Evaluating Strategic Project Portfolio Performance

By Susan S. Bivins and Michael J. Bible

Introduction

Project portfolio management does not guarantee success in achieving strategic goals and objectives. However, an effective PPM process can increase the chances of selecting and completing the projects that best accomplish organizational objectives and contribute to achieving its vision. Key factors in meeting these objectives are (1) selecting the projects that best support strategic objectives, (2) monitoring performance during implementation to ensure the portfolio remains on track to deliver strategic benefits and (3) adjusting strategy and the portfolio when changes in strategy or performance dictate.

After selecting and implementing the optimal project portfolio, the organization must monitor and control project and portfolio performance. To do so, performance metrics must be identified, unacceptable variances determined, performance reporting processes and information specified, and performance baselines established; these provide a framework to effectively monitor and control performance. To assess performance at the portfolio level, it is vital to measure the performance of individual projects and consolidate the measurements in a mathematically meaningful way that reflects the strategic importance of the member projects.

Traditional metrics and methods emphasize performance relative to cost, schedule and sometimes quality or scope baselines. They do not assess whether projects and portfolios remain on track to deliver the strategic benefit for which they were selected. Beyond the traditional metrics, obvious questions are how to (1) derive project strategic performance using traditional performance measurements, (2) synthesize individual project measurements into meaningful strategic performance measurements at the portfolio level, and (3) assess current project and portfolio strategic performance with respect to continued expectation of achieving strategic objectives as they progress through implementation. This paper addresses the first two questions, and suggests a means of approaching the third.

1 Second Editions are previously published papers that have continued relevance in today’s project management world, or which were originally published in conference proceedings or in a language other than English. Original publication acknowledged; authors retain copyright. This paper was originally presented at the 6th Annual UT Dallas Project Management Symposium in Richardson, Texas, USA in August 2012. It is republished here with the permission of the authors and UT Dallas.
Assumptions about the Context of PPM

Organizations that perform PPM effectively establish and, periodically or as events dictate, revise their strategy, including mission, vision, goals, and objectives. Importantly, they prioritize the goals and objectives in the strategic plan, a step that is omitted by many organizations but is fundamental for effective portfolio decisions. Because organizational objectives are not of equal strategic importance, prioritizing them is vital to establish their relative contribution to accomplishing the strategic goals of the organization.

Serious candidate projects are mapped to the strategic objective(s) they support and prioritized against all other projects. This allows the participants to determine the relative priorities of the projects with respect to the objectives they support, and with respect to the overall goal. The relative priority of each candidate project is thus expressed as its relative benefit in achieving organizational strategy. Since this relative strategic benefit is a key aspect of the portfolio performance measurement approach specified in this paper, we discuss how it is determined in the following section. Once the projects are aligned to objectives and priorities established, the optimal portfolios are selected. This does not mean that the projects with the highest relative strategic benefit are selected in turn until funding is exhausted. Rather, the portfolio selected contains the combination of projects that provide maximum total relative benefit subject to the specified budget and organizational constraints. Organizational constraints can include, among others, critical resources, project dependencies and balance and coverage targets across competing objectives.

During portfolio implementation, the projects selected for funding are monitored and controlled using specified metrics and processes. Performance results from all projects are assembled, the results synthesized considering their relative importance or relative strategic benefit, and adjustments made to address performance issues and/or changes in organizational strategy.

Determining Strategic Benefit

Portfolio decisions are complex. They involve many elements, and require making decisions in an environment that by definition contains conflicting objectives and involves both quantitative and qualitative factors. To effectively select, measure and manage the performance of a portfolio, we suggest that each objective must have a mathematically sound relative importance with respect to each of the other objectives in achieving the overall strategic goal, and each project in the portfolio must have a mathematically sound relative benefit with respect to each of the other projects and the strategic goal. In our view, many commonly used decision methods and ranking and scoring models for project selection fall short, meaning they are not mathematically sound. In this section we briefly describe the basis upon which mathematically sound relative strategic benefit is determined, and recommend sources that provide more information than can be included in the scope of this paper.
Decision Methods

Many of us have experienced the frustration of interminable meetings about project selection, which often end in decisions made in exhaustion, by decree or in deference to the loudest voice. This decision technique is commonly known as BOGSAT, for Bunch of Guys/Gals Sitting around Talking (Urban Dictionary, 2012). A major reason BOGSAT fails as a decision technique is that, as psychologists have found, the average human brain can discriminate among only seven elements, plus or minus two, and can hold in short-term memory only seven objects, plus or minus two (Miller, 1994). In other words, we can remember about seven numbers in the order read to us and can discriminate or make judgments about, for example, seven musical tones, with each sound associated with a letter or number. Most business decisions can involve dozens of elements, such as ‘issues, pros, cons, objectives, criteria …’ (Forman, 2001).

Appropriate Use of Numbers

To reduce the use of BOGSAT, many organizations use ranking and scoring models. But rankings are ordinal numbers and thus indicate only order. If 20 projects are ranked from 1st to 20th, how much more important is the first than the second project, or the second project than the last project? Performing arithmetic operations on ordinal numbers yields mathematically meaningless results. Weighting and scoring are often used when there are multiple criteria, for example, least cost and highest NPV. Most business decisions involve multiple objectives, making the assignment of weights and scores difficult, arbitrary and with no sound basis for differentiation. Yet many organizations insist upon averaging or adding rankings and weighted scores on multiple criteria to make important business choices.

As identified in social science research (Trochim, 2006 and others), the four numerical scales of measurement are nominal, ordinal, interval and ratio. Since there are no restrictions on the use of mathematical operations on ratio-scale numbers, decision methods based on such operations are mathematically sound. As the highest order level of measurement, we recommend that portfolio selection decisions be based on ratio-scale numbers2.

Structuring Conflict and Complexity

To make portfolio decisions even more difficult, strategic objectives are often conflicting, such as short-term profit versus investment in employee benefits to attract and retain the best talent. To address conflicting objectives, we need to choose a conflict-confronting decision strategy, one that allows us to make trade-offs (Hogarth, 1987). For example, in considering which airline ticket to buy, we may include among our

---

2 For more information about the four numerical scales of measurement and the valid mathematical operations that can be performed on each, please see Trochim (2006) and Forman (2001).
objectives both price and number of stops – if price is more important to us than the number of stops, we might choose the lower priced ticket that may require two stops or plane changes; if time is more important, we make the trade-off and agree to pay more for a flight that gets us there faster.

We can also break down these complex decisions into simpler parts, structured in the form of hierarchies in which each level contains no more than seven (plus or minus two) elements. Herbert Simon noted that hierarchical subdivision occurs in all complex systems and is how humans with limited cognitive powers can address complexity (Simon, 1960). Lancelot Whyte noted that the human mind uses hierarchies as the prevailing method for classifying what we observe (Whyte, 1969). Now that we’ve introduced the need for ratio-scale numbers and hierarchies for producing meaningful decisions, we will briefly introduce the analytic hierarchy process (AHP) as the means we use in this paper to develop meaningful relative strategic benefits or priorities for projects in a portfolio.

Overview of the Analytic Hierarchy Process

AHP provides a method to structure major decisions into hierarchies of objectives and alternatives, and compare them to simplify complex decisions, including selection of project portfolios for an organization. Developed by Dr. Thomas Saaty at the Wharton School of Business in the 1970s (Saaty, 1980), AHP is a conceptual process that allows people to structure complex decisions, and to incorporate both qualitative and quantitative assessments, as well as intuition, into the process of decision making. AHP and the software tools that support it present simplified decisions to the evaluators with a series of pairwise comparisons or rating scales that mimic pairwise comparisons, and then perform the mathematical calculations to properly and accurately produce the ratio-scale results by synthesizing the individual inputs of all participants in the evaluation process. The use of AHP involves three basic steps: decomposition (structuring), making comparative judgments (measuring), and combining (synthesizing) (Forman, 2008). The structuring or decomposition step breaks down a complex problem into hierarchies or related clusters much like a deliverable work breakdown structure is created to refine the products and work packages for a large project.³

Applying AHP to Determine Relative Project Benefit

Recall that because an organization’s objectives are not of equal importance, the evaluators, usually senior executives, are asked to prioritize the objectives using AHP in a series of pairwise comparisons. The individual judgments are then synthesized to produce ratio-scale relative priorities for the objectives (and sub-objectives, if any). To determine the relative strategic benefit for projects during the portfolio selection process, each alternative (i.e. candidate project) is mapped to the objective(s) it supports and compared pairwise (or in the case of large numbers of projects, using a

³ For more information about AHP, please see Saaty (1980 and 2008) and Forman (2001).
rating scale that simulates the pairwise comparisons) to each of the other projects supporting the same objective(s) to determine its relative importance in achieving the objective.

Then the relative priorities of the objectives are applied to the relative benefit of the projects with respect to the objectives they support to derive the relative strategic benefit of each project with respect to the overall goal. The most important projects supporting the most important objectives will thus have the highest relative strategic benefit (priority), with less important projects having lower relative strategic benefit. All of these calculations are performed in accordance with the mathematics supporting AHP, normally with the aid of available software tools\(^4\), yielding ratio-scale relative priorities as the foundation for considering the candidate projects, as illustrated in the “Benefit” column of Figure 1, captured from Expert Choice software.

The optimal project portfolio can then be selected; the optimal portfolio is defined as the combination of projects at a given budget that yields the maximum total benefit under specified constraints. In Figure 1, a notional project portfolio was selected using a software optimizer from Expert Choice to yield the maximum possible total strategic benefit subject to specified constraints at a given funding level. Considering project cost and benefit as calculated earlier, the highlighted projects are selected for inclusion in the portfolio and represent the combination that yields maximum total benefit for the budget of $86.5 million given any specified constraints.

For this notional portfolio, the total benefit equals 1.9556; the sum of the benefits for all projects selected for funding, or 74.5% of a possible 2.6429. This total benefit is monitored during the implementation and evaluation phases, and serves as the strategic performance baseline for the portfolio. Some organizations apply a risk index for each project, such as the probability of success or failure, to discount the anticipated benefit, thus yielding expected relative strategic benefit rather than anticipated relative strategic benefit. In such cases, the total expected benefit is used to select the optimal portfolio and serves as the strategic performance baseline.

\(^4\) For more information about calculating relative benefit and using AHP to prioritize strategic objectives and candidate projects for portfolio selection, please see Bible & Bivins (2011) chapters 4 and 7.
To implement the portfolio, the organization must have defined the project metrics or performance indicators to be used, and have distributed the acceptable limits of those metrics through the organization’s portfolio management plan or equivalent. As well, the planned baselines must have been established. The project performance indicators are used to monitor ongoing project performance and control the project when measurement variances are outside acceptable tolerances. To illustrate the performance measurement approach, we use earned value management (EVM) and quality performance metrics, although the approach in this paper can be applied using most other project performance indicators.

Traditional Measures of Project Performance

As a technique endorsed by PMI and referenced in the PMBOK (PMI, 2008), many organizations use EVM as a systematic means of evaluating project progress that measures schedule and cost performance to answer the question ‘what have we received for the money spent?’ Earned value management comprises four (4) primary metrics; Budget at Completion (BAC); Planned Value (PV), Earned Value (EV), and Actual Cost (AC). These metrics are conceptually illustrated in Figure 2.

Figure 1. Sample Selected Project Portfolio

Measuring Project and Portfolio Performance -- Traditional Metrics
Achievement using earned value can be measured in terms of cost and schedule variances, or, more often, as indices, including the cost performance index (CPI), calculated as EV / PV, and schedule performance index (SPI), calculated as PV / AC\(^5\).

While earned value management provides a useful and powerful method for capturing project cost and schedule performance, it does not account for meeting specifications or the customer’s expectations. A project can be performing well in terms of cost and schedule, but if the project is not meeting specifications\(^6\) or customer expectations, then project success is negatively affected. Nisenboim (2002) suggests the use of a Quality Performance Index (QPI) as a measure of how well the product appears to be conforming to customer requirements, or specifications.

