The conventional simplex procedure is a univariate search technique and suffers from the drawback of slow convergence. Researchers at one stage felt that one has to live with this algorithm since none was found better. Multivariate search procedures such as the gradient or conjugate gradient techniques are used in seeking solution for nonlinear programming problems. The major obstacle in employing the multivariate search technique to solve linear programming problem was to select a set of linearly independent vectors to form a basis. This problem was overcome recently by the development of a multiplex algorithm. This paved the way to choose a set of linearly independent vectors and thus bring a large number of variables into the basis at a time. This algorithm led to saving in computational effort compared to the proven and well founded simplex algorithm. What are the relative merits of the multiplex algorithm compared to simplex? Does the preservation of the feasibility property be an obsession to fast rate of convergence? Should it not be possible to extend multiplex algorithm to solve quadratic programming problems? Cannot this algorithm be suitably modified to solve bounded variable linear programming problems? Questions of this kind and many more thronged the author and they motivated him to undertake investigations in these
The first step which is a big stride is the construction of the 'θ' matrix. It is this matrix which enables to select a set of promising and linearly independent vectors to generate a basis not only at start but also in between passes until the optimal solution is reached.

The construction of the 'θ' matrix at start of each pass was computationally an expensive operation.

A modified multiplex algorithm to induct a set of linearly independent vectors into the basis without constructing the 'θ' matrix at the beginning of each pass, is a significant step. The transpose of the constraint matrix is employed to make the choice and this has resulted in appreciable saving in computer time.

The modified multiplex algorithm is capable of cutting right across the constraint set and finds optimal solution in a single pass, without any overshoot.

The saving in time comes from two fronts. This algorithm does not compute the relative contribution/cost coefficient for each variable as many times as the simplex algorithm and suppresses the tendency of variables popping in and out of basis.

A revised multiplex algorithm has been developed to study the effect of preserving the feasibility property on the rate of convergence. The conclusion of this study was
that preservation of feasibility property introduces a drag on the rate of convergence. A significant conclusion arrived is that acceptance of infeasible solution in the course of searching for optimal solution makes the convergence rapid. A dogmatic preservation of the feasibility property is detrimental to the speed of convergence.

In the course of the above investigation, a new range of basic solutions which hitherto was unknown was hit.

The range of solution has been divided into two zones, in one of which the modified multiplex algorithm is employed to accelerate convergence and in the other, the dual multiplex algorithm has been used to remove infeasibility from the solution in as few passes as possible. These two algorithms together make a new approach to improve the rate of convergence.

The conventional dual simplex procedure removes only a single infeasible variable from the basis at a time. A dual multiplex algorithm similar to the multiplex has been developed. This algorithm removes a set of infeasible variables from the basis at a time. The applications of multiplex and dual multiplex algorithms to bounded variables problems have worked equally efficiently and very encouraging results have been obtained. Quadratic programming problems were also solved by the multiplex algorithm. It is found from computational experience that multiplex algorithm works equally efficiently for quadratic programming problems also.
The following few problems are suggested for further investigation:

i. Finding solution for a class of linear programming problems without computing the pricing vector by suitably modifying the steps of the simplex algorithm. This may lead to some saving in computational effort.

ii. Representing sparse matrix using Data Structure concept which will save storage and additional computational effort.

iii. Extending the modified multiplex algorithm to solve problems solvable by decomposition principle.

iv. Utilizing the 'Θ' matrix to identify redundant constraints in a given problem to mitigate unnecessary computations.

v. Extending modified multiplex algorithm to the study of sensitivity of LP problems.

vi. Utilising the dual multiplex algorithm to remove more than one infeasible variable while employing Gomory's cutting plane algorithm to solve Linear Integer Programming problems.