First of all, I would like to say it is the first year this lecturer teaching this courses. Hence the quality of the lecture is not as good as expected. The lecturer even do not have his own slides but previous lecturer's (Now teaching in Australia) slides are quite good so you can read the slides and tell what the courses is about. All of us only can do review based on the slides and what the lecturer say in class will not be important from my experience. Still, it require large amount of memory work and if you work hard you can made it. Secondly, I am under exchange in Norway during the time I write out this answer and I do not bring my notes here so there might existing minor error. Sorry for that but I will try my best to put the answer as standard answer. Best wishes for your exam!

Q1:

(a) (Tricky Question) If you don't measureresults, you can't tell success from failure. If you can't see success, you can't rewardit and if you can't reward success, you are probably rewarding failure. If you can't recognize failure, you can't correct it
Good performance measurement including:

FIGURE 13–3Characteristics of Good Measures

A Good Measure	Description
• is quantitative	• The measure can be expressed as an objective value.
• is easy to understand	• The measure conveys at a glance what it is measuring, and how it is derived.
• encourages appropriate behavior	• The measure is balanced to reward productive behavior and discourage "game playing."
• is visible	• The effects of the measure are readily apparent to all involved in the process being measured.
• is defined and mutually understood	• The measure has been defined by and/or agreed to by all key process participants (internally and externally).
• encompasses both outputs and inputs	• The measure integrates factors from all aspects of the process measured.
• measures only what is important	• The measure focuses on a key performance indicator that is of real value to managing the process.
• is multidimensional	• The measure is properly balanced between utilization, productivity, and performance, and shows the trade-offs.
• uses economies of effort	• The benefits of the measure outweigh the costs of collection and analysis.
• facilitates trust	• The measure validates the participation among the various parties.

The reason why it is important to carry out good performance measurement is that:

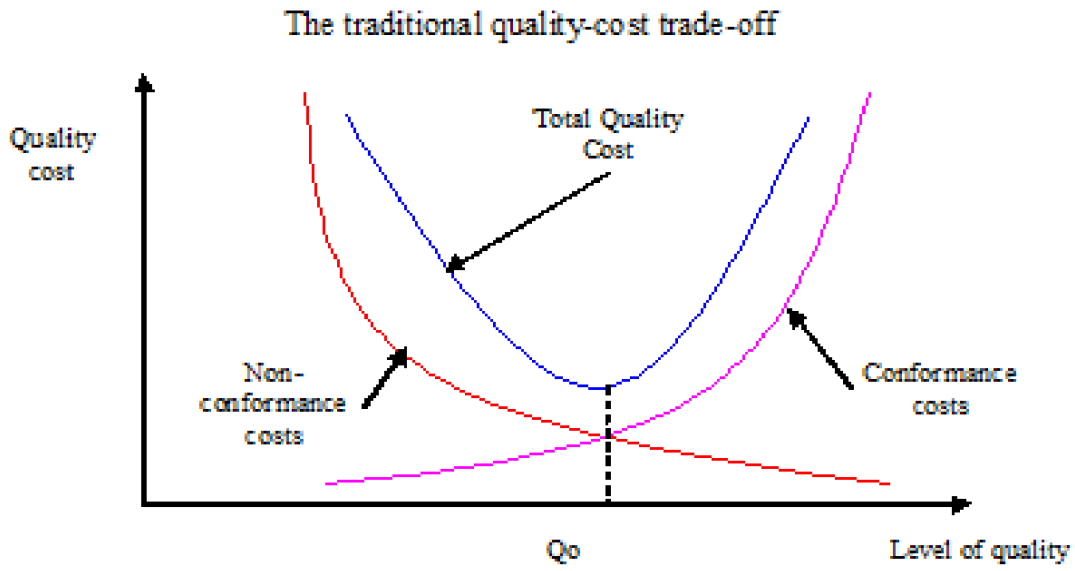
- You will know customer's needs and wants through performance measurement
- You will know what you are lacking of so that you can improve
- You will know your competitors' strength and weakness so that you can exceed them
- You will have standard of control so that your company will perform better
- You will achieve better reputation if you can improve your product and service through performance measurement and attract more customers and earn more profits

Example in shipping including recent years, many shipping companies such as Maersk and OOCL have adopted total quality management for competitive reasons, which has helped make lean thinking and process management commonplace. Understanding that customers want accurate shipments delivered on time, not multiple contracts with multiple shippers, has prompted many firms to become logistics experts. Sometimes driven by shipping companies, sometimes by railroads and other times by true logistics

organizations, new transportation partnerships are providing one-stop shopping for businesses needing to distribute goods worldwide.

