

THE CAUSE-AND-EFFECT DIAGRAM FOR MARITIME INDUSTRY PRODUCTIVITY IMPROVEMENT

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Quality management is critically important for the maritime industry because of a number of reasons related to safety, environment, economy and reputation. The scientific literature reflects many approaches to classifying quality management methods, among which classical and modern methods can be distinguished.

The cause-and-effect diagram (Ishikawa diagram) belongs to the classical methods. This method is a way to identify and systematize the main factors (causes) that influence the final result (consequence). The cause-and-effect diagram is an important tool in the maritime industry because of its ability to visualize, analyze, and solve complex problems. The diagram allows to identify the main problems, providing a deeper understanding of processes and contributing to their improvement.

The maritime industry faces high risks, such as technical malfunctions of vessels, crew errors or adverse weather conditions. Using the Ishikawa diagram allows to understand the causes of accidents or failures and prevent their recurrence.

The Ishikawa diagram consists of a quality indicator that characterizes the result and factor indicators. Depending on the object of analysis and quality control, the factor indicators are grouped into certain categories. Most often, when constructing an Ishikawa diagram, classification features of factors based on the "5 M" concept are applied. The 5 M's represent different categories of potential causes for a problem. These are man, machine, material, method, measurement. For each of the specified groups of factors, secondary factors are determined that influence the main one.

The construction of an Ishikawa diagram is carried out in the following sequence:

1. The quality problem that needs to be solved is identified and placed in the cell at the beginning of the horizontal arrow ("bone skeleton").
2. The most significant factors (causes) that influence the problem (quality indicator) are identified.
3. Secondary causes, which affect the main factors (so-called second-order causes), are selected.
4. Tertiary causes, which influence the secondary causes, are chosen.
5. The logical connection of each cause-and-effect chain is checked, the causes are ranked according to their significance, and the most important ones that affect the main outcome are highlighted.
6. A plan of action is developed to eliminate the causes that negatively affect quality.

Examples of causes in the maritime industry that can be solved using a cause-and-effect diagram are delays in cargo delivery through the port, cargo damages during

transportation, low efficiency of vessels, safety problems, inconsistency of shipping schedules, environmental violations during transportation. If we take the delay in loading and unloading of vessels as the main problem, the categories of primary problems will be man, machine, material, method, measurement. Secondary causes in the man category may be insufficient number of workers in the port to handle vessels, inexperience or poor training of crew or stevedores, low motivation. For the machine category such reasons may include old or faulty equipment, insufficient number of automated systems and so on. This search for secondary problems must be carried out for each category. By identifying all the factors, it becomes possible to more accurately determine where changes are needed.

The Ishikawa diagram offers a systematic approach to problem analysis, allowing the collection of information from all participants in the process (staff, managers, experts) and consideration of all possible causes. This helps create a comprehensive picture of the situation and make informed decisions. Once all possible causes of the problem have been identified, the Ishikawa diagram helps analyze and determine which of them have the greatest impact on the final outcome. This allows efforts to be focused on the most critical factors.

The Ishikawa diagram is a powerful tool for problem analysis and solution development in the maritime industry. It helps identify root causes of issues, prioritize solutions, improve operational efficiency, develop action plans, and mitigate future risks. As a result, the maritime industry can significantly enhance its productivity, safety, and environmental responsibility.

References

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