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Benefits in Implementation of PPM Technique in Manufacturing Industry

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ABSTRACT

Evaluating technological investments has been a central concern in industrial engineering research and practice for decades. Critical path method (CPM), PERT and project portfolio management (PPM) are intangible frameworks that are most widely used to attain utmost efficiency and increase the technical and financial benefits in small scale industries to big corporate companies. The benefits of adopting PPM includes maximizes the value of investments while minimizing risk, improves communication between design and manufacturing teams, alignment between product innovation and business leaders, encouraging business leaders to act as team players, allowing planners to allocate resources more efficiently and to ceasing the loss generating products/projects. The present research study aims to evaluate the benefits of implementation of PPM technique and find the major benefit factor by employing the technique in manufacturing industry. The primary data that was required for analysis was collected from the selected of respondents of companies through a well-structured survey questionnaire. This exploratory research study endeavors its evaluation based on the data analysis and concludes statistical analysis using cumulative weighed average (CWA) and chi-square analysis techniques. The analysis unveiled that PPM technique provides many benefits and identifying appropriate technology to align with market dynamics and identifying and managing gaps in product portfolio are the major benefits that PPM implementing companies attains. The identified problems should be eluded to maximize the benefits of project portfolio management.

Keywords: Capability Maturity, Product Innovation, PPM Technique, Strategic Business Management.

I. INTRODUCTION

Making the right product innovation and decisions on design improvements with the given limited available resources such as budget, time, and human resources is both critical and challenging. This decision must bridge the service gap between where the enterprise currently is and where it wants or needs to go. It is a real challenge to select the right product that provide the highest value to the business and ensure that they get implemented to align with strategic plans of the company to dwell in a rapidly changing dynamic market environment. Generally, selecting right product/project at the right time is crucial to sustain a competitive advantage, yet many organizations struggle with allocating limited resources and assets wisely [1]. PPM technique has become a manifestation of the business's strategy.

Generally, in any company, the senior management quiet momentous in evaluating the impact, whenever they introduce a new process or tool, especially the benefits. The impact of organizational benefits of project portfolio was subject to an inquiry. The main benefits that organizations expect from adopting project portfolio management includes maximizing the value of product investments while minimizing risk, improving team communication and alignment between design and business leaders, and encouraging business leaders to act as team players, allowing planners to allocate resources more efficiently and to terminate projects.[2] Also PPM impacts the performance of the organization's strategic activities such as improving the product/projects value of each product/project in the portfolio, optimizing the investment, delivering products in on time for effective project evaluation.

Saaty has proposed a new decision making model called "Analytical Hierarchy Process (AHP)". AHP is a process for developing a numerical score to rank each decision alternative based on how well each alternative meets the decision maker's criteria. So this model helps decision makers to rationally select the best alternative based on the qualitative and quantitative approach [3]. Bell et al., have developed a model to select a portfolio of projects that maximized an economic benefit function, subject to given resource availability in each of several future time periods. The most important shortcoming in applying linear programming to portfolio selection problems is the assumption of 'additivity' which does not consider the interrelation among the projects. The additivity assumption implies that, for each function in linear programming models, the total function value i.e. portfolio value can be represented by the linearly added sum of the individual contributions from the related projects [4].

Sounder [5] has used a methodology to develop performance profiles and assess the usefulness of few operational research models such as linear model, non-linear model, scoring, zero-one model, profitability index, and utility models. Profitability index and scoring types of models were found to have the easiest usability and the lowest cost performance characteristics, while the linear, nonlinear and zero-one models had the highest realism, flexibility and capability. Baker and Freeland [6] noted that many of project selection models that were developed in the past were actually ignored in practice. The most widespread method was still traditional capital budgeting thus ignoring the non-monetary aspects of the projects. Farquhar and Rao [7] have proposed the Balance Model to evaluate portfolios of multi-attributed items. In particular, 'balance' of a portfolio refers to homogeneity of items with respect to some attributes and heterogeneity with respect to other attributes. Rao et al. [8] applied the Balance Model for evaluating alternative firms for acquisition (i.e. evaluating the portfolio of acquired firms). In addition, Roussel et al. [9] have discussed the analysis of R&D portfolio in similar concept of portfolio balance that was considered in different dimensions. They illustrated a bubble diagram to show the two-dimensional distribution of the individual projects along the spectrum of specific portfolio contexts. The display raises interesting questions for R&D managers and thus facilitates the decision making process.

