LITERATURE REVIEWS

Beraldi et al. (2009) developed a two-stage stochastic programming formulation for solving the CSP under uncertainty. The objective function was to minimize both setup cost and raw material cost, subjected to uncertainty customer demands, fitting to the given width length, and the limitation of maximum number of products that can be cut from one pattern. The random vector of customer demands was created as uncertain scenarios. The conclusion claimed that the stochastic solution was more robust and provided recommendations to the decision maker with added value and better quality than the expected demand solution.

Birge and Louveaux (1997) described that a stochastic programming is a framework for modeling optimization problems that involve uncertainty. Two basic models of stochastic program are chance constraint model and two-stage model. For two-stage program, the decision maker makes a decision in the first stage then the random effects occur. After that the decision maker can make a second-stage decision that compensates for any bad effects from the first-stage decision. For chance constraint model, it does not require that our decisions are feasible for every outcome of the random parameters, but require feasibility with at least some specified probability. Dantzig (1955) was the first, considered the stochastic program with recourse under the name two-stage linear programs under uncertainty.

Approaches for solving stochastic program with reducing scenarios can be performed as Monte Carlo sampling based-methods (Ermoliev, 1983), importance sampling method (Dantzig and Glynn, 1990) and stochastic decomposition methods (Higle and Sen, 1991).

Many algorithms were developed for solving stochastic program with recourse such as (Elmaghraby, 1959 and 1960), (Ziemba, 1970), (Garstka and Rutenberg, 1973), and (Audsley et al., 2000).

Elmaghraby (1959) presented that production problem with stochastic demand, when distribution function demand is discrete, can be transformed to be the linear programming problem. The objective function is minimizing production cost plus storage cost plus shortage cost. The objective function was proved to be a piecewise convex function. To transform the stochastic problem to be linear programming problem, the objective function of minimizing cost is changed to be minimizing partial differentiate of original objective function. In addition, the numerical examples of transforming problem were applied. Moreover, Elmaghraby (1960) proposed the particular problem when the demand is in continuous distribution.

Ziemba (1970) modified the convex simplex method for solving convex stochastic program with simple recourse.

Garstka and Rutenberg (1973) presented a procedure for solving discrete stochastic programs with recourse. It views the m stochastic elements of the right-hand side vector as an m-dimensional space in which each combination of the discrete values is a lattice point. For a given second stage basis, certain of lattice points are feasible. A procedure is presented to delete infeasible points from this m-dimensional