an environment where their physical and mental well-being is protected. Workplace safety is an essential component of any successful business. By reducing risks, preventing accidents, and minimizing exposure to hazards, safety measures directly contribute to the overall success of an organization. Companies that prioritize safety not only comply with legal and regulatory requirements but also enhance employee satisfaction, morale, and productivity.Safety management systems vary by industry, but they generally include practices such as risk assessments, safety audits, training programs, emergency protocols, and the implementation of safety standards and regulations. For instance, manufacturing plants may have strict guidelines on the handling of dangerous machinery or chemicals, while office environments may focus on ergonomics and fire safety.

In today's highly competitive business environment, organizations are increasingly recognizing the importance of Total Quality Management (TQM) and safety measures as integral elements of their operations. TQM is a comprehensive management approach that aims to continuously improve processes, products, and services by focusing on customer satisfaction, employee involvement, and systematic quality control. Its core philosophy emphasizes that every employee, regardless of role, plays a part in ensuring quality throughout the organization. By fostering a culture of continuous improvement, TQM seeks to enhance efficiency, reduce waste, and create a sustainable competitive advantage. In parallel, safety measures are fundamental in maintaining a healthy and secure workplace. Ensuring the safety and well-being of employees is not only a moral obligation but also a legal requirement that significantly impacts organizational performance. Safe working environments lead to fewer accidents, lower healthcare costs, and improved morale among employees. Furthermore, integrating safety into organizational practices enhances productivity by preventing disruptions caused by injuries or unsafe conditions.

When TQM and safety measures are combined, they create a holistic approach to organizational excellence. TQM provides the framework for ongoing improvement, while safety protocols ensure that operations are conducted in an environment that minimizes risks. This synergy helps organizations achieve not only high-quality outcomes but also a secure and sustainable workplace. As businesses strive for greater efficiency and customer satisfaction, the integration of TQM with safety measures becomes a key strategy for long-term success and organizational resilience.

OBJECTIVES

PRIMARY OBJECTIVE:

A study on Total Quality Management and Safety measures in Maraica Industries at Palavakkam, Chennai.

SECONDARY OBJECTIVES:

- To analyze the impact of TQM principles on organizational performance.
- To evaluate the effectiveness of different quality management tools and techniques.
- To conduct a risk assessment to identify potential hazards and safety risks.
- To establish and implement a safety management system that meets regulatory requirements.
- To investigate the relationship between quality management and safety performance.

RESEARCH METHODOLOGY

Research methodology refers to the systematic and scientific approach employed to collect, analyze, and interpret data for the purpose of answering research questions or testing hypotheses. There are several types of research methodology that researchers may use, depending on the nature of the research question, the available resources, and the goals of the study. The type of research used is descriptive research. Some common types of research methodology include quantitative research, Qualitative Research Methodology, mixed-method research, experimental research, and case study research. The Primary and Secondary data collection method was used in the project. First time collected data are referred to as primary data. In this research the primary data was collected by means of a Structured Questionnaire. The questionnaire consisted of several questions in printed form. It had both openend closed end questions in it.

RESEARCH DESIGN

Research design is a blueprint of a scientific study. It includes research methodologies, tools, and techniques to conduct the research. It helps to identify and address the problem that may rise during the process of research and analysis.

Sources of Data

The sources of data can be classified into two types:

A) Primary data

- Primary data means first-hand information collected by an investigator.
- It is collected for the first time.

• It is original and more reliable.

B) Secondary data

- Secondary data refers to second-hand information.
- It is not originally collected and rather obtained from already published or unpublished sources

SAMPLING TECHNIQUES

SAMPLE DESIGN

Sample Size

This refers to the number of items to be selected from the universe to constitute a sample.

105 samples were collected for the study. The Sampling method used was simple random sampling.

Sampling Unit

Sampling unit may be a geographical one such as state, district, village, etc., or a construction unit such as house, flat, etc., or it may be a social unit such as family, chub, school, etc., or it may be an individual. The sampling unit is within employee of MaraicaIndustries.

