ABSTRACT:

Small Scale Industries (SSI) occupy a place of strategic importance in Indian economy owing to their significant contribution to the Gross Domestic Product (GDP), employment, manufacturing value added and exports. In the post-liberalization era this sector has been subject to intense and unprecedented global as well as local competition. This is on account of the liberalization of investment regime leading to the increase in Foreign Direct Investment (FDI) inflow, the formation of the World Trade Organization (WTO) forcing its member countries to scale down quantitative and non-quantitative restrictions on imports, and domestic economic reforms. It is imperative, therefore, that appropriate strategies are adopted to enhance their competitive strength and economic performance. Technological innovation is considered to be an important strategy to enhance economic performance in small-scale industries. It is with this backdrop that the present study probes the nature, sources and dimensions of technological innovations and its relationship with economic performance of small enterprises in the precision engineering industry of Peenya Industrial Estate, Bangalore.

The review of literature showed that small enterprises are more conducive to innovation on account of specific advantages such as flexibility, concentration, internal communication and the ability to enter niche areas. Technological innovations are caused by both external and internal factors. The external factors include customer needs, changes brought about by the supplier, competition and inefficient supply channels. The internal factors consist of the objectives held by the entrepreneur, flexible organizational
structure, unutilized resources and R&D Innovations leading to new product/process development are of highest intensity and are called radical innovations Innovations involving modifications in already existing products or processes are of lesser intensity and are termed incremental innovations

Impact of innovation on the economic performance has been measured in terms of changes in output, costs, sales, profits, financial ratios and exports In the Indian context, one of the earliest studies is that of Rama Shastry and Krishnaswamy They classified small firm innovation into two groups innovations relating directly to technology, i.e. process/fabrication, design material etc and innovations relating to available products acting as stimulants, i.e. competitors' products They also found that the environment prevailing in late 1970s was not conducive for innovation Desai and Taneja covered a cross section of industries and found that small scale industries in India have been innovating even before liberalization Majority of the firms developed technology on their own, while the rest imitated others Kharbanda emphasized on the importance of a conducive environment for innovation Bala Subrahmanya found that internal factors were mainly responsible for innovation among the small scale engineering enterprises in Peenya Industrial Estate, Bangalore

There have been few empirical attempts to study the relationship between technological innovation and economic performance of small scale enterprises. The studies done so far used measures such as final output, financial ratios, market share, sales, profits and export performance However none of the studies done so far have assessed the
relationship of technological innovation with economic performance in terms of factor productivities, value addition and the returns to scale. Given the research gaps it is worthwhile to empirically probe the relationship of technological innovation with the parameters of economic performance.

The study is confined to the small scale precision engineering industries in Peenya Industrial Estate, Bangalore. A structured questionnaire was used to gather data about the basic characteristics of the small scale precision engineering enterprises in Peenya Industrial Estate. Further, the objectives, sources and dimensions of technology innovations undertaken were ascertained on the basis of the relative importance given to technological innovation by the entrepreneurs. Parameters of economic performance were compared between groups classified on the basis of innovation expenditure and degrees of innovation, respectively.

The study shows that incremental innovations driven by customer feedback are the most prominent. The primary objectives of technological innovations are quality improvement and cost reduction, apart from meeting customer requirements. Most of the innovative enterprises did not have external sources of technology and developed technology on their own. However, the innovation intensity of these enterprises, measured in terms of the number of employees devoted to innovation and innovation expenditure as a percentage of annual turnover, is found to be low. The analysis of relationship between technological innovations and economic performance revealed that innovating enterprises had higher factor productivities than that of the non-innovating enterprises. Among the
innovating enterprises, which have incurred innovation expenditure, there is a statistically significant positive correlation between innovation expenditure and factor productivities. Kruskal-Wallis test and ANOVA revealed that factor productivities and value addition as a proportion of the value of output do differ between innovating enterprises with and without innovation expenditures, respectively and non-innovating enterprises. Innovating enterprises exhibited higher returns to scale than non-innovating enterprises. Chow test brought out that the higher returns of innovating enterprises than that of non-innovating enterprises have statistical significance.

In sum, economic performance of small scale precision engineering firms, which have carried out incremental technological innovations, is better than that of the non-innovative firms. It is therefore appropriate to conclude that technological innovations, even if incremental, can be used as an effective means of enhancing economic performance of small enterprises. Appropriate policy encouragement, therefore, is called for as a part of the overall small industry development strategy in India.

The study has certain policy implications for small scale industry development in the country. There is an intense need to spread awareness about technological innovation. In this regard, the state-level councils of Science and Technology can play an important role in spreading the awareness about the needs and the benefits of technological innovations and provide technical information/inputs for the benefit of the small enterprises. Technology Resources Centers must reach out to the small enterprises and ensure that the
enterprises derive maximum benefits from the services rendered for carrying out technological innovations

Through financial institutions like Small Industries Development Bank of India (SIDBI), the government could formulate appropriate financial schemes to promote technological innovations. Further small industries working as clusters must think of forming a consortium for promoting technological innovations. In this context, small industries associations can play a key role in promoting such consortia for the promotion of technological innovations among the small enterprises.