

# Economic Justification for Advanced Manufacturing Systems

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This paper describes about the economic justification of advanced manufacturing systems to achieve excellence in manufacturing.

Traditionally, the analytical methods such as rate of return, payback period, and future cash flows have been widely used to make for manufacturing systems efficient. It is important to consider strategic factors in conjunction with the traditional analytical methods for economic justification.

However, it is difficult to assess and incorporate the impact of strategic factors in economic decision making due to the difficulties of quantifying the economic measure of productivity, quantity and flexibility. It has been noted that for efficient economic justification, it is not sufficient to quantify the economic related variables.

As a part of the economic justification research, an attempt has been made to identify the strategic factors involved in economic decision making since flexibility is an important evaluation factor in the overall economic justification process for advanced manufacturing systems. It is important to refine the existing method of quantifying flexibility before making any attempts to build the general framework for economic justification.

In this paper a method of quantifying flexibility is presented.

The task of quantifying flexibility is an important consideration because it is still remained as not a properly resolved technical issue.

Flexibility is considered as a dynamic variable, since different subsystems have different values each other within a system. The identification and

consideration of various components of flexibility will depend on the user accuracy requirements of assessing flexibility.

A methodology for quantifying flexibility consists of four components of flexibility such as the machine flexibility, the part family flexibility, the operations flexibility, and the demand flexibility like Sridharan Venk.

As a part of the economic justification research, the interrelationship of the four components of flexibility to the overall system was investigated.

It has been assumed that the demand forecast made for any products applies equally for all parts that are assembled to form the finished product.

The concept of overall subsystem flexibility at a demand level, part family level, and operations level, and the pure component flexibility for machine, part family and demand, was also investigated. A method for carrying out economic justification of advanced manufacturing systems is also presented.

A general framework for economic justification of advanced manufacturing systems is presented in the form of two important stages such as project classification stage and strategic optimization cycle.

problem formulation is the first step in optimization. As a part of problem formulation, the important input and output variables are identified and classified. For each of the input and output variables initial region to start optimization, and the constraint limits are identified.

Finally, a case study is presented to demonstrate the application of the strategic optimization cycle, and the method of quantifying flexibility.

#### REFERENCES

1. Bessant, J. and W. Haywood, "Flexibility in Manufacturing Systems", OMEGA, International Journal of Management Sciences, Vol. 14, No. 6, 1986
2. C. S. Park, K. Y. Son, "An Economic Evaluation Model for Advanced Manufacturing Systems", The Engineering Economist, Vol. 34, No. 1, 1988
3. A. Mital, J. L. George, "Economic Feasibility of a product Assembly Line : A Case Study", The Engineering Economist, Vol. 35, No. 1, 1989
4. S. Padmanabhan, "A Tandem Expert System as Justification for a Flexible Manufacturing System", Journal of Manufacturing Systems, Vol. 8, No. 3, 1989
5. V. Sridharan, "Strategic Optimization Cycle as a Competitive Tool for Economic Justification of Advanced Manufacturing System", Journal of Manufacturing Systems, Vol. 9, No. 3, 1990