Questionnaire Design

A questionnaire consists of several questions printed or typed in a definite order on a form or set of forms. The respondents must answer the questions on their own. Questionnaire should be comparatively short and simple i.e. the size of the questionnaire should be kept to the minimum. There are some questions based on 5-point scale (starting from strongly agree till strongly disagree), multiple choice (alternative answers listed) or open-ended. The later types of questions are often difficult to analyze and hence should be avoided in a questionnaire to the extent possible.

TOOLS

STATISTICAL TOOLS

The data collected from the consumers during the survey are analyzed using various tools. Some of the statistical tools applied in the study are

- Karl Pearson's correlation
- Regression
- Anova single factor

KARL PEARSON'S CORRELATION

Karl Pearson's Coefficient of Correlation is a mathematical approach in which the numerical expression is used to estimate or determine the range or magnitude and the direction of the relationship between two linearly related variables. Karl Pearson's Coefficient is a quantitative method that is often used in statistics. It is also known as the Pearson's Coefficient of Correlation, and it is a widely accepted and widely used method. To calculate the measurement of the relationship between two variables Karl Pearson's Coefficient of Correlation formula is used.

REGRESSION

Regression analysis is a statistical methodology that explores the relationship between a dependent variable and one or more independent variables. The letter "Y" generally denotes the dependent variable, and the independent variable is an "X."

In simpler terms, you can think of regression to predict a future outcome based on what has happened in similar scenarios (i.e., based on our existing data sets). We can use this mathematical model to predict the outcome (the dependent variable) based on the input or changes in the other variables (the independent variables). In a linear regression model, you would have a continuous outcome and create a line equation to predict future outcome values. In a logistic regression model, your outcome is a fixed categorical event (e.g., yes/no or pass/fail), and you predict the probability your outcome will be in a certain category.

Y = a + bX, Where, X is the explanatory variable, Y is the dependent variable.

SINGLE FACTOR ANOVA:

ANOVA determines whether the groups created by the levels of the independent variable are statistically different by calculating whether the means of the treatment levels are different from the overall mean of the dependent variable. The one-way analysis of variance (ANOVA) is used to determine whether there are any statistically significant differences between the means of three or more independent (unrelated) groups. This guide will provide a brief introduction to the one-way ANOVA, including the assumptions of the test and when you should use this test. If you are familiar with the one-way ANOVA but would like to carry out a one-way ANOVA analysis, go to our guide: One-way ANOVA in SPSS Statistics. Use a one-way ANOVA when you have collected data about one categorical independent variable and one quantitative dependent variable.

