

Title of the Project: **The Influence of Technological Innovations on the Growth of Manufacturing SMEs**

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Executive Summary

Small and Medium Enterprises (SMEs) account for a significant proportion of industrial enterprises, employment, national income and exports in developed as well as developing countries. In addition, SMEs are encouraged as a “seed bed of innovation” in industrialized countries.

The innovation capability of SMEs has been recognized only recently in industrializing countries like India. This could be largely attributed to the growing competitive environment for SMEs both locally and globally.

However India’s overall innovation status cannot be considered high absolutely or relatively. According to the Council on Competitiveness (1999), India similar to China and Malaysia registered no international patenting through the mid -to-late 1990s and therefore their innovation indices were virtually zero and were considered imitators, not innovators. The Technology Achievement Index of India was lower to many international economies (UNDP, 2001). But according to the recent Global Innovation Index (GII) of countries, India ranked far ahead of many of industrializing countries and was close to many prominent industrialized countries. This gives an impression that India’s innovative capability of late is on the rise though its actual world ranking may be debatable.

However India does not have any exclusive innovation policy, unlike the industrialized countries. Of course, as part of the XI Five Year Plan, a Working Group on Science and Technology for SMEs has been set up, which has prescribed specific institutional and financial policy measures for implementation to promote SME innovations.

Encouragement to SME innovations is justified on the ground that recent empirical studies have indicated clearly that SMEs are innovative, which help them to improve their scale of operations, market share and performance. However no empirical study has substantiated whether and how innovations help SMEs to grow over a period of time. It is to fill this research gap that the present study is undertaken.

The present study covered SMEs in Auto components, Electronics and Machine Tool sectors in the state of Karnataka. The specific objectives of the research study comprised the following:

- To ascertain the characteristics of manufacturing SMEs in industrial sectors, which offer scope for gradual growth of SMEs

- To study the nature of technological innovations of SMEs, which pursue them with the objective of growth overtime, in the identified industrial sectors

- To analyze the growth of SMEs in terms of investment, employment and production, in the identified industrial sectors

- To probe the contribution of technological innovations to the gradual growth of SMEs, in the identified industrial sectors
- To bring out policy implications to encourage technological innovations as a means of gradual growth of SMEs

The study had two stages: **Stage 1:** Primary data based aggregate analysis covering 72 auto component SMEs, 67 electronic SME and 75 machine tool SMEs. **Stage 2:** Case study based micro analysis consisting of nine case studies. The study was confined to Bangalore Urban and Bangalore Rural districts. The primary data collection and case studies were started in December 2006 and were completed in December 2007.

The analysis of characteristics of SMEs in the three sectors revealed the following: Auto, electronics and machine tool SMEs have come up primarily as start-ups by the existing entrepreneurs. At least 70% of these entrepreneurs had technical education backgrounds in the form of engineering diplomas, graduates, post-graduates and even doctorates.

Majority of these SME entrepreneurs set up their own enterprises to gain self-employment and/or to implement innovative ideas and/or to exploit market opportunities. The current size structure of SMEs in terms of employment, investment and sales turnover indicated its relative skew-ness towards small scale enterprises away from both micro and medium sizes.

Most of these SMEs had relatively latest technologies and their manpower structure comprised about 10% technical executives. Though these SMEs are predominantly domestic market focused, majority considered their markets in general competitive and turbulent rather than placid or monopoly. Accordingly their IT connectivity in the form of fax, e-mail and web page is significantly high.

External interactions of these SMEs are confined to other SMEs and professional consultants but not with large enterprises, R&D establishments and academic institutions. Thus the competitive strategy of SMEs in the increasingly competitive market relied more on strengthening their own capabilities and interactions with similar other SMEs but not with large enterprises/R&D or academic institutions.

Majority of the SMEs carried out technological innovations primarily to enhance their competitiveness. However, not many have set up exclusive R&D divisions though a considerable number of them had exclusive design centres within their premises.

A substantial majority of the innovative SMEs have revealed that they carried out innovations once a year or half yearly or quarterly and abortive innovations accounted for about a quarter in electronics, one-fifth in auto components and one-tenth in machine tools. This is so despite majority claiming to have implemented high-value innovations rather than moderate/low value innovations.