Benefits of PPM comprises of the following 11 elements:

- Zeroing in on the Right Projects
- Investment of Funds in Appropriate Business Areas
- Elimination Efforts on Project Redundancies
- Elimination Plans of Unyielding Projects
- Optimal Allocation of Resources
- Role of PPM on Increased Cost Savings
- Alignment Levels of Projects with Business Strategy, Impact on Profits
- Identifying and Managing Gaps in the Portfolio
- Contribution to reduced Time to Market
- Identifying Appropriate Technology to Align with Market Dynamics.

The above elements are used as parameters to measure the benefits of the PPM and the collective response ratings of the all elements ascertain the adherence levels of the concept.

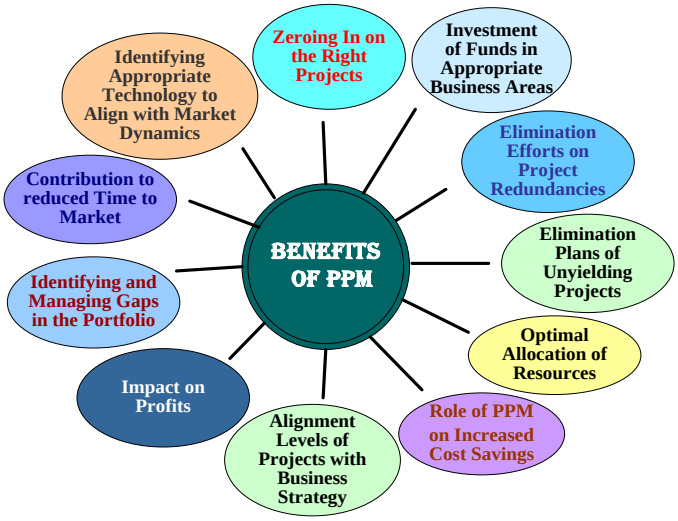

Figure 1 : Benefits of project portfolio management (PPM)

II. METHODS AND MATERIAL

Benefits of PPM – Elements	CWA
Zeroing In on the Right Product/Projects	3.21
Investment of Funds in Appropriate Business Areas	3.19
Elimination Efforts on Product/Project Redundancies	3.22

Elimination Plans of Unyielding Projects	3.2
Optimal Allocation of Resources	3.24
Role of PPM on Increased Cost Savings	3.21
Alignment Levels of Products/Projects with Business Strategy	3.22
Impact on Profits	3.23
Identifying and Managing Gaps in the Product Portfolio	3.25
Contribution to reduced Time to Market	3.24
Identifying Appropriate Technology to Align with Market Dynamics	3.32
Total Cumulative Weighted Average (CWA)	**3.23**

III. RESULTS AND DISCUSSION

The findings of the research study that are related to elements of Benefits of PPM are discussed and presented in the below paragraphs.

A. Analysis using Cumulative Weighted Average

The research study results are depicted in figure 1 and figure 2. As shown in figure 2, the results were clearly revealing that identifying appropriate technology to align with market dynamics is the major benefit of PPM followed by identifying and managing gaps in the product portfolio. CWA values were ranging from 3.19 to 3.32 on 5-point scale with respect to the elements of benefits of PPM offered.