REVIEW OF LITERATURE

- Lassaad Lakhal (2017), "There is no consensus among the research community about the relationship between ISO 9000 certification and total quality management (TQM). Some researchers suggest that ISO 9000 certification be implemented first to create a favorable environment for TQM implementation next, while others believe TQM provides a good starting point for ISO 9000 certification. The effect of each of these quality management practices on organizational performance is still debated. This paper developed a conceptual model to study the relationships between ISO 9000 certification, TQM practices, and organizational performance. The model was tested with data collected from 176 certified firms in various industrial sectors in Tunisia. Data analysis indicated considerable support for the conceptual model. The results indicated that, in the case of Tunisian firms, implementing ISO 9000 first before embarking on TQM leads to better organizational performance, although both ISO 9000 certification and TQM practices directly affect organizational performance."
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- Mohd Said, Nur Shafini and Mohamad Yusoff, Nur Ayuni and Omar Ali, Siti Rapidah and Abdul Manaf, Suhaily Maizan and Adenan, Nur Dalila (2020), "Lately, issues of incidents in workplace are increasing and this situation obviously brings bad impact to the management and also the workers in manufacturing industries. This quantitative study identified the factors that influence the workplace safety among the workers. The researcher has selected workers from production department as the population for this study. To complete this study, the researcher has developed a set of questionnaire as the research instrument for collecting the data. The questionnaire consisted of two parts; Part A and Part B. Part A is the demographic factors while part B is the variables involve in this research. The variables were employee involvement, management commitment, workplace environment and workplace safety. The target population was 534 who are workers from production department only. The sampling method was a stratified random sampling based on the table of Krejci and Morgan and the sample size was 217. The findings were assessed by using the Statistical Package for the Social Sciences (SPSS) version 23. SPSS then were analyzed the instrument throughout reliability analysis and correlation analysis. The study revealed that three independent variables contributed in influencing the workplace safety among the workers at Malaysian manufacturing sector. In addition, this study provides the management and workers with a few suggestions and opinions to reduce or eliminate the rate of workplace incidents."
- Reingle Gonzalez, J.M., Jetelina, K.K. and Jennings, W.G. (2016), "The purpose of this paper is to examine the impact of school safety measures, including SROs and safety personnel, on school-related delinquency and perceived safety. The results of this exhaustive search revealed 32 unique study samples that met the inclusion criteria. Results from the studies suggest that implementation of more security measures may not be an effective policy. More safety measures often result in a decline of student-perceived safety. Study limitations and directions for future research are also discussed."
- Sordan, J.E., Oprime, P.C., Pimenta, M.L., Chiabert, P. and Lombardi, F. (2020), "The purpose of this paper is to develop a bibliometric study about Lean Six
- Sigma (LSS) in the manufacturing process and to conduct an analysis of sources of publication, authorship, citations and other bibliometric indicators. This paper also identifies the research agenda for future research related to the LSS approach in manufacturing processes."
- Souza, F.F.d., Corsi, A., Pagani, R.N., Balbinotti, G. and Kovaleski, J.L. (2022), "The purpose of this article is to explore the new concept of TQM 4.0 as a way of adapting quality management (QM) in Industry 4.0 (I4.0), guiding industries to this new phase, which has generated adaptations in numerous areas, one of which is QM and human resources."
- Sreedharan V., R., Sunder M., V. and R., R. (2018), "The Content analysis revealed various research implications and directions for the future. The number of studies in the literature regarding Critical success factors assessment is found to be far from substantial while compared to Continuous improvement implementation. Assessment methodologies developed have been ranging from qualitative to quantitative models. Key gaps were identified and directions for Critical success factors assessment are proposed which requires further validation".

- TSOU, Yu-Hong & HUANG, Yung-Fu (2021), "This article systematically reviews the adoption of total quality management (TQM) implementation and corporate social responsibility (CSR) initiatives on firm performance. A total of 233 published documents from 1996 to 2020 in international journals have been collected and listed on the SCOPUS database. It aims to fill the existing literature gap regarding TQM and CSR practices and point out a future research agenda."
- Valmohammadi, C. (2011), "The purpose of this study is to provide reliable and valid constructs of total quality management (TQM) and a measurement instrument in the context of Iranian manufacturing small to medium- sized enterprises (SMEs) and to examine the effects of these seven TQM criteria, namely: leadership, process management, supplier, customer focus, employee management, communication and quality information system (QIS) and tools and techniques on the organizational performance of the Iranian manufacturing SMEs."
- Zink, K.J. (2007), "The purpose of this paper is to analyze the development of total quality management (TQM) from the very beginning to the present and to give a proposal for a redefinition for the future."

ORGANIZATION CURRENTLY IMPLEMENTING TQM PRINCIPLES

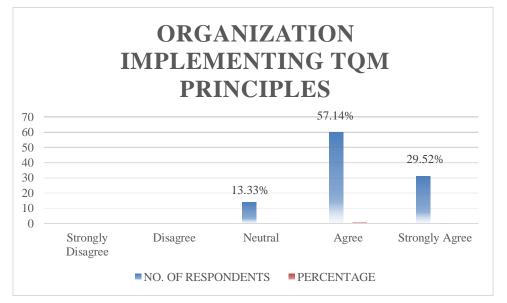
| TABLE 1.1 | | | | | | |
|-------------------|--------------------|------------|--|--|--|--|
| FACTORS | NO. OF RESPONDENTS | PERCENTAGE | | | | |
| Strongly Disagree | 0 | 0 % | | | | |
| Disagree | 0 | 0 % | | | | |
| Neutral | 14 | 13.33 % | | | | |
| Agree | 60 | 57.14 % | | | | |
| Strongly Agree | 31 | 29.52 % | | | | |
| TOTAL | 105 | 100 % | | | | |

INTERPRETATION

From the above table about the organization currently implementing TQM principles it is found that the respondents of Neutral are 13.33 %, the respondents of Agree are 57.14 %, the respondents of Strongly agree are 29.52 %.

