Optimizing the Profit Using Linear Programming:A Case Study on a Concrete Yard of a Government Corporation in Sri Lanka

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The effective and optimum decision making in modern business environment is critical due to the competition and complexity. When considering a manufacturing organization, the most critical decision would be to identify the product mix that will maximize the profit while maintaining the required quality standards. This study is focused on optimizing the profit of a concrete yard of a government corporation in Sri Lanka using linear programming.

The organization considered produces Beams, Poles, Pipes and Bridge components and has available expenditure, skilled-labour and demand as the main constraints. Per unit selling price or non-labour costs do not vary based on the level of production. However the labour cost varies significantly according to the type of labour (skilled or non-skilled) allocated to different products. Therefore labour allocation becomes a sub-problem in the study. The data from March 2014 to July 2014 (150 days) was collected for the study.

This study reveals that the organization is capable of improving its profits if they produce at the optimum level. In most of the months that have been considered, the total profits can be improved over Rs.150,000 based on optimum production. The criticality of labour allocation has been proven by the results of the study. Because based on the optimum labour allocation, the organization is capable of improving its profits even if they are committed for a product mix other than the optimum product mix. This can be done by minimizing the total labour costs. Based on the optimum labour allocation for the actual production the profit can be improved over Rs.75,000 for the considered months. The sensitivity analysis indicates the sensitivity of the coefficients of the objective function and the constraints. The sensitivity of the variables as well as constraints vary based on considering time duration. The constraints have positive as well as negative shadow prices.

This model can be used to identify the future product mixes that will maximize the profit while maintaining the quality standards based on the resource availability. Even if the coefficients of the variables subjected to change, still the model can be used with little amendments to improve the profits.

Key words: Linear Programming, Optimization, Constraints, Sensitivity Analysis, Shadow Price

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