Companies today find themselves in a highly competitive environment of rapidly changing operational requirements. The need is to manage increasing product complexities, shorter time to market, newer technologies and threats of global competition. The project management techniques need to be revisited to improve its application and effectiveness. The most popular methods for project planning and management are based on a network diagram such as Program Evaluation and Review Technique (PERT) and the Critical Path Method (CPM). These tools did not consider number of factors which are important for real-life project management. The extensions on these tools like decision CPM (DCPM), Graphical Evaluation and Review Technique (GERT), and Venture Evaluation and Review Technique (VERT) are limited in application.

The need for powerful graphical and analytical tools arises in project management to meet the growing applications. Simulation is a powerful technique for solving a wide variety of problems. Modeling and simulation can help in reduce projects cycle time; reduce cost and the amount of testing that must be done during development project. The manufacturing projects need fast and reliable decision making tool for better management. Random selection of activity duration with its appropriate probability distribution will make the project estimation close to reality. The methods for
estimation of project completion time with rework probability, with increased resources and with stochastic activity duration are developed and demonstrated using spreadsheet simulation. Cost management of the manufacturing projects is exemplified using spreadsheet simulation. The application of Petri Net (PN) for modeling, simulation and analysis for manufacturing projects is detailed

Resource leveling is the project management function of resolving project resource over-allocation. This process of rescheduling of project activities without affecting the project completion date will result in effective resource usage and cost effective project schedule. Memetic algorithms and Particle Swarm Optimization (PSO) algorithms are developed for resource leveling application and are validated. The proposed methodology is easy to handle and proposed alternative schedules which allows flexibility in managing.

Resource allocation procedures are aimed at obtaining the shortest project schedule and minimum cost by allocating the available limited resources to project activities. It is a process of scheduling the project activities as and when the required resources are ready or in other words a process of allocating the limited resources period by period basis to some subset of activities that requires attention. Proposed procedures provide optimal alternate solutions in terms of minimizing the project completion time. This work confirms an alternative and efficient methodology for solving resource constrained project scheduling problems and opening the application of Bacteria Foraging Optimization Algorithm (BFO), genetic
algorithm and memetic algorithm to the optimization of scheduling of manufacturing projects under resource constrained environment.

Managing multiple projects is a complex task. It involves the integration of varieties of resources and schedules. The researchers have proposed many tools and techniques for single project scheduling. Mathematical programming and heuristics are limited in application. In recent years non-traditional techniques are attempted for scheduling. This research proposes the use of a heuristic and meta heuristics for scheduling a multi-project environment with an objective to minimize the make span of the projects. The proposed method is validated with numerical examples.