INFERENCE

CHART 1.1



The study found that the respondents of Agree are 57.14 %.

PERFORMANCE METRICS TO MEASURE THE EFFECTIVENESS OF TQM

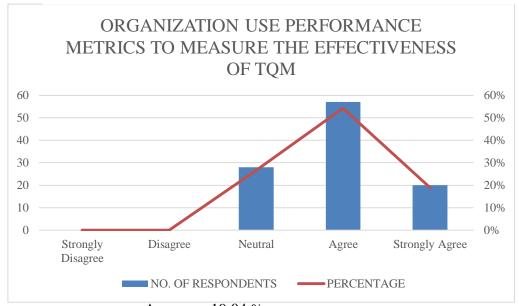
TABLE 1.2

| FACTOR | NO. OF RESPONDENTS | PERCENTAGE |
|-------------------|--------------------|------------|
| Strongly Disagree | 0 | 0 % |
| Disagree | 0 | 0 % |
| Neutral | 28 | 26.66 % |
| Agree | 57 | 54.28 % |
| Strongly Agree | 20 | 19.04 % |
| TOTAL | 105 | 100 % |

INTERPRETATION

From above these table about performance metrics to measure the effective of TQM, it is found that the respondents of Neutral are 26.66 %, the respondents of

CHART 1.2



Agree are 54.28 %, the respondents of Strongly Agree are 19.04 %.

INFERENCE

It is found that the respondents of Agree are 54.20 %.

IMPLEMENTING TQM PRINCIPLES HAS POSITIVELY IMPACTED YOUR ORGANIZATION PERFORMANCE

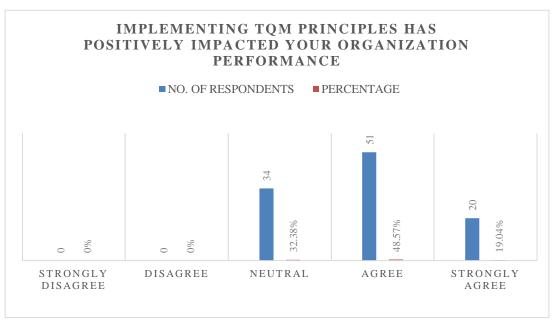
| TABLE 1.3 | | | | | | |
|-------------------|--------------------|------------|--|--|--|--|
| FACTOR | NO. OF RESPONDENTS | PERCENTAGE | | | | |
| Strongly Disagree | 0 | 0 % | | | | |
| Disagree | 0 | 0 % | | | | |
| Neutral | 34 | 32.38 % | | | | |
| Agree | 51 | 48.57 % | | | | |
| Strongly Agree | 20 | 19.04 % | | | | |
| TOTAL | 105 | 100 % | | | | |

INTERPRETATION

From above these table about implementing TQM principles has positively impacted your organization performance it is found that the respondents of Neutral are 32.38 %, the respondents of Agree are 48.57 %, the respondents of Strongly Agree are 19.04 %.

INFERENCE





It is found that the respondents of Agree are 48.57 %.

AILURE MODE AND EFFECT ANALYSIS (FMEA) IS EFFECTIVE IN IDENTIFYING & MITIGATING POTENTIAL QUALITY RISK

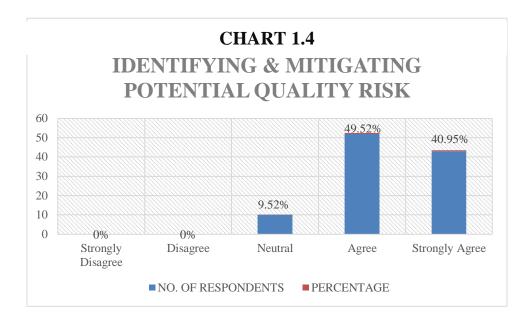
TABLE 1.4

| FACTOR | NO. OF RESPONDENTS | PERCENTAGE |
|-------------------|--------------------|------------|
| Strongly Disagree | 0 | 0 % |
| Disagree | 0 | 0 % |

| Neutral | 10 | 9.52 % |
|----------------|-----|---------|
| Agree | 52 | 49.52 % |
| Strongly Agree | 43 | 40.95 % |
| TOTAL | 105 | 100 % |

