

## INDUSTRIAL ENGINEERING (IND)

- IND 8401      **Aventino, Lindsay R. (MS Ind. Eng'g.)**  
**A system dynamics model of the production-price behavior of the sugar industry in the Philippines. 1984.**

A computer simulation model of the production-price behavior of the sugar industry of the Philippines is constructed using System Dynamics methodology. The governing dynamic equations are programmed in DYNAMO. The model, under the prevailing policies, reproduces the past history of the system (1974 to 1982) adequately. It could be used as a tool to evaluate different policies on pricing, production and marketing for long-term planning. This model provides national policy makers with a scientific basis to investigate the impact of their policies with respect to the total view of the sugar industry.

- IND 8502      **Asuncion, Roberto M. (MS Ind. Eng'g.)**  
**An investigation of dynamic programming models as applied to a production-smoothing problem. 1985.**

The application of dynamic programming (DP) models to a production-smoothing problem is studied. Two DP models: Type I (no penalty costs) and Type II (with penalty costs) are presented under consideration of deterministic demand and wherein production capacity is constrained by the number of full-shift and overtime production available for each period of a T-period planning horizon. It is shown that under certain production situations such models can be

effectively applied.

The Type I Model derives a minimum-cost production plan based on given demand forecasts. The Type II Model, however, results in a set of alternative minimum-cost production plans based on an already given plan. Furthermore, in the Type II Model, a stochastic variable ("noise") is incorporated expected demand fluctuations.

IND 8903      **Castillo, Aura V. (MS Ind. Eng'g.)**  
**Development of a productivity index for engineering schools using multiattribute analysis.**

The measurement of productivity of education systems necessarily rely on numerous interrelated aspects and judgements. This paper illustrates an application of the concepts of multiattribute utility evaluation of productivity for engineering educational institutions based on the assessment of deans of engineering schools/colleges in the Philippines. The school administrators selected for the surveys and elicitation process were from school that offered at least two of the four major engineering baccalaureate programs. These are, B.S. Chemical Engineering, B.S. Civil Engineering, Electrical Engineering and B.S. Mechanical Engineering. Sixty-eight schools were selected from the total list of 196 engineering schools (based on the official list of recognized engineering schools as of 1987. Technical Panel for Engineering Education) as prospective respondents.

Seventeen measures of productivity were identified: cost efficiency, completion rate, percentage of honor graduates, board examination passing percentage, board examination competitiveness, probability of employment, probability of engineering employment, quality and quantity of research outputs expressed in terms of number of completed research projects and number of research projects with impact, number of published books, number of articles/technical papers written, number of technical papers presented, number of technical lectures delivered number of sponsored seminars, number of consultancy projects, faculty research involvement, faculty publication involvement, and consultancy involvement.

The assessment produced an additive multiattribute

function with a bilinear submodel for quality and quantity of research outputs. The model was tested using 4 engineering schools in the National Capital Region. Information regarding productivity measures were kindly provided by the respective school administrators and the Technical Panel for Engineering Education Research and Development Group. The model was partially successful in evaluating the performance of the selected schools.

The potential application of the resulting aggregate measure is promising. However, it will have to go through refinements and adjustments to be truly representative of the preference consensus of the different school administrators. The development of model relating the productivity index with a capability index is suggested as the most interesting extensions of the model.

IND 9004      Nicdao, Derrick J. (MS'Ind. Eng'g,)  
Computer-aided maintenance and operating cost  
allocation model for the UP Diliman academic units.  
1990.

Preparation of Maintenance and Operating Expenses (MOE) budget in the past years has been done using the traditional method of budgeting. The main purpose of this thesis is to develop a computer-aided model in preparation of budget proposals for each UP Diliman academic units. This model is designed to consider relevant factors in determining the amount to be allocated. It is to be used by decision-makers starting from the level of the departments chairmen up to the chancellor's level.

The model is not a straight-forward maximizing one, but definitely allows flexibility for the decision-maker in analyzing the different ways of using the university's resources. It intends to achieve an acceptable budget that will stand scrutiny from outside agencies. Furthermore, it requires active participation from all persons concerned in preparing the budget proposals.

Lastly, it is recommended that a study be conducted to determine the applicability of this model to other areas of budgeting. In addition, further refinement of the process to include some other essential characteristics of the units may be considered.

A methodology to determine the effect of the levels of productions automation of productivity, quality and working conditions.

1991.

A methodology for determining the effects of production automation on productivity, quality and working conditions was developed. This methodology involved characterization of the level and degree of production automation using an Automation Profiling Chart. Ten Levels of Automation ranging from manual to fully automated systems were defined. The effects of automating a specific manufacturing task were evaluated using quantitative and qualitative measures. Effect of automation on productivity was measured in terms of output to input ratios. Effect of automation on quality was gauged based on rejection rate, rework rate and scrappage rate. Effect of automation on working conditions was evaluated based on qualitative indicators such as exposure to hazards and toxic chemicals, fatigue, difficulty of work, material handling required and manual control needed.

Three production processes performed at different levels of automation were studied. Results of the study confirmed earlier assertions on labor-productivity-increasing effects if production automation. Based on this study, quality performance is found to be dependent on the extent of automation i.e. small difference in the levels of automation may not yield the desired increase in quality performance. This study also shows that working conditions in an automated environment is better than that in a manual process.

The study points to new areas of investigation. For instance, other production inputs such as material, energy and capital should also be considered when measuring the effects of automation on productivity. The study could also be enhanced by using quantitative measures to determine the effects of production automation on working conditions. The application of automation profiling methodology on a specific operation or equipment is also a good subject for future research. This study could also be extended to cover a number of companies in a specific industry. Finally, a comprehensive yardstick when deciding on automation projects such as a Automation Justification Index is recommended for further study.