

ABSTRACT

Tea is a very pleasant and popular beverage which is consumed by millions of people worldwide. Tea is produced from the leaves of the plant *Camellia Sinensis*. Tea is not only a popular beverage but also one of the oldest known beverages in the world. It is also believed that tea is an anti oxidative agent which may help in preventing heart ailments and different forms of cancer. With the increase in awareness among the consumers regarding the health benefits of tea, the demand for tea has been on the increase. This increasing demand is met by tea manufacturers located in certain countries. The major producers of tea are located in China, India, Sri Lanka, Kenya, Turkey and Indonesia. These major tea producing countries are also the major exporters of tea.

As marketing of tea facilitates wealth generation in the societies, there is a stiff competition among the major tea producing countries to conquer the global market. In order to survive in this stiff competition, the tea exporters should manufacture tea of high quality. On account of the stiff competition, prevailing in the tea trade, the quality of tea has become a major parameter in fixing the price of tea in the international market. Due to this changing economic scenario, food technocrats and agronomists have been striving to find solutions for improving the quality of tea. Even though food technocrats have contributed towards improving quality of tea, there is very little contribution concerning tea manufacture and

engineering. It is a well known fact that, the manufacturing of tea is carried out using large machineries whose design, production and operation come under the purview of various engineering disciplines. The manufacturing of tea depends on these machineries which play vital roles in determining the quality of the tea manufactured. Under these circumstances, though it appears that only food technocrats and agronomists can contribute towards improving the quality of tea, it is evident that engineers too need to play a lead role in providing solutions for improving the quality of tea.

At present, tea industry has acknowledged the need for infusing high degree of quality to thrive in the stiff global competition among the tea exporters. As tea industry deals with core engineering activities, it is felt that globally accepted approaches like Total Quality Management (TQM) could be used in the tea industry for attaining continuous quality improvement. A literature survey conducted in this direction has revealed that, tea industry is yet to adopt TQM concepts for improving the quality of tea manufactured. On identifying this research and practice gap, the doctoral work reported in this thesis was carried out. During this doctoral work, the practicality of applying a TQM technique called Total Failure Mode and Effects Analysis (TFMEA) for enhancing the quality of tea was investigated.

TFMEA is devoid of any complex computations and procedures and therefore it facilitates illiterate labourers of tea industry to participate in the

endeavour of exercising continuous quality improvement in tea manufacturing. Despite its simplicity, tactical steps are required to be followed to gain the acceptance of TFMEA programme among the labourers and managerial personnel of tea manufacturing companies. A TFMEA model with 13 distinct steps suitable for implementation in tea industry has been designed during the conduct of the doctoral work reported in this thesis.

Two types of tea are produced in the tea industry. They are known as 'green tea' and 'black tea'. Out of these two, black tea is widely manufactured and sold throughout the world. Hence, the manufacturing of black tea has fallen within the scope of the doctoral work reported in this thesis. Implementation studies were conducted in two tea manufacturing companies to investigate the practicality of TFMEA technique in tea industry for attaining continuous quality improvement. Except for a few steps, it was possible to successfully implement all the other steps of the TFMEA technique in the tea manufacturing companies. The results and analysis of the implementation studies revealed that the TFMEA technique is suitable for application in the tea industry and its implementation will help the tea industry to attain continuous quality improvement. The thesis is concluded by stating that more real time case studies are required to be carried out for validating the practicality of implementing TFMEA programme in tea industry.