INTERPRETATION

From above these table about FMEA is effective in identifying and mitigating potential quality risk it is found that the respondents of Neutral are 9.52 %, the respondents of Agree are 49.52 %, the respondents of Strongly Agree are 40.95 %.



INFERENCE

It is found that the respondents of Agree are 49.52 %.

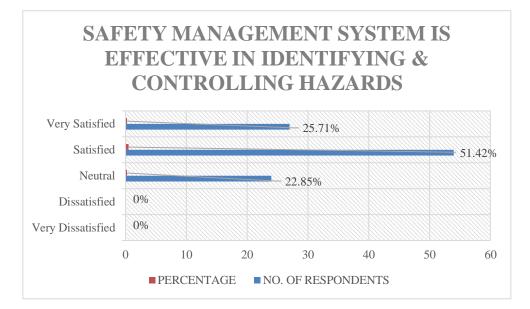
SAFETY MANAGEMENT SYSTEM IS EFFECTIVE IN IDENTIFYING & CONTROLLING HAZARDS

| TABLE 1.5 | | |
|-------------------|--------------------|------------|
| FACTORS | NO. OF RESPONDENTS | PERCENTAGE |
| Very Dissatisfied | 0 | 0 % |
| Dissatisfied | 0 | 0 % |
| Neutral | 24 | 22.85 % |
| Satisfied | 54 | 51.42 % |
| Very Satisfied | 27 | 25.71 % |
| TOTAL | 105 | 100 % |

INTERPRETATION

From above these table about Safety management system is effective in identifying and controlling hazards found that the respondents of Neutral are 22.85 %, the respondents of Satisfied are 51.42 %, the respondents of Very Satisfied are 25.71 %.

CHART 1.5



INFERENCE

It is found that the respondents of Satisfied are 51.42 %.

FINDINGS

- 57.14% of the respondents selected "Agree."
- 54.20% of the respondents selected "Agree."
- 48.57% of the respondents selected "Agree."
- 49.52% of the respondents selected "Agree."
- 51.42% of the respondents selected "Agree."

SUGGESTIONS

At Maraica Industries in Palavakkam, the implementation of an effective Total Quality Management (TQM) and Safety Management System can significantly enhance operational efficiency and ensure a safe working environment. To strengthen TQM, the company should focus on continuous improvement practices, employee involvement, and the integration of advanced quality tools such as Six Sigma and Kaizen. Emphasizing customer satisfaction and standardizing quality processes across all departments will help maintain consistency and reduce defects. On the safety front, developing a proactive Safety Management System that includes regular risk assessments, safety audits, and employee training is essential. Introducing real-time monitoring systems and digital reporting tools can aid in identifying potential hazards early, thereby preventing accidents. Additionally, fostering a culture where safety and quality are viewed as shared responsibilities among all employees will contribute to a more engaged and conscientious workforce. These measures, when effectively implemented, will not only boost product quality and workplace safety but also reinforce Maraica Industries' reputation for operational excellence.

CONCLUSION

In conclusion, the integration of Total Quality Management (TQM) and a robust Safety Management System (SMS) is essential for driving sustainable growth and operational excellence at Maraica Industries. By fostering a culture of continuous improvement, prioritizing employee involvement, and adopting advanced quality and safety practices, the organization can achieve higher levels of efficiency, customer satisfaction, and workplace safety. These systems not only help in minimizing errors and risks but also ensure compliance with industry standards and enhance the company's overall competitiveness. A well-implemented TQM and SMS framework will serve as a strong foundation for long-term success and resilience in an ever-evolving industrial landscape.