The recognitions won by SMEs recognitions were limited to winning national awards: about 22% of the SMEs in auto components, 10% in electronics and almost 50% in machine tools have won national awards. The negligible presence of patents refers to the widely held belief that 'patenting culture' is low among SMEs. However majority SMEs could achieve a significant share of innovation sales in their total sales.

SMEs as a group have registered higher sales growth as compared to investment growth and employment growth. Between innovative and non-innovative SMEs, innovative SMEs have out-performed non-innovative SMEs in all the growth parameters. However, within innovative SMEs, analysis did not bring out consistent results to indicate that new product/process developing SMEs are better-off relative to SMEs engaged in improving existing products/processes. Similarly there is no unambiguous result to prove

that SMEs involved in high value innovations are better placed compared to SMEs involved in moderate/low value innovations.

The analysis of economic performance of innovative SMEs in terms of returns to scale for two different periods of time clearly brought out that these SMEs achieved increasing returns to scale and they marginally improved from 2001/02 to 2005/06. However the improvement in returns to scale was statistically significant for SMEs of auto components but not for electronics and machine tools. But it is significant that innovative SMEs in all the three sectors could sustain their increasing returns to scale over a period of time.

There is a statistically significant positive correlation between percentage of innovation sales in total sales and growth rate of sales of innovative SMEs. Regression analysis revealed that innovation sales along with growth rates of labour and capital have a significant influence on the rate of growth of sales turnover of innovative SMEs.

Regression analysis using a dummy variable for high growth and low growth innovative SMEs, along with labour and capital for the dependent variable of gross value added brought out that innovation sales had a stronger association with gross value added in electronics and machine tool sectors but not in auto components. Overall, empirical analysis in the context of manufacturing SMEs in auto components, electronics and machine tool sectors of Karnataka substantiated that innovation positively contributes to the performance and growth of SMEs.

The nine case studies substantiated that innovation leads to enhancement of firm performance and growth. In addition case studies' analyses enabled the following general conclusions:

1. Incremental innovation is more clearly associated with growth than radical innovation.
2. The pull force of indigenous market is stronger for incremental innovation than for radical innovation.
3. More often the radical innovative efforts take place in isolation of customer needs and tend to fail in the market.
4. The international market demands very high quality of products which in turn trigger higher degree process innovations.
5. The SMEs go for interactions with an R&D institution for new product development or product improvement more often than for process improvements.

However, these conclusions are qualitative and more in the nature of hypotheses. It is therefore necessary to set up appropriate hypotheses and test them in further studies.

Policy Recommendations

Based on the aggregate empirical analysis and micro level case study based analysis to ascertain the influence of technological innovations on the growth of manufacturing SMEs in Karnataka the following policy recommendations are made:

- SMEs in general are innovative and therefore, to exploit their innovation potential, it is necessary to formulate an innovation policy both at the national and regional levels to take care of their micro needs in terms of finance, training of personnel, infrastructure, etc.

- Financial infrastructure must be strengthened for extending financial support to the innovations of SMEs by Small Industries Development Bank of India (SIDBI) branches and SSI specialized branches of Public Sector Banks.

- The relationship with large enterprises can be an important source of support for innovations. Therefore subcontracting relationship between SMEs and large firms including Transnational Corporations (TNCs) operating within the country as well as outside must be consciously encouraged.

- SMEs should be encouraged to develop contacts with R&D laboratories and technical institutes of research & higher learning for their innovation activities.

- Innovative SMEs should be encouraged to cultivate 'patenting culture' and information as well as financial assistance towards this objective must be significantly available at the State level.

- Micro, Small and Medium Enterprises (MSME) Development Institute along with regional SME Associations should identify start-ups which carry out innovations, on a periodic basis, for extending encouragement and support.

- Similarly official efforts must be made to identify SMEs which have successfully grown over a period of time to graduate into medium and large firms due to innovations, to spread the message of innovation contribution to the competitiveness and growth of SMEs.

These above policy recommendations would go a long way in laying the right policy thrust to encourage innovations, competitiveness and growth of SMEs