

Evaluate the Application Levels of PPM Framework in Product Design and Innovation

Srivella Vijaya Bhaskar

Department of Mechanical Engineering, Sreenidhi Institute of Science & Technology, Hyderabad, India

ABSTRACT

Today's highly belligerent production environment, it is a colossal and a continuous challenge to manufacturing industries in selecting the best-fit product with right balance of new product innovation that increases the industry value and minimize the manufacturing budget. The main purpose of this exploratory study is to evaluate and establish the application levels of PPM process frameworks which are used to select the best-fit product portfolios and project selection methods which are used for the selection of right products in the perspective of project portfolio management (PPM). This paper presents the study findings which were established based on the statistical data analysis using cumulative weighed average technique that was performed on the primary data. The primary data was collected through a pre-tested and well-structured self-administered questionnaire. The results reveal that the application intensity of process frameworks and selection methods in product design and innovations are moderate. PMI-Project Portfolio Management Process is a most widely used process framework followed by in-house process frameworks and Return on Investment and Net Present Value are most widely used methods in manufacturing firms followed by Balanced Scorecard, Weighted Scoring Model, Payback Method and Check-List Model.

Keywords: Project Portfolio Management, PPM Frameworks, Product Selection Methods, Industrial Engineering

I. INTRODUCTION

In this modern era of technology, manufacturing companies are extensively using advanced technology to gain and apply the knowledge that is unique to their business in order to drive innovation and make better use of limited resources by aligning with the business goals. The trend towards increasing use of cutting-edge technology continues and the challenge that remains now is how to manage product development projects better in order to maximize their economic benefits. Traditional management areas deal with doing product/projects right and has failed to provide better solution to maximize the returns from the investments on new product design and innovation. To the contrary, project portfolio management (PPM) is focused on doing the right product/projects right. However, selecting right portfolio with right blend of projects is quite an enormous challenge for any manufacturing organization, especially their research and development wing.

Making the right investment decisions in product design and innovation with the given limited available resources such as budget, time, infrastructure 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 project 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. Evaluating the technology investments has been a central concern in information systems research and practice for decades [1].

Usually, the limited availability of resources prohibits the simultaneous execution of all proposed products/projects. Each project has to be evaluated in order to determine its priority. Determining the priorities of products/projects is an essential step in the planning process. Working on the right projects at the right time is crucial to sustain a competitive advantage, yet many organizations struggle with allocating limited resources

and assets wisely [2]. Project portfolio management (PPM) supports organizations in selecting and managing an optimal portfolio with the right set of projects in order to increase the return on investment, align with strategic business objectives and eventually minimize the technology investment cost. In general three criteria can be used to select and prioritize the projects that can be easily mapped to modern portfolio theory: maximization, balance and strategic alignment [3]. Ghasemzadeh et al., (1999) defined project portfolio selection as follows: Project portfolio selection is the periodic activity involved in selecting a portfolio, from available project proposals and projects currently underway, that meets the organization's stated objectives in a desirable manner without exceeding available resources or violating other constraints [4].

Emphatically, the selection of portfolios and projects of new products are accomplished with the help of process frameworks and selection methods in project portfolio management. PPM process frameworks facilitates organizations in selecting the right portfolio(s) in a structured and efficient way in order to maximize the returns by aligning with the strategic business goals of the firms. In the literature, many PPM process frameworks that are defined by mainly academicians as well as practitioners are available. However it is identified that the following are matured and industry attuned portfolio processes and therefore selected for the study along with in-house PPM processes:

- ✚ PortfolioStep Process [5]
- ✚ PMI-Project Portfolio Management Process [6]
- ✚ Stage-Gate Process [7]
- ✚ Integrated Framework [8]
- ✚ Hierarchical Process Framework [9]
- ✚ Financial Appraisal Profile [10]

According to Srivannaboon et al (2006), many organizations have been trying to implement their corporate strategies through projects. Consequently selecting right new product development projects with the right balance of projects for the portfolio(s) is considered as one of the most important contractual obligations to the firms with the limited resources and capabilities to successfully gain the competitive advantage and attain the corporate strategies [11]. Selection methods help organization in assessing the value of each project and its contribution to the portfolio in order to increase the revenues of the company. In this

paper, 16 selection methods: Net Present Value, Return on Investment, Payback Method, Expected Commercial Value, Expected Net Present Value, Cost Benefit Analysis, Q-Sort, Delphi Model, Analytical Hierarchy Process, Multi-attribute Utility Theory, Check-List Model, Weighted Scoring Model, Un-Weighted Scoring Model, Decision Trees, Bubble Diagrams and Balanced Scorecard are selected for the study.

In 1952, Harry Markowitz has proposed a financial portfolio theory called Modern Portfolio Theory (MPT) which helps in selecting the specific blend of investments that generates the highest return for a given level of risk [12]. Saaty (1980) has proposed a new decision making model called Analytical Hierarchy Process (AHP) which supports decision makers to rationally select the projects based on the qualitative and quantitative approach [13]. Similarly, Kaplan et al., (1996) have developed a business process called Balanced Scorecard that helps organizations to select projects that balances financial and non-financial returns [14]. Golabi et al., (1981) have applied the multi-attribute utility theories for selecting a portfolio of new product projects [15]. In 1981, McFarlan has applied the MPT theory to the modern field of project portfolio management (PPM) for IT projects and according to him, management should also employ a risk-based approach to the selection and management of project portfolios [16]. In the end of 90's, Archer, N.P., Ghasemzadeh, F(1999) were proposed an integrated framework for the portfolio selection in the perspective of PPM [17]. The task of selecting project portfolios is an important and recurring activity in many organizations. Cooper et al., (2000) have developed a portfolio management model, known as Stage-Gate model in which the project is broken down into several review phases called stages and the milestone between two successive phases is called a gate [7]. Tom Mochal et al., (2007) have introduced a ten step PPM process called: PortfolioStep, a portfolio management framework for setting up and running portfolios in organizations. This portfolio management process provides a way to select, prioritize, authorize and manage the totality of work in the organization [18]. In the same period, Project Management Institute (2008) has recognized the importance of PPM and published "The Standard for Portfolio Management" in 2006 and revised in 2008 to provide a guide to PPM processes generally recognized as good practices in portfolio management [6].

The main objective of this research study is to evaluate and establish the application levels of PPM process frameworks and project selection methods which are part of project portfolio management practice. This paper also tries to find the most widely used process framework(s) among the all frameworks and most significantly used project selection method(s) among all the selection methods.

II. METHODS AND DATA COLLECTION

The present exploratory study is in the specialized area of project portfolio management with reference to the application levels of PPM techniques in product design and innovation of manufacturing firms.

Sample Universe: Managerial Category Employees

Sample Frame: PPM Practicing Companies

Sample Size: 95

Sampling Technique: Proportionate Stratified Random Sampling

Data Collection: The primary data was collected through a pre-tested and well-structured questionnaire
 Analysis Tool: Cumulative weighted average (CWA) technique was used for data analysis

Sampling Procedure: The study precisely selected the respondents in the pre-defined approximate ratio of 1:2:6:6:1:2 from Corporate Executives Tier-II Project Management, Tier-III Project Management team, Technology Management, Operations Management and Marketing/Sales Management Groups. Table I presents the selection criteria of the respondents.

TABLE I. SELECTION CRITERIA OF THE RESPONDENTS

| S.No | Respondents Group | Frequency |
|-------|-----------------------------|-----------|
| 1 | Corporate Executives | 6 |
| 2 | Tier-II Project Management | 12 |
| 3 | Tier-III Project Management | 35 |
| 4 | Technology Management | 24 |
| 5 | Operations Management | 6 |
| 6 | Marketing/Sales Management | 12 |
| Total | | 95 |

III. RESULTS AND DISCUSSION

A. Application levels of PPM process frameworks

The data pertaining to the application levels of PPM Process Frameworks in the respondents' respective organizations are in the form of radar chart in Figure 1. The overall CWA rating of 2.49 on a 5-point mean rating scale demonstrates that the application intensity

of PPM process frameworks is merely moderate in manufacturing firms. Particularly, PMI-Project Portfolio Management process is recognized as a highly used framework among the all process frameworks, followed by in-house processes.

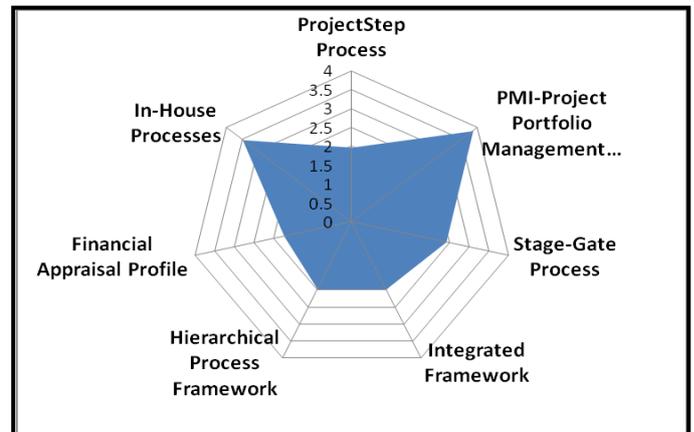


Figure 1: Application Levels of PPM Framework

B. PPM Product Selection Methods

The data was collected through a questionnaire in order to evaluate and find the application levels of product selection methods in the perspective of project portfolio management is depicted in Figure 2 in the form of a radar chart. The application intensity of product selection methods with the average CWA value of 2.52 on a 5-point mean rating scale reveals moderate application levels in manufacturing firms. In specific, the Return on Investment and Net Present Value are most widely used selection methods with an average score of > 3.5 on a 5-point scale followed by highly moderate usage of Balanced Scorecard, Weighted Scoring Model and Payback Method with an average score of ≥ 3.0 and < 3.5 .

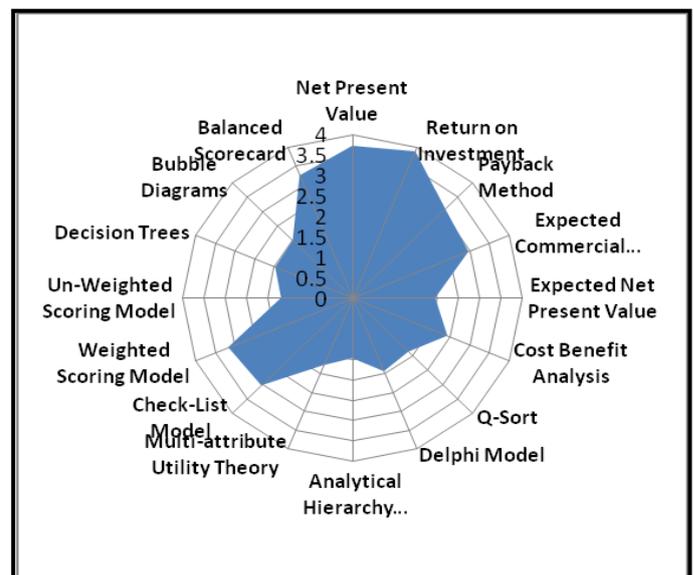


Figure 2: Application Levels of Product Selection Methods

IV.CONCLUSION

The application levels of both PPM process frameworks and product selection methods are merely moderate in product design and innovation areas of manufacturing firms. This evidently confirms that firms are not matured yet with reference to the selection of products in the perspective of project portfolio management. It is noticeably indicates that firms are in need of a right rigid selection process management in order to select right portfolios and projects to realize the full potential benefits from the effective product portfolio(s). The study confirms that the application intensity of project portfolio selection techniques in product design and innovation area is moderate. It is recommend that firms must recognize the significance of selection techniques and intensify their usage in order to select right portfolio(s) with right blend of product to maximize the returns to efficiently distribute the scarce resources.

V. REFERENCES

- [1] Starling Hunter, Kevin Kobelsky, Vernon J. Richardson (2003), "Information Technology and the Volatility of Firm Performance", Working Paper 4449-03, MIT Sloan School of Management, Cambridge, MA, November 2003
- [2] Kent Crawford(2008), "Organizational Improvement: Project Portfolio Management", White Paper, PM Solutions Inc, 1788 Wilmington Pike, Glen Mills, PA 19342 USA
- [3] Cooper, Robert G., and Scott J. Edgett (1997), "Portfolio Management in New Product Development: Lessons from the Leaders—I", *Research Technology Management*, vol 40, No. 5 (1997): pp.16–52.
- [4] Ghasemzadeh F.and Archer N. P (1999), "An Integrated Framework for Project Portfolio Selection", *International Journal of Project Management*, Vol. 17, No. 4, August 1999, pp. 207-216
- [5] Tom Mochal et al, (2007), "PortfolioStep Portfolio Management Framework Overview", White Paper, TenStep Inc, 2363 St. David's Square, Kennesaw, GA 30152
- [6] Project Management Institute (2008), "The Standard for Portfolio Management", Second Edition, Newtown Square, PA, Project Management Institute, pp.36
- [7] Cooper G. Robert (2000), "Doing it right – winning with new products", *Ivey Business Journal*, July/August (2000), Volume: 64, Issue: 10, pp. 54-60.
- [8] Ghasemzadeh F.and Archer N. P (1999), "An Integrated Framework for Project Portfolio Selection", *International Journal of Project Management*, Vol. 17, No. 4, August 1999, pp. 207-216
- [9] Cooper, R. G. (2005), "Portfolio Management for Product Innovation". In Harvey H. Levine, (eds.) (2005), "Project Portfolio Management: A Practical Guide to Selecting Projects, Managing Portfolios and Maximizing Benefit", USA: Pfeiffer Wiley, ch7.2, pp.318-354
- [10] Lefley, F.,Morgan, M. (1998), "A New Pragmatic Approach to Capital Investment Appraisal: The Financial Appraisal Profile (FAP) Model", *International Journal of Production Economics*, 55 (3), pp.321-41.
- [11] Srivannaboon, S., Milosevic, D. Z (2006), "A Two-Way Influence between Business Strategy and Project Management", *International Journal of Project Management*, 24(6), pp.493-505.
- [12] Markowitz, H.M. (1952), "Portfolio Selection". *The Journal of Finance*, March 1952 vol: 7(1): pp.77-91
- [13] Saaty L. Thomas (1980), "The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation", McGraw-Hill, USA, pp.30
- [14] Kaplan S. Robert and Norton P. David (1996), "Using the Balanced Scorecard as a Strategic Management System", *Harvard Business Review*, MA, Jan/Feb 1996, pp.72-85
- [15] Golabi Kamal, Craig W. Kirkwood, Alan Sicherman, (1981), "Selecting a Portfolio of Solar Energy Projects Using Multiattribute Preference Theory", *Management Science*, vol. 27, no.2, February 1981, pp. 174-189
- [16] F. W. McFarlan, "Portfolio Approach to Information Systems," *Harvard Business Review*, Vol. 59, No. 5, 1981, pp. 142-150
- [17] Archer, N.P. and Ghasemzadeh, F. (1999) An Integrated Framework for Project Portfolio Selection. *International Journal of Project Management*, 17, 207-216.
- [18] Tom Mochal et al, (2007), "PortfolioStep Portfolio Management Framework Overview", White Paper, TenStep Inc, 2363 St. David's Square, Kennesaw, GA 30152