(b) The way to measure CoQ and RoQ are:

COQ:



Measuring CoQ including measuring

- Prevention: investments made to keep nonconforming products from occurring and reaching customers
- Appraisal: associated with efforts to ensure conformance to requirements, generally through measurement and analysis of data to detect nonconformances
- Internal failure: costs of unsatisfactory quality found before the delivery of a product to customers
- External failure: costs incurred after poor-quality products reach customers

The way to measure RoQ

- measure of revenue gains against costs associated with quality efforts
- Principles is that quality is an investment and quality efforts must be made financially accountable

Example in maritime industry can be when we measuring CoQ of container stacking service, we should measure:

- Prevention: investment in measuring the correct distribution plan so that the container will not be deliver to wrong customers
- Appraisal: measuring data for wrong distribution
- Internal failure: costs of wrong allocation before we deliver the goods to customers and do the internal adjustment
- External failure: cost incurred when wrong goods are delivered and customers come and ask for compensation

Example in maritime industry can be when we measuring RoQ of container stacking service, we should measure how much we gain or cost in order to improve the service quality of the container stacking system.

(c) Berth Occupancy Ratio (BOR) = Total service time in a period/(Available time in a period x number of berths). We should not aim too high due to:

- Berth itself must have gap, if the gap is too narrow in order to increase the number of ship we service, accident are more likely to happen and incur higher cost due to accident such as collision.
- We must ensure the quality of the service, too fast might incur more error in service and result in higher cost than profit.
- Other equipment also have handling constrain, if we done too much service time lag might be created which is not desirable. Customers might be loss and port end up with losing instead of earning money.
- More equipment must be purchased to satisfied the faster rate of service and the maintenance cost or capital cost of buying new equipment will exceed the revenue.
- Fender of the quay will be damaged when ship berth. More maintenance cost will incur and might exceed revenue.

Q2

(a) The reason of good quality system including:

- Tangibles: physical facilities, equipment and appearance of personnel
- Reliability: ability to perform the promised service, along with dependability and accuracy
- Responsiveness: willingness to help customers and to provide prompt service
- Assurance: knowledge and courtesy of employees and their ability to inspire trust and confidence. Involved critical element including competence, courtesy, credibility and security.
- Empathy: caring, individualised attention with which the company provides its customers which require access, communication and understating of customers

For maritime organization, it can translate into (which is the same as big container company like Maersk and OOCL):

- on time pick up & delivery
- equiptment condition
- cleanliness & availability
- compliance with environmental standards
- effective communications
- competence
- courtesy & appearance
- internal monitoring of service
- accuracy in billing
- prompt handling of claims

The reason of bad quality system including:

- Inadequate trained personnel
- Goals and objectives not made known to employees
- Poor communication, horizontally and vertically
- No/poor system of customer feedback
- Not understanding customer needs

- Poor leadership
- Dissatisfied employees, etc.

Example can be found in the reconsolidation of Hanjin Shipping which is because of the higher hierarchy of leader playing politics and do not follow the goal of maximizing the revenue and goods so that they stop bank from giving loan to Hanjin and leading Hyundai to buy off the group.

(b) (Tricky Question) The impact of laid up crew instead of finding a better way is that:
- It affect your company image and lesser employees will come to you after that.
- If the market become better, you will find yourself hard to find experienced workers and those you fired now might bring you with more fortune in the boom market.
- Your workers might go for other company so that your companies' strategy and etc might be leak to your competitors.
- Other employee might be afraid of being fired so that they will felt fear when they doing jobs and affect job quality.
- Some employee you laid off have relationship with customers, custom of some country and officers in government so they will bring these away.

Differences between ISO9000 and ISO14000 series is that ISO 9000 is a quality management standard that presents guidelines intended to increase business efficiency and customer satisfaction. The goal of ISO 9000 is to embed a quality management system within an organization, increasing productivity, reducing unnecessary costs, and ensuring quality of processes and products. ISO 14000 is a series of environmental management standards developed and published by the International Organization for Standardization (ISO) for organizations. The ISO 14000 standards provide a guideline or framework for organizations that need to systematize and improve their environmental management efforts.

3Q

(a) DFMEA Cycle is the step of DFSS.
Design for Six Sigma (DFSS) is:
- is a set of tools and methodologies in the product/service development process,
- for ensuring that goods and services will meet customer needs and achieve performance objectives, and that
- the processes used to make and deliver them achieve six sigma capability

The steps of DFSS are:

- Concept development, determining product/service functionality based upon customer requirements, technological capabilities, and economic realities. Key tool is concept engineering and step involve:
  - Understanding the customer's environment: form the team, gain team consensus on the project focus, collect the voice of the customer
  - Converting understanding into requirements: Analyze the customer transcripts to translate the voice of the customer into more specific requirements
  - Operationalizing what has been learned: Determine how to measure how well a customer requirement is met by the design concept

- Concept generation: Generate ideas for solutions that will potentially meet customers' needs
- Concept selection: Evaluate potential ideas with respect to meeting requirements, trade-offs are assessed, and prototyping begins

– Design development, focusing on product and process performance issues necessary to fulfil the product and service requirements in manufacturing/provision or delivery. Key tools include:
  - Quality Function Deployment (QFD)
    - Originated in 1972 at Mitsubishi's Kobe shipyard, followed by Toyota in 1977 with good results
    - Xerox and Ford initiated using it in 1986 –Today, it has been used successfully by Mazda, Xerox, Motorola, IBM, P&G, etc.
    - Under QFD, all operations of a company are driven by the voice of customers
    - benefits companies through improved communication and teamwork between all constituencies in the value chain, such as between marketing and design, between design and manufacturing, and between purchasing and suppliers

    Step of QFD involve:

    - Identify customer requirements
    - Identify technical requirements
    - Relate the customer requirements to the technical requirements
    - Conduct an evaluation of competing products or services
    - Evaluate technical requirements and develop targets
    - Determine which technical requirements to deploy in the remainder of the production/delivery process
  - Design for Excellence (DFX), represents a total approach to product/service development & design involves the followings:
    - Constantly thinking in terms of how one can design or manufacture/provide products/service better
    - Focusing on "things done right"rather than "things gone wrong"
    - Defining customer expectations and going beyond them
    - Optimizing desirable features or results, not just incorporating them

– Design optimization, seeking to minimize the impact of variation in production/provision. Key tools for design optimisation
  - Design Failure Mode and Effects Analysis (DFMEA), identification of all the ways in which a failure can occur, to estimate the effect and seriousness of the failure, and to recommend corrective design actions. A DFMEA usually consists of specifying the following information for each design element, function or system:
    - Failure mode: ways in which each element, function or system can fail
    - Effect of the failure on the customer: dissatisfaction, potential injuries, downtime, etc.
      - The severity rating is based on how serious the impact would be if the potential failure were to occur

        - The occurrence rating is based on the probability of the potential failure occurring
        - The detection rating is based on how easily the potential failure could be detected prior to occurrence
        - Based on these assessments, a risk priority number (RPN) is calculated

      Steps for DFMEA:
        - Step 1: Review the process -Use a process flowchart to identify each process component
        - Step 2: Brainstorm potential failure modes -Review existing documentation and data for clues
        - Step 3: List potential effects of failure -There may be more than one for each failure
        - Step 4: Assign Severity rankings -Based on the severity of the consequences of failure
        - Step 5: Assign Occurrence rankings -Based on how frequently the cause of the failure is likely to occur
        - Step 6: Assign Detection rankings -Based on the chances the failure will be detected prior to the customer finding it
        - Step 7: Calculate the RPN = Severity x Occurrence x Detection
        - Step 8: Develop the action plan -Define who will do what by when
        - Step 9: Take action -Implement the improvements
        - Step 10: Calculate the resulting RPN -Re-evaluate each of the potential failures once improvements have been made
    - Reliability measurement
        - Generally defined as the ability of a product/service to perform as expected over time
        - Formally defined as the probability that a product, piece of equipment, or system performs its intended function for a stated period of time under specified operating conditions
        - Reliability failure–failure after some period of use
- Design verification, ensuring that the capability of the production/provision system meets the appropriate sigma level, key tool is design review. The purpose of a design review is to stimulate discussion, raise questions, and generate new ideas and solutions to help designers anticipate problems before they occur:
    - Preliminary design review evaluates such issues as
        - function of the product/service,
        - conformance to customer's needs,
        - completeness of specifications
    - Intermediate design review studies the design in greater detail to identify potential problems and suggest corrective action
    - Final design review evaluates material/service component lists, and other detailed design information with the purpose of preventing costly changes after production/service setup

Quality loop in shipping industry (Tricky part of this question) is that for example for container handling system. First will design the concept how we can improve the handling system and make the design in step 2. Third step is to optimize the design and at last verify the design of new handling system.

(b) 10 Service quality in transport:

- on time pick up & delivery
- eqpt condition
- cleanliness & availability
- compliance with environmental standards
- effective communications
- competence
- courtesy & appearance
- internal monitoring of service
- accuracy in billing
- prompt handling of claims

ROPMIS model of service quality in transport develop into:

- Resources-related quality dimension
- Outcome-related quality dimension
- Process-related quality dimension
- Management-related quality dimension
- Image/reputation-related quality dimension
- Social responsibility-related quality dimension

Q4

Safety Management objectives of the Company should, inter alia and assess all identified risks to the ships, personnel and the environment and establish safeguards.

- Risk assessment can be used to achieve the ISM Code, safety management objectives.
- It provide for safe working practices in ship operation and a safe working environment.
- It establish safeguards against all identified risks
- Continuously improve safety management skills of personnel ashore and aboard ships
- Develop plans for shipboard operations concerning safety of the personnel, ship and protection of the environment.
- Establish procedures in its safety management system to identify equipment and technical systems sudden operational failure which may result in hazardous situations.

Risk assessment – Example

- Hazardous Activity – Crossing a busy street
- Hazard – Being knocked down by traffic
- Probability – High
- Consequence – Death
- Risk – High
- Action to reduce risk – Use traffic crossing in safe manner i.e. cross only when green man.
- Resultant Risk – Low

Risk still exist but now it is at acceptable level. Risk Assessment:

- Purpose: to ensure a careful examination of shipboard operations is carried out to determine what can cause harm and that existing controls are adequate.
- Objective: to identify workplace precautions to prevent harm to people, property and the environment at the point of the risk.
- Risk assessment is a part of risk management.

ISM Code (International Safety Management)

- 1.2 Objectives
- 1.2.1 The objectives of the Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property.
- 1.2.2 Safety management objectives of the Company should, inter alia: .1provide for safe practices in ship operation and a safe working environment;
- .2assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards; and
- .3continuously improve safety management skills of personnel ashore and aboard ships, including preparing for emergencies related both to safety and environmental protection.
- 1.2.3 The safety management system should ensure:
- .1compliance with mandatory rules and regulations; and
- .2that applicable codes, guidelines and standards recommended by the Organization, Administrations, classification societies and maritime industry organizations are taken into account.

Q5

In pursuing its policies, IMO makes use of three different instruments: Resolutions, Codes and Conventions. Most crucial and binding on the parties is the Conventions. Resolutions, merely have advisory character, and considered to be only recommendations to member states. Codes stand between the two. ISM Code is the IMO develop tool for safety management. History of ISM including:

- Despite intense legislative program of IMO during the 70's and the implementation of program at the beginning of the 80's, maritime casualties demonstrated no decline.
- Casualty record of the 80's suggested that the comprehensive system of the IMO conventions had little or no impact on safety or pollution prevention.
- IMO looked into the practices of the industry for solution, and reached the conclusion that a quality assurance system, similar to that of ISO 9002, could contribute to the solution of the problem.
- Good management was to become the target of IMO, and set out to find the best way to achieve this.
- The Maritime Safety Committee concluded with the introduction of the International Management Code for the Safe Operation of Ships and for Pollution Prevention, better known as the International Safety Management (ISM) Code.
- Based on the fact that most casualties in shipping and marine pollution incidents are the result of crew negligence, ineffective management and lack of communication between the vessel and the shore-based managers,
- the ISM Code sought to introduce a new culture to the management of shipping companies (commercial practices, are excluded) and established a universal mandatory code of practice to ensure that safety and pollution prevention issues are addressed along defined lines on board and ashore.

The stated purpose of the ISM Code is to establish an international recognised standard for the organisation of a shipping company in relation to the safe management and operation of ships and pollution prevention.

ISM aims to apply, in the area of shipping, a system of quality assurance and safety management in order to minimise the possibilities of human error both ashore and on board.

Objectives of the ISM Code are the “safety at sea and the prevention of marine pollution”. The Code is drafted in a simple and easily legible manner and is based upon basic general principles and clear objectives. Its philosophy is simple, no matter how well qualified the personnel may be under STCW convention, serious problems can arise if proper management systems are not in place.

All the aspects of the ISM Code may be grouped under four headings.

- Management: responsible for developing, implementing and maintaining an effective safety management system, onshore and on board its ships

- People: People are the key to the system.

    - The human element is mentioned in 96 per cent of marine casualties, and 70 per cent of fires and explosions on board ship.
    - Parameters include qualifications, communication, provision of information on work and responsibility, training and motivation.

- Ship and equipment: the ship and its equipment represents the ‘hardware’.

    - The work environment, development of preventive maintenance programme to minimise risks of breakdowns and accidents.
    - Identification and periodical inspection of all the equipment and systems for the safe and effective operations of the ship.
    - Necessary inspection and control of instruments and materials which provide information on the operational condition of the ship.

- Procedures: Operational procedures for the ship to perform within the context of the company’s policy for safety and environmental protection.

    - Preparation and maintenance action plans to enable management of all foreseeable situations affecting safety and pollution risks.
    - Regular training in emergency exercises, systematic organisation of documental internal audits, analysis and handling of non-conformities observed during audits and controls.

Certification: the four aspects are subject to an assessment which leads to a document of compliance for the company, and a safety management ship certificate, attributable to each ship, renewable every five years and subject to periodical assessment.

ISM Code (International Safety Management code) content including:
- 1.2 Objectives
- 1.2.1 The objectives of the Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property.

- 1.2.2 Safety management objectives of the Company should, inter alia: .1provide for safe practices in ship operation and a safe working environment;
- .2assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards; and
- .3continuously improve safety management skills of personnel ashore and aboard ships, including preparing for emergencies related both to safety and environmental protection.
- 1.2.3 The safety management system should ensure:
- .1compliance with mandatory rules and regulations; and
- .2that applicable codes, guidelines and standards recommended by the Organization, Administrations, classification societies and maritime industry organizations are taken into account.

Q6

Plan

- Environmental Aspect Identification (EM-01: Section 4.3.1, EP-01, EAR-01)
- Legal and Other Requirements (EM-01: Section 4.3.2, EP-02, LR-01)
- Objectives, Targets and Programmes (EM-01: Section 4.3.3, O&T-YYYY)

Do

- Resources, Roles, Responsibility and Authority (EM-01: Section 3.1, 3.2, 3.3, 4.4.1)
- Competence, Training and Awareness (EM-01: Section 4.4.2, EP-03)
- Communication (EM-01: Section 4.4.3, EP-07)
- Documentation (EM-01: Section 4.4.4)
- Control of Documents (EM-01: Section 4.4.5, EP-04)
- Operational Control (EM-01: Section 4.4.6, EI-XX)
- Emergency Preparedness and Response (EM-01: Section 4.4.7, EP-05)

Check

- Monitoring and Measurement (EM-01: Section 4.5.1, EP-06)
- Evaluation of Compliance (EM-01: Section 4.5.2, EP-06)
- Nonconformity, Corrective Action and Preventive Action (EM-01: Section 4.5.3, EP-08)
- Control of Records (EM-01: Section 4.5.4, EP-09)
- Internal Audit (EM-01: Section 4.5.5, EP-10)

Act

- Management Review (EM-01: Section 4.6)
- Environmental working committee and environmental committee meetings will be held regularly to review all issues regarding the whole EMS

BEST WISHES FOR YOUR EXAM!

Answer key provided by Lin Hanye