Nisenboim recommends deriving this measure during project implementation using a simple rating review conducted informally by a peer or subject matter expert. A rating of 0.90, for example, would mean that, in the opinion of the reviewer(s), for the components of the developing product that are available for review, conformance to requirements is 90%. Another more formal method is comparing work package deliverables against contract specifications and assessing compliance directly or by

---

\(^5\) For additional information about earned value metrics, see Meredith & Mantel (2006) or any number of other reputable sources on the topic, with special attention to calculating percent complete.

\(^6\) Although some treat scope as separate from quality, in the authors’ view, quality is a measure of conformance to specifications, and specifications represent the scope. Also, the specifications should be aligned with customer expectations.
using a rating scale. Those who wish to have separate performance indicators for scope, customer satisfaction or any other metric can apply them to the discussion in this article in the same manner as EVM and quality metrics.

**Project and Portfolio Strategic Performance Using Traditional Metrics**

In the introduction, we questioned how to derive project strategic performance using traditional performance measurements and to synthesize individual project measurements into meaningful strategic performance measurements at the portfolio level. Because all projects are not of equal value in determining portfolio performance, we must consider relative strategic benefit when deriving strategic project performance measurements and consolidating project performance at the portfolio level. Since the project priorities (or relative strategic benefits) are ratio-scale numbers when derived using AHP, and they represent the relative importance of the project in achieving strategic objectives, they can be used to weight the project’s earned value and other performance indices to calculate strategic performance at the portfolio level. To measure strategic project performance, individual project performance metrics such as SPI and CPI can be designated SPI\textsubscript{PRO} (Project SPI) and CPI\textsubscript{PRO} (Project CPI).

These and any other project level metrics can then be synthesized to produce portfolio level metrics designated, for example, as SPI\textsubscript{PORT} and CPI\textsubscript{PORT}. The CPI\textsubscript{PORT} and SPI\textsubscript{PORT} are determined by multiplying each index by the relative strategic benefit, or priority, of the project, and adding them to arrive at the respective portfolio index. For example, a CPI\textsubscript{PRO} of 1.10 for a project can be multiplied by its relative strategic benefit, or priority, of 0.171; when this is calculated for all projects, their sum is the CPI for the portfolio, or CPI\textsubscript{PORT}. In Excel, this can be accomplished using the “SUMPRODUCT” function. Simply averaging the CPI and SPI numbers for the member projects yields different results for the portfolio indices, and is misleading because it does not take into account the project priorities; the differences become more dramatic when the performance of the highest priority projects is very high or very low.

**Visual Representation of Strategic Performance Using a Dashboard**

One method to help decision makers monitor, evaluate, and control portfolio performance against strategic objectives is to use a project portfolio dashboard that incorporates benefit. The dashboard provides a simple visual aid to evaluate how the portfolio is performing from a macro perspective and how the performance of individual projects impacts the strategic objectives they support. Figure 3, as illustrated using Expert Choice’s Periscope software, shows a performance hierarchy with the goal at the top of the hierarchy, objectives listed at the second level and individual projects, in this case supporting Objective 2, on the third (bottom) level. This hierarchy maintains traceability of projects to the objectives they support and of objectives to the goals they support.
In the dashboard, each box is color highlighted to visually display the current performance status of the goal, objectives, and individual projects. The basis for the color coding in this case is an organizationally-developed rating system, shown as the sample performance legend in Figure 3, with the various colors indicating performance within the specified range, from “Way Behind Plan”, shown as red, to “Way Ahead of Plan”, shown as blue.

Further, each box provides the priority (PRTY), i.e. relative strategic benefit or contribution to the goal or parent objective. The height of the priority fill (colored rectangle) within the box represents the relative priority or contribution to the parent level; the colored rectangle of the highest priority project or objective fills the box, and the height of the other rectangles with the same parent are in proportion to the height of the full box, with respect to their ratio-scale relative contributions.