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APPENDIX

| 1. Age | | | | | | |
|--------------------------------|---------------------|--------------|-------------------------|----------------|----------|----------|
| 18 – 25 2. Years of Experie | ence? 26 - | - 35 | 36 – 45 | 46-58 | | |
| 0 – 2 years 2 – 3. Gender | | years Abov | e 5 years | | | |
| Male | Fem | ale Prefer | Not to Say 4. Design | nation | | |
| 5. What is your hig | ghest level of educ | ation? | | | | |
| 10 th std | 12 th | std/ Diploma | | Under Graduate | Post | Graduate |
| | Strongly | Disagree | Neutral | Agree | Strongly | |
| | Disagree | - | | | Agree | |
| | (1) | (2) | (3) | (4) | (5) | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

6. Is your organization currently implementing TQM principles

7. TQM principles have helped your organization to reduce costs and improve efficiency?

- 8. TQM principles have helped your organization to innovate and improve processes?
- 9. Does your organization use performance metrics to measure the effectiveness of TQM?
- 10. Do you believe that implementing TQM principles has positively impacted your organization performance?

| 11. Which (organization? Six Sigma Total Qu | Quality Juality Management | | ement tools and tech | | | implemented in your |
|--|--|---|---|--|-----------|--|
| 12. Quality managemen Strongly Ag 13. Quality and waste in our organ Strongly Ag 14. Failure n mitigating potential qu Strongly Ag 15. What are the or techniques? Resista Lack of management 16. Do wor Yes, incidents ar No, 17. Are emp Yes, all em | At tools and techniques and tools and techniques anization? ani | Agree Agree effects Agree challenges Lack of t Difficult zards or incidents ot sure h machinery training Sor | d product quality in Neutral managemen Neutral analysis Neutral you have training and a training and a nts regularly? s are | our organization? Disagre tools an Disagre (FMEA Disagre faced in resource Time of analyzing reported, but not co safety prot are trained, but | d | Strongly Disagree techniques have reduced defects Strongly Disagree effective in identifying and Strongly Disagree implementing and using each tool |
| No, ulere i | s no formal training Very poor | Poor | Fair | Good Good | Very good | |
| | (1) | (2) | (3) | (4) | (5) | |
| | | | | | | |
| | | | | | | |
| Employee Safety a Fire and emergence Your Company's Quality management Strongly Ag | cy preparedness? regular equipment m ent practices are ess | naintenance? | ng safety performar | nce? | e 🗌 | Strongly Disagree |
| 22. Do you feel that the | he company's safety | management sy | ystem is effective? | | | |

| | Strongly Agree | Agr | ee 🗌 | Neutral | | Disagree | | Strongly Disagree |
|----------|-----------------------------|-----------------|----------------|--------------------|---------|-----------------|----|-------------------|
| 23. Qua | lity management and safet | y performance | are interdepe | endent and cannot | be sepa | rated? | | |
| | Strongly Agree | Agr | ee | Neutral | | Disagree | | Strongly Disagree |
| 24. Reg | ular audits and inspections | help to identi | fy and mitigat | e safety risks? | | | | |
| | Strongly Agree | Agr | ee | Neutral | | Disagree | | Strongly Disagree |
| 25. Safe | ty performance metrics are | e used to evalu | ate the effect | iveness of our qua | lity ma | nagement system | 1? | |
| | Strongly Agree | Agr | ee | Neutral | | Disagree | | Strongly Disagree |

26. Your Organization Safety management system meets all relevant regulatory requirements?

27. The Safety management system is effective in identifying and controlling hazards?

- 28. The Safety management system is effective in promoting a positive safety culture?
- 29. Employees are aware of their roles and responsibilities within the Safety Management System?
- 30. What are the Strengths and Weaknesses of your organization's Safety Management System?

| Very Dissatisfied | Dissatisfied | Neutral | Satisfied | Very Satisfied |
|----------------------|--------------|---------|-----------|-------------------|
| (1) | (2) | (3) | (4) | (5) |
| | | | | |
| | | | | |
| | | | | |
| | | | | |