Abstract

The productivity improvement is an issue that combines the effect of various productivity attributes. Development of productivity model showing impact of various productivity attributes is vital to enhance productivity. Therefore, this research work is focused on the comprehensive productivity system dynamics (SD) model in manufacturing industries. The SD model plays a very important role in productivity measurement thereby, suggests the strategies for achieving targeted productivity in shorter period of time significantly influencing the production and employees wage growth. It is important that the productivity team understand that the managerial strategy affects the performance of organization. The initial feedback in the strategy development process avoids re-work loops needed to utilize resources capacity utilization of manufacturing industry. The SD model will help researchers and manufacturing organizations to understand the issues involved and to set better managerial strategies for productivity improvement. The work is carried out in four phases.

The concept of multi factor productivity has received much attention in the past four decades, however, different scholars who have investigated productivity issues have done it mostly independent of each other and widespread literature review has not been presented so far. The work aims to identify the attributes affecting productivity and performance of various industrial sectors. The work further categorizes identified attributes into five major key factors including human resource management (HRM), organizational culture (OC), production methodology (PM), management strategy (MS), and performance (PER).

Although there are number of studies investigate attributes affecting productivity, the research in the measurement of productivity attributes has been incomplete. In an attempt to deal this gap, the work is extended to integrate the attributes for developing a measure to tap those attributes. The measuring tool, questionnaire on productivity attributes (QPA), is based on five-dimensional conceptual framework. A measurement model that provides a way to construct linear measures from ordinal data has been also introduced in this work. Similarly, functioning of the response categorization of the QPA is demonstrated by developing rating scale model. The designed questionnaire provides new insights into how to avoid the trade-offs commonly observed in productivity research. The newly designed QPA appears as a general measure for productivity attributes which can be used by scholars and practitioners to conduct basic research on productivity improvement in various industries.
The research work is carried to develop a structural equation model (SEM) for exploring key productivity factors to overcome some of the issues related with productivity enhancement and measurement in manufacturing industries. The methodology has been developed in five clearly defined steps including model specification, model identification, model estimation, model testing, and model modification. The Malcolm Baldrige National Quality Award (MBNQA) framework is used to develop basic productivity model. Further best fit measurement model is developed showing acceptable goodness of fit (GOF) indices. Afterward, improved productivity SEM having acceptable GOF indices is developed. SEM proposes causal relationship among key productivity factors in terms of driver and system elements. From results, it is clear that five-key factors incorporate organizational culture, human resource management, management strategy, production methodology, and performance leading to a conceptual model. The quantitative relationship will become a key guideline to develop managerial tool for productivity improvement as well as to develop productivity models for its measurement at various levels in manufacturing industries.

This study presents preliminary work on modeling and brings to light the execution dynamics of the key productivity factors in manufacturing industries. The model focuses on execution as well as intervention of key productivity factors to develop a tool assessing the current productivity maturity level of industry and plans for productivity improvement. The diverse relations among key factors are brought together in a cohesive system dynamics model to investigate performance. Three feedback loops- driver loop, system loop, and productivity index loop are recognized and the role of these loops in the dynamics of productivity improvement strategy is discussed. A causal loop diagram is obtained and on this basis a detailed system dynamics (SD) model is developed. The simulated results conclude that for any industry having no productivity concern should first and foremost focus on enhancing the ‘organizational culture’, ‘human resource management’, and ‘performance’ factors to achieve higher maturity levels in the future. The contribution of the study is in bringing together the dynamics of the driver and system elements affecting productivity, which can be also useful for realizing the dynamics of other industries.

Finally, System dynamics productivity model is executed in a small scale manufacturing industry. Initially, by using SD model productivity index (PI) of the industry is measured. The current productivity maturity level is estimated with the help of measured PI and establishment year of industry. Further, various attributes considered in the model are assessed for the firm. Through assessment attribute gap results are found out. The identified
gap results are used to set managerial strategy for productivity improvement. The developed strategy is recommended to the industry. It is found that the recommended strategy is useful for management to carry out productivity improvement program.