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Chapter II

Critical Success Factors for IT Projects

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IT managers' careers will rise and fall based on their ability to deliver high quality projects on time.

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(J. I. Cash, Harvard Business School)

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A key factor leading to the continued failure in IT projects is the lack of identification and appreciation for all the major components of project success. Critical success factors are those things that must be done or handled properly for a project to be successful. A comprehensive model of critical success factors for IT projects permits the development of better management plans, processes, and metrics, particularly for risk, quality, and performance control. In this chapter, general critical IT success factors are identified and techniques for the management of those factors are introduced; later chapters then detail those techniques.

Definition of Success

Cost, time, and quality (often referred to as the *Iron Triangle*) have formed the prime basis for measuring project success for the last 50 years (Atkinson, 1999). However a number of authors in more recent years (Atkinson, 1999; Brandon, 2004; DeLone & McLean, 1992; Lim & Mohamed, 1999; Morris & Hough, 1987; Pinto & Slevin, 1998;) have suggested that other criteria are also important. Some of these other criteria may be less quantitative, more difficult to measure, and some of the criteria may be temporary in that their values may be much more important at some points in the project.

So what is meant by project success? Success needs to be defined *completely* so that the factors that lead to success or failure in a broad perspective can be identified. In the past, success has been too narrowly defined; this definition has typically been confined to scope, cost, and time issues. Handling these particular issues has been well addressed by methods such as earned value analysis (EVA), which have proven successful for accurate performance measurement and control (Brandon, 1999; Fleming & Koppelman, 1994, 1998); earned value is specifically addressed in later chapters of this book.

Originally, Schultz and Slevin (1979) discussed overall implementation success and identified three dimensions to success: technical (Does it work?), organizational validity (Is it what the users want?), and organizational effectiveness (Is it a cost effective solution?). Pinto and Slevin (1998) presented a widely used "10 Factor Model" for success factors involving project mission, management support, planning, client consultation, personnel, technical tasks, client acceptance, project control, project communication, and handling unforeseen issues (Pinto & Millett, 1999; Pinto & Slevin, 1992). Hawkins (2004) determined that the most critical success factors for ERP IT projects were adequate resources, shared and well communicated business justification, open communications, participation by all relevant levels of management, visible and continuous executive sponsorship, being in touch with those most affected, preimplementation training, and structured change management.

Klastorin (2004) illustrated project success in broader terms with the example of the movie *Titanic* (Paramount Pictures, 1997). When that movie was release in 1997, it was well behind schedule and cost almost twice the planned amount. It was, however, the first movie in history to gross over $1 billion, and it received the best picture award for that year.

Lim and Mohamed (1999) also raised the question of "What is a successful project?" and noted that different stakeholders involved with the same project may have different opinions about a project's success. One of their examples concerned the construction of a shopping center that was eventually completed to match the required quality standard, however with significant cost and time overruns. Some stakeholders were very unhappy, depending upon the type of contracts involved and who contractually bears the burden of the cost overruns (i.e., who pays for cost overruns). Other stakeholders (such as mall customers and the merchants renting space in the mall) were all pleased and saw the project as a great success. Lim and Mohamed defined two perspectives, the macro perspective, which involves all the stakeholders, and the micro perspective, which involves only the construction parties such as the developer and contractor(s). The macro perspective is relevant for all phases of a project from conceptualization, through construction, and then operation. The micro perspective is most relevant for the construction phase.

Completion and Satisfaction Criteria

Lim and Mohamed (1999) also defined two types of success criteria: completion and satisfaction. *Completion criteria* include contract-related items such as cost, time, and

scope. *Satisfaction criteria* include utility (fitness for purpose), quality, and operation (ease of use, ease of learning, ease of maintenance, etc.). The macro perspective involves both; the micro perspective only involves completion perspectives. This is illustrated in Figure 2.1. Often, scope can be somewhat divided into a portion affecting completion (mainly stated requirements, or needs) and a portion affecting satisfaction (mainly unstated requirements and expectations, or wants). *This division of success criteria into micro and macro perspective types is very important in terms of project performance control and the effectiveness and cost thereof. This division provides for different review time periods, different review methods, and different project stakeholder involvement for the review of each type of criteria.*

Lim and Mohamed (1999) drew a clear distinction between "success criteria" and "success factors." The criteria are "a principle or standard by which anything is or can be judged"; factors are "any circumstance, fact, or influence which contributes to a result". Figure 2.2 illustrates this point. Factors for the completion criteria would typically include financial variables, process variables, resource variables (cost, availability, skill, motivation, etc.), management variables (project manager skill, line management support, etc.), and risk variables (weather, economy, technology, etc.). Factors for the satisfaction criteria would be those things that drive the satisfaction of the stakeholders.
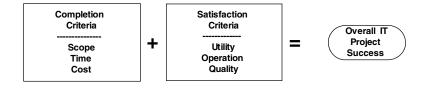
Success criteria tend to be relatively independent of the type of project being measured. The factors are, however, very dependent on the type of thing being built (or accomplished). In the previous mall example, a factor for the satisfaction type criteria of utility might be "ample parking"; a factor for the operation component of the satisfaction criteria might be "ease of parking."

Generalization of Success Factors for IT

I proