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|  | **BAHRIA UNIVERSITY, (Karachi Campus)**  *Department of Software Engineering*  **Assignment 1 - Spring 2023** |  |



COURSE TITLE: **SOFTWARE QUALITY ENGINEERING** COURSE CODE: **SEN-321**

Class: **BSE-6 (B)** Shift: **Morning**

Course Instructor: Sohaib ur RehmanTime Allowed:  **1 Week**

Submission Date: **1st May 2023** Max. Marks: **5 Marks**

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**Question No. 1 [CLO1: 5 Marks]**

Assignment Title: ISO 9000 Model and Quality Management

Task:

1. Define the ISO 9000 Model and explain its significance in the field of quality management. Provide examples of industries or organizations that commonly use the ISO 9000 Model, and explain why it is important for them to do so.

**Solution:**

The ISO 9000 Model is a set of international standards for quality management systems that outlines the requirements for an organization to achieve certification. It is significant in the field of quality management because it provides a framework for organizations to implement a quality management system that meets international standards. This can help organizations to improve product and service quality, increase customer satisfaction, and create a more efficient and effective organization.

Industries and organizations that commonly use the ISO 9000 Model include manufacturers, service providers, and software development companies. It is important for these organizations to implement the ISO 9000 Model because it can help them to improve their ability to consistently provide products and services that meet customer and regulatory requirements.

By implementing a quality management system based on the ISO 9000 Model, these organizations can improve their efficiency and effectiveness, reduce costs, and increase customer satisfaction and loyalty. Additionally, ISO 9000 certification can provide assurance to customers and other stakeholders that the organization is committed to providing quality products and services.

1. Label and describe the three different components of the ISO 9000 Model, which include ISO 9001, ISO 9002, and ISO 9003. For each component, explain its purpose and the requirements it outlines for an organization seeking ISO certification. Provide examples of the types of organizations that would benefit from each component.

**Solution:**

ISO 9000 is a set of international standards for quality management systems. The ISO 9000 model consists of three different components: ISO 9001, ISO 9002, and ISO 9003. Each component has a unique purpose and outlines specific requirements for an organization seeking ISO certification.

* **ISO 9001:** This component outlines the requirements for a quality management system that an organization must meet in order to be certified. ISO 9001 is the most comprehensive of the three components and is applicable to a wide range of organizations in different industries. It requires an organization to demonstrate its ability to consistently provide products and services that meet customer and regulatory requirements. Examples of organizations that would benefit from ISO 9001 certification include manufacturers, service providers, and software development companies.
* **ISO 9002:** This component outlines the requirements for a quality management system that an organization must meet in order to be certified, but it is specifically designed for organizations that do not design or develop new products. ISO 9002 is less comprehensive than ISO 9001 and is applicable to a narrower range of organizations. It requires an organization to demonstrate its ability to consistently provide products and services that meet customer and regulatory requirements. Examples of organizations that would benefit from ISO 9002 certification include service providers such as cleaning companies or transportation companies.
* **ISO 9003:** This component outlines the requirements for a quality management system that an organization must meet in order to be certified, but it is specifically designed for organizations that do not design or develop products or services. ISO 9003 is the least comprehensive of the three components and is applicable to a narrow range of organizations. It requires an organization to demonstrate its ability to consistently provide products and services that meet customer and regulatory requirements. Examples of organizations that would benefit from ISO 9003 certification include inspection services or testing laboratories.

1. Identify and record the steps required for an organization to become ISO certified. Explain the role of an external auditor in the certification process, and the importance of maintaining a quality management system after certification has been achieved.

**Solution:**

# Steps to become ISO certified

1. **Determine the relevant ISO standard:** The first step for an organization seeking ISO certification is to determine which ISO standard is relevant to their industry and operations. For example, ISO 9001 is relevant to organizations seeking to implement a quality management system.
2. **Develop a quality management system (QMS):** Once the relevant ISO standard has been identified, the organization must develop a QMS that meets the requirements outlined in the standard. This process involves documenting the organization's processes and procedures and ensuring that they meet the standard's requirements.
3. **Implement the QMS:** After the QMS has been developed, the organization must implement it throughout the organization. This involves training employees and ensuring that they understand and follow the processes and procedures outlined in the QMS.
4. **Internal audit:** The organization must conduct an internal audit of the QMS to ensure that it is effectively implemented and that it meets the requirements of the relevant ISO standard.
5. **Engage an external auditor:** The organization must engage an external auditor to conduct an external audit of the QMS. The external auditor will review the QMS to ensure that it meets the requirements of the relevant ISO standard.
6. **Address non-conformities:** If the external auditor identifies any non-conformities with the QMS, the organization must address them and provide evidence to the external auditor that they have been resolved.
7. **Receive certification:** If the external auditor determines that the QMS meets the requirements of the relevant ISO standard, the organization will receive certification.

## Role of an external auditor in the certification process

The role of an external auditor in the certification process is to review the organization's QMS to ensure that it meets the requirements of the relevant ISO standard. The external auditor will conduct an audit of the QMS and provide a report that identifies any non-conformities with the standard. The organization must address any non-conformities identified by the external auditor and provide evidence to the external auditor that they have been resolved. Once the external auditor is satisfied that the QMS meets the requirements of the ISO standard, the organization will receive certification.

## Importance of maintaining a quality management system after certification

Maintaining a QMS after certification is important because it ensures that the organization continues to meet the requirements of the relevant ISO standard. If the organization does not maintain the QMS, it may lose its certification. Additionally, maintaining a QMS can help the organization to identify areas for improvement and to continually improve its operations. This can result in increased efficiency, reduced costs, and improved customer satisfaction.

1. Name and list the key quality management principles outlined by the ISO 9000 Model, such as customer focus, leadership, and continuous improvement. Explain how each principle contributes to the overall success of a quality management system.

**Solution:**

The key quality management principles outlined by the ISO 9000 Model include:

* **Customer focus:** This principle emphasizes the importance of understanding and meeting customer needs and expectations. By focusing on the customer, organizations can improve customer satisfaction and loyalty, as well as their own competitiveness.
* **Leadership:** This principle emphasizes the importance of leadership in establishing and maintaining a quality-focused culture within the organization. Strong leadership can help to ensure that the organization's quality objectives and policies are understood and implemented throughout the organization.
* **Engagement of people:** This principle emphasizes the importance of engaging and empowering employees at all levels of the organization. By involving employees in quality initiatives, organizations can improve employee satisfaction, motivation, and commitment, as well as the quality of products and services.
* **Process approach:** This principle emphasizes the importance of understanding and managing processes as a system in order to achieve organizational objectives. By taking a process approach, organizations can improve efficiency and effectiveness, as well as their ability to adapt to changing conditions.
* **Improvement:** This principle emphasizes the importance of continually improving organizational performance by identifying and addressing areas for improvement. By focusing on improvement, organizations can increase efficiency, reduce costs, and improve customer satisfaction.
* **Evidence-based decision making:** This principle emphasizes the importance of using data and evidence to make informed decisions. By making decisions based on objective information, organizations can improve the effectiveness and efficiency of their processes and operations.
* **Relationship management:** This principle emphasizes the importance of managing relationships with stakeholders, including customers, suppliers, and partners. By building strong relationships with stakeholders, organizations can improve collaboration, communication, and overall performance.

Each of these principles contributes to the overall success of a quality management system by emphasizing the importance of customer focus, leadership, employee engagement, process management, continuous improvement, data-driven decision making, and stakeholder relationships. By adopting these principles, organizations can improve their ability to meet customer needs, achieve their objectives, and continually improve their performance.

1. Tell and explain the benefits of implementing a quality management system based on the ISO 9000 Model, both for the organization and its customers. Provide examples of how ISO 9000 certification can lead to improved product quality, increased customer satisfaction, and a more efficient organization.

**Benefits for the organization:**

**Improved efficiency:** A quality management system helps organizations to identify and streamline processes, reducing waste and increasing efficiency. This can lead to cost savings and improved profitability.

**Better product quality**: By implementing quality control measures and continuously monitoring and improving processes, organizations can ensure that their products or services consistently meet or exceed customer expectations.

**Enhanced reputation:** ISO 9000 certification is widely recognized as a mark of quality, and organizations that are certified are often seen as more trustworthy and reliable by customers, suppliers, and stakeholders.

**Increased employee engagement**: By involving employees in the quality management process and empowering them to contribute to continuous improvement efforts, organizations can enhance employee engagement, motivation, and job satisfaction.

**Benefits for customers:**

**Consistent quality:** By implementing a quality management system, organizations can ensure that their products or services consistently meet customer expectations, leading to higher levels of customer satisfaction and loyalty.

**Improved customer service**: By focusing on customer needs and preferences, organizations can provide better customer service, leading to a more positive customer experience.

**Greater transparency**: By implementing quality control measures and continuously monitoring and improving processes, organizations can provide greater transparency into their operations, leading to greater trust and confidence among customers.

**Lower risk:** By working with ISO 9000-certified organizations, customers can have greater confidence in the quality and reliability of the products or services they receive, reducing the risk of product failure or service disruptions.

Toyota , Samsung , Boeing are a few examples which implemented a quality management system based on the ISO 9000 Model, which helped the company to reduce defects, improve efficiency, and enhance customer satisfaction. These companies focus on quality helped the company to establish a reputation for reliability and quality, leading to increased market share and profitability.

Here are some references related to the ISO 9000 Model:

* "ISO 9000 Quality Systems Handbook - Updated for the ISO 9001:2015 Standard" by David Hoyle
* "The ISO 9000 Essentials: A Practical Handbook for Implementing the ISO 9000 Standards" by Bridget Benecke
* "ISO 9001:2015 in Plain English" by Craig Cochran
* ISO 9000:2015 - Quality management systems - Fundamentals and vocabulary (<https://www.iso.org/standard/62085.html>)
* ISO 9001:2015 - Quality management systems - Requirements (<https://www.iso.org/standard/62085.html>)
* ISO 9004:2018 - Quality management - Quality of an organization - Guidance to achieve sustained success (<https://www.iso.org/standard/62452.html>)