![Figure 3. Example Project Performance Dashboard (Expert Choice Periscope)](image)

Finally, a quantitative performance measurement (PERF) provides an assessment of the project, objective, and goal performance based on current performance measurements. In this example, project performance is traced through the objectives hierarchy up to the goal and uses traditional metrics as the basis for evaluating performance as discussed previously. Using a capable dashboard, it is also possible to view the performance of individual metrics for any project, as well as performance trends for projects and the portfolio as a whole.
Measuring Project and Portfolio Performance – Strategic Expectations Metrics

In the introduction we asked how to assess current project and portfolio performance with respect to continued expectation of achieving strategic objectives as they progress through execution. In selecting the optimal portfolio subject to constraints, the organization has chosen the combination of projects that provides the highest total strategic benefit. Once selected and implemented, there are no guarantees that the total anticipated or expected strategic benefit of the portfolio or that of individual projects will remain static as the portfolio moves through implementation.

Recall that the anticipated benefits represent the ratio-scale relative priorities of all the candidate projects with respect to one another, whether funded or not. In this regard, anticipated benefits usually do not change until a reprioritization is performed as a result of changes in the strategic plan; or when the organization chooses to reprioritize for other reasons. However, this does not mean that projects in the portfolio stay on track to deliver those anticipated benefits between reprioritizations, so we need metrics to provide regular progress information as measured against benefits. In selecting the optimal portfolio, many organizations use project risk or probability of failure to reduce anticipated benefit, resulting in an expected strategic benefit instead. In these cases, the optimal portfolio represents the combination of projects with the highest total expected benefit under specified constraints, rather than the highest total anticipated benefit under specified constraints.

We believe that risk is a metric closely related to achieving project and portfolio benefit; if risk is defined as probability of failure, then it represents the likelihood that a project will not complete successfully. If the project does not complete successfully, or is less successful than planned, it will not deliver its anticipated benefit as evaluated; much more importantly, it will not subsequently (after completion or termination) help the organization to achieve its strategic objectives. Since project risk is assessed as frequently as other performance measurements, we suggest it can be used to assess changes in the expected benefit values that originally resulted in selection of the project for the portfolio.

Over time, changes in expected benefit (or risk-reduced anticipated benefit), when compared to baseline at the time of selection, can be used to define how well the project remains on track to deliver the strategic benefit for which it was selected. As project execution proceeds, risks are encountered and managed, effectively or not; these risks events can affect expected benefit by increasing or decreasing the project’s likelihood of success in terms of delivering benefit. Risks events that are not successfully anticipated or managed become issues that reduce the likelihood of success. Risks that are successfully avoided or managed increase the likelihood of success. Based on this concept, we suggest new strategic portfolio performance metrics that address how both project and portfolio performance can be assessed in terms of continued relevance to achieving strategic goals and objectives.
Strategic Benefit Indices

Project and portfolio strategic performance can be evaluated using indices that compare current expected benefit to baseline expected benefit. Measuring risk for each reporting period to discount anticipated benefit produces a current expected benefit for the reporting period that can be compared to the baseline expected benefit used to select the project in the first place. As projects and portfolios are implemented and work progresses, the likelihood of successful completion changes and thus the likelihood of delivering strategic benefit after completion. Methods and metrics are needed that account for the changing probability of failure or success and the impact on the project strategic benefit. Many organizations use risk breakdown structures (RBSs) tailored to each type of project they undertake; they periodically measure probability of success for each project based upon risk events and actions just as frequently as they calculate more traditional metrics.

We suggest the Project Expect Benefit Index (EBI\textsubscript{PRO}) and the Portfolio Expected Benefits Index (EBI\textsubscript{PORT}) to help evaluate projects and portfolios against baseline expected benefits (the risk discounted benefits at the time of selection or re-baselining); these metrics can be used and calculated in a manner similar to traditional metrics described earlier. The difference is that they are focused on the degree of continued expectation of strategic benefit.

One reason we need these indices is that project risk can and will change after project portfolio selection and as project work progresses. Comparing current project and portfolio expected benefits to baseline expected benefits can help portfolio management evaluate a project’s and a portfolio’s progress in delivering expected benefits and continued relevance to achieving strategic objectives. Another reason to define and use these indices is that project and portfolio managers are not directly responsible for “benefit realization”.

Managing effectively during project and portfolio execution is crucial to maintaining the anticipated benefits; however, the actual delivery of strategic benefit is managed later by others. Once a project is completed, it is transitioned to the organization’s operations or to the external customer, and is no longer under the auspices or control of project and portfolio managers.

This does not mean that project and portfolio managers are immune to the need to focus on benefits; they must manage such that project performance supports the delivery of future benefits. However, because actual strategic benefit is usually not delivered until after project completion, we propose EBI\textsubscript{PRO} and EBI\textsubscript{PORT} as metrics to be used while projects and portfolios are under way to assess how well they remain on track to complete successfully and thus deliver strategic benefit.
Summary and Conclusion

This paper has described how project performance information can be combined to produce portfolio performance measurements that reflect strategic benefit. We described an approach to synthesize individual project performance measurements and relative strategic benefit to produce strategic portfolio level performance metrics, and showed how to visually illustrate them in a dashboard that displays project and portfolio performance with respect to the strategic objectives they support. With this information, managers can make proactive decisions about necessary adjustment of projects within the portfolio, or the portfolio as a whole.

While the approach discussed in this paper provides a method for measuring and evaluating portfolio performance against strategic benefits, this alone is insufficient to predict the probability of success in delivering these benefits. Benefits can change due to reevaluation when the organization’s strategy changes, or when more promising project candidates come along, resulting in reprioritization and reselection or major adjustments to the portfolio. In addition, estimates and assumptions made within the business cases prior to portfolio selection may prove to be vastly under- or overstated, representing greater risk or opportunity than foreseen at the time of selection.

Actual delivery of benefit does not generally occur until after projects or major phases are completed and transitioned to operations. Strategic performance metrics can indicate the degree to which projects and portfolios in flight remain on track to deliver the strategic benefit for which they were selected. However, project relative benefit also can change even while the strategy and list of portfolio candidates remains constant for a period of time, due to risk or opportunity events that negatively or positively affect projects and thus, in aggregate, performance of the portfolio. In this paper we have suggested a means to account for strategic performance during and after such changes to measure continued expectation of delivery of anticipated strategic benefit for projects and portfolios.
References


About the Authors

Susan S. Bivins

Co-Author

Susan S. Bivins, MSPM, PMP, has more than twenty-five years of management and leadership experience dedicated to delivering successful information technology, organizational change management, and professional consulting services projects for major global corporations. She specializes in project and portfolio management; international, multi-cultural and multi-company initiatives; and business strategy integration in the private and public sectors.

During her career with IBM, Sue managed multiple organizations and complex projects, including operations and support for the Olympics, and a strategic transformational change program. Since retiring from IBM, she has led multi-company joint initiatives with Hitachi, Microsoft and Sun Microsystems, and served as Director of Project Management at Habitat for Humanity International.

Sue earned her Master of Science in Project Management from the Graduate School of Business at The George Washington University, where she received the Dean’s Award for Excellence and was admitted to the Beta Gamma Sigma business honorarium. A member of PMI, she contributed to the PMI Standard for Portfolio Management and is currently serving on the OPM3 Third Edition team. She and her husband live in Missouri. Sue can be reached via e-mail at sbivins@gwmail gwu.edu.

© 2012 Susan S. Bivins & Michael J. Bible www.pmworldlibrary.net Page 14 of 15
Michael J. Bible

Co-Author

Michael J. Bible, MSPM, PMP, has twenty-five years of professional and leadership experience supporting the U.S. Department of Defense (DoD), of which last 12 years have been dedicated to project and program management of test and evaluation programs for major defense acquisition programs. He is a project management professional with a successful history applying project management best practices to the technical field of test and evaluation for portfolios of complex defense acquisition programs and projects.

Mike specializes in management of complex technical projects, and as a former co-owner of an engineering services firm, has applied strategic planning to establish organizational direction while utilizing project portfolio management to successfully grow the company in alignment with business initiatives.

A retired Marine Corps officer, Mike obtained his Master of Science in Project Management from the Graduate School of Business at The George Washington University and is a member of PMI. He lives with his wife and son in Virginia. Mike can be reached via e-mail at mb1775@gwmail.gwu.edu.