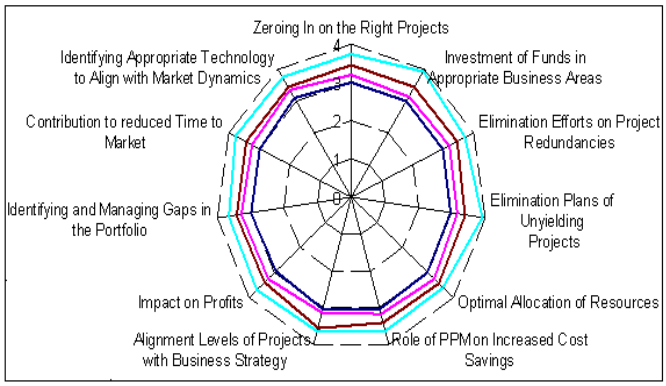

Figure 2 : Adherence Levels of PPM Benefits

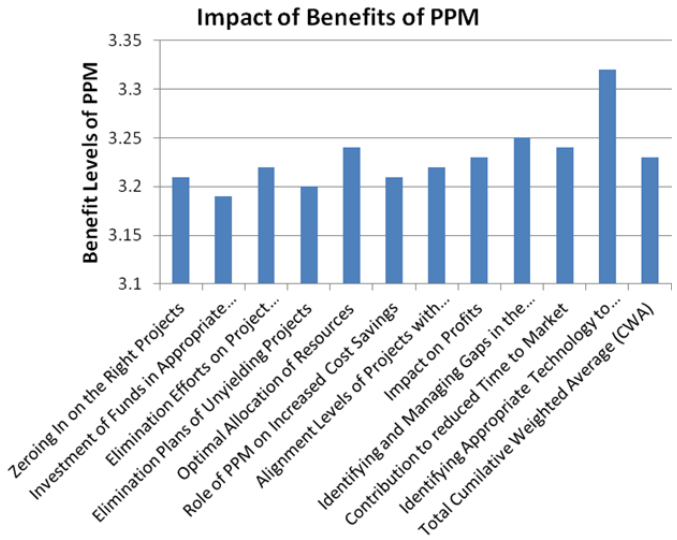

Figure 3 : Factors vs. Adherence levels of Benefits

B. Chi-square Analysis

Chi-squared test, also referred to as χ^2 test (or chi-square test), is any statistical hypothesis test in which the sampling distribution of the test statistic is a chi-square distribution when the null hypothesis is true. Chi-squared tests are often constructed from a sum of squared errors, or through the sample variance. Test statistics that follow a chi-squared distribution arise from an assumption of independent normally distributed data, which is valid in many cases due to the central limit theorem. A chi-squared test can then be used to reject the hypothesis that the data are independent [10]. Use the chi-square distribution table first determine degrees of freedom and locate the value in the appropriate column. It then locates the value closest to calculated χ^2 on those degrees of freedom (df) of row. p value will be determined by moving up the column. If the p value for the calculated χ^2 is $p > 0.05$, accept the hypothesis else reject the hypothesis.

Chi-square test was conducted on primary data of benefits of PPM and findings are presented in Table II.

TABLE II
CHI-SQUARE VALUES OF PPM BENEFITS

Concept	Calculated Chi-Square Value χ^2_{cal}	Critical Value (Table Value) $\chi^2_{TableValue}$	Degree of Freedom	Alpha-Level (Significance Level)
Benefits of PPM	277.0612	192.7001	162	0.05

The calculated Chi-Square value (χ^2_{cal}) for 162 degree of freedom (d.f) at 5% of significance level is greater than the critical value (table value) ($\chi^2_{TableValue}$), hence χ^2_{cal} is falling under rejection region.

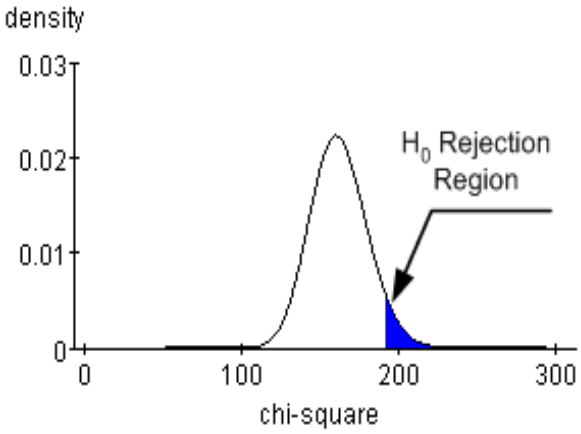

Figure 4 : Chi-Square Analysis on Benefits of PPM

IV.CONCLUSION

Project portfolio management always helps companies to take better decision while introducing new product or project. It minimizes the risks to individual products/projects in terms of business impact, maximizes the control on human resources and improves efficiency of the company. The research study findings conclude that there is a significant effect on benefits of the manufacturing industries with reference to PPM. Identifying the appropriate technology to align with market dynamics is the major benefit of PPM followed by identifying and managing gaps in product portfolio. Investment of funds in an appropriate business area is the least benefit of PPM.

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