

## Abstract

This study investigates the performance of the Large Scale Manufacturing Industries (LSMI) at four-digit level and how agglomeration economies promote productivity at establishment level in the Punjab province of Pakistan utilizing the survey data for the years 1995-96, 2000-2001 and 2005-06 collected from the Punjab Bureau of Statistics (PBS). The research questions to be interrogated are: (1) how the average rate of technical efficiency and productivity in the LSMI changed during 1995-2005? (2) What are the key factors which determine the spatial agglomeration of LSMI? (3) What are the effects of spatial concentration or agglomeration of LSMI on its productivity at establishment level? Are establishments at an advantage when they are spatially agglomerated in contrast when they are spatially dispersed? And (4) which industrial policy is beneficial through which spatial agglomeration may enhance the productivity of LSMI? Should the industrial policy be biased in favour of specialization (localisation) or in favour of diversification (urbanisation) to enhance the performance of the manufacturing sector of the Punjab province?

The study on the spatial agglomeration of the manufacturing sector and its impact on the establishments' productivity in the Punjab province provide important results and policy implications for the planning and development of the industrial sector of the province. A careful reading of literature on the economy of Pakistan reflects that specific issue of agglomeration (urbanisation and localisation) effects on productivity of LSMI has been overlooked in Pakistan.

In this study, the performance of LSMI in terms of productivity and efficiency is determined by using Malmaquist productivity index that is non-parametric approach. It is further decomposed into technical change, efficiency change and scale efficiency change. Moreover, the bootstrapping methodology is applied to get the confidence intervals for the mean values of Malmquist productivity indices to perform statistical inferences.

The study utilizes Ellison and Glaeser (EG) index to investigate the pattern of spatial agglomeration of LSMI and finds that its pattern is quite dissimilar in contrast with developed countries. This study further investigates the sources of spatial agglomeration of manufacturing sector by taking EG index as explained variable and

Masalian factors (knowledge spillovers, input sharing and labour pooling) as explanatory variables along with control variables (natural advantages, transportation cost and scale economies). The results suggest that knowledge spillovers, labour pooling and scale economies are positive and statistically significant determinants of industrial agglomeration. Moreover, transportation cost is significant and has inverse relation with EG index, which implies that industries in Punjab province do not prefer to concentrate in an urban setup where the per unit transportation cost is high.

This study also examines whether spatial agglomeration of LSMI facilitates establishments to enhance their productivity in the Punjab province of Pakistan by utilizing production function framework. The production function estimated individually for the seven groups of LSMI, each group contains four-digit manufacturing establishments i.e (1) Traditional, (2) Textile and Leather Products, (3) Heavy, (4) High-Tech, (5) Transportation or Auto-Parts, (6) Machinery and (7) Sports and Surgical Instruments. The results of production function suggest that the role of spatially agglomerated LSMI is vital in enhancing the productivity at establishment level. In general, the impact of localisation (specialization) is positive and stronger than urbanisation (diversification) which implies that locating manufacturing establishments in a particular district leads to enhance the productivity of establishments. Therefore, government policy should be biased to promote localisation.