**W6 Lecture "Quality Improvement Methods & Lean Enterprise"**

**Quality Improvement Methods & Lean Enterprise**

**Lesson 11: Quality Improvement Methods**

1. Sources for quality improvement ideas: customer feedback, benchmarking, and employee feedback.

* Identifying the root causes of quality problems begins by collecting feedback from many different sources, such as customers and employees, and by benchmarking other organizations.
* Ideas for quality improvement from customers can be collected in a variety of formats and from a variety of sources, such as customer satisfaction surveys, customer choice analysis, and blogs.
* Benchmarking is used for comparing the business practices of an organization to the best practices that can be identified in other organizations (partner firms, competitors, or suppliers) or other divisions within a company.
* Feedback from employees about quality improvement plans can be compiled in many different ways. Some companies use a regular and formal system of collecting feedback from their employees, whereas others use informal and ad hoc approaches. One approach that is used extensively in Japanese companies is known as quality circles. A quality circle is made up of a small group of employees who are responsible for similar or related work functions.

2. Qualitative quality improvement tools, including brainstorming, affinity diagrams, interrelationship diagrams, tree diagrams, process decision program charts, flowcharts, cause-and-effect diagrams, failure modes and effects analysis, and mistake-proofing.

* Companies use a variety of qualitative quality improvement techniques in combination with one another, and there is no specific order in which they should be implemented. The specific needs of the organization determine which techniques are most appropriate for analyzing a given quality problem or improvement idea.
* Brainstorming is a systematic method for generating a large number of creative problem-solving ideas in a relatively short amount of time based on input from many different individuals.
* The affinity diagram is used as a visual tool for organizing the ideas generated during brainstorming into natural groups based on the collective wisdom of the participants.
* Often used in combination with brainstorming and affinity diagrams, an interrelationship diagram is used to show the connections and natural relationships among different ideas or constructs identified for quality improvement.
* A tree diagram is used to describe how one idea branches into two or more sub-ideas, each of which branches into further sub-ideas, and so on.
* The process decision program chart is used to systematically identify initiatives that might potentially go wrong in a quality improvement plan that is under consideration.
* A flowchart is used to visually represent the separate steps of a process in a sequential manner.
* A cause-and-effect diagram is used to illustrate the potential reasons for a quality problem.
* Failure modes and effects analysis (FMEA) is a systematic approach for identifying all possible failures in a design, a manufacturing process, or a service process.
* Mistake-proofing or poke-yoke refers to the use of any automatic device or method that either makes it impossible for an error to occur or makes the error immediately obvious once it has occurred.

3. Quantitative quality improvement tools, including inspection and sampling, check sheets, Pareto analysis, histograms, scatter diagrams, process capability analysis, run charts, and statistical process control charts.

* Implementing a successful quality improvement program requires systematic data sampling, data collection, and analysis.
* Because sample data are used to assess the quality of a larger population, the possibility of Type I and Type II errors exists and should not be ignored during analysis.
* The process capability index can be used to assess how well a process meets established standards.
* Statistical process control charts are used to assess whether the variations present in a process are natural or special-cause variations.
* x and R charts are commonly used in combination for process data that are measured on a continuous scale.
* p charts are commonly used for data that are counted in categories or for attributes.

**Lesson 12: Lean Enterprise**

1. The concepts of lean production and lean thinking.

* Lean thinking is an approach for eliminating or minimizing waste and variability within a production system.
* The principles of lean thinking are derived from the Toyota Production System and can be applied to a wide range of manufacturing and service organizations.
* Lean production is based on five guiding principles: customer focus, value creation, smooth production flows, pull production system, and organization-wide commitment.

2. Different kinds of waste present in a production system.

* The wastes present in any production system can be classified into three broad categories: non-value-added activities (muda), unevenness of processes (mura), and overburden (muri).
* There are many different types of waste present in a typical production system, including wastes related to waiting time, setup and processing times, quality, and transportation.
* The lean production approach emphasizes the need for minimizing each type of waste present in a production system.

3. Components of a lean production system.

* Lean production is configured as a pull system, which means that production is based on actual customer demand rather than forecasts. Therefore, lean production systems have relatively lower work-in-process inventory.
* Lean production systems also strive to achieve smaller batch sizes and shorter setup times to reduce work-in-process inventory further.
* A just-in-time (JIT) inventory system is used to deliver the right amount of inventory at the right time during the production process.
* A number of tools and techniques, such as kanbans, are used to implement JIT.
* Uniform production planning is facilitated by the calculation of takt time.
* Continuous improvement or kaizen, closer supplier relationships, and a multifunctional work force are essential for the success of a lean production system.
* A number of tools and techniques, such as five S, preventive maintenance, visual controls, and value stream mapping, are used during the implementation of a lean production system.

4. New advances related to lean thinking.

* New technology such as radio frequency identification (RFID) is making the implementation of a lean production system easier and more effective.
* A number of organizations have combined the key elements of a lean production system and Six Sigma and developed a more comprehensive framework known as Lean Six Sigma.