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PLANT TECHNOLOGY AND TURNAROUND MAINTENANCE

Large scale operation is a synonym to heavy industries with high fixed costs as a result of the huge investment in the plant technology. This is commonly seen in the process-based industries such as petrochemicals, fertilisers, electricity generation, refineries, and cement. The large scale output is necessary to lower the overall unit cost of production (Pickering, 1971). The large scale production requires an efficient manufacturing operation that demands a highly reliable and efficient plant technology. This is achievable through efficient maintenance management, particularly turnaround maintenance management. This implies a clear link between the technical system and the organizational resources that are required for its management and maintenance.

PLANT TECHNOLOGY AND ORGANIZATIONAL SIZE

The implications of plant technology on the workflow activities of the turnaround maintenance were analyzed. The types of final products manufactured by the companies influence the designs of the production processes vis-à-vis plant technology. This centralised influences the organising function, in particular, the organization of human resource. As the degree of process complexity (technology) varies from relatively simple (such as the process of manufacturing basic chemicals) to fully integrated-process (example the refining process of liquefied natural gas), the number of employees increases. Perhaps, the following example could well explain one of the many reasons for the increase in the number of employees.

A refinery or process plant in the petroleum industry, for instance, MLNG Sdn Bhd, that employs 1,000 employees places a high priority on safety and environmental aspects in their business operations given the risks and hazards inherent in the production processes and operations. Hence, the companies established the Health, Safety, and Environment Department (HSE) that has a sizeable number of employees to manage the HSE functions organization-wide. On the contrary, Malay-Sino Chemicals Industries Sdn Bhd is relatively small in size with 158 employees. Its HSE Department is rather small in comparisons to the HSE Department of MLNG Sdn Bhd. Similarly, the size of the engineering, maintenance, and training departments among these industries varies to suit their operations' needs.

Plant technology requires administrative and operations management systems for its effective and efficient operations. It demands maintenance work to be carried out to maintain their efficiency and reliability. For this purpose, appropriate organizational resources need to be organised. Depending on the nature of the plant technology, the size of the administrative and operations components varies among the companies. Hence, variations in the size of companies among the process-based industries are apparent. For instance, different types of technical expertise are necessary to maintain different plant technology. A highly mechanised and automated technology in the petrochemical industries places a heavier reliance on electronics and instrumentation specialists (technicians and engineers) in comparison to the relatively less electronic plant technology used by the basic chemicals and palm oil sectors. A Different pattern for organising the turnaround maintenance resources can be seen among these industries vis-à-vis (1) administrative and overheads, (2) labour, (3) equipment, shops fabrication, and materials.

The survey data reported variations in the turnaround planning duration among the companies in the process-based industries. The planning duration depends on the complexity of the turnaround maintenance works and the risk involved in the turnaround. By and large, plant turnaround maintenance that is complex and holds the potential of high risk requires more comprehensive planning and longer time than a plant turnaround that is comparatively less complex and has a lower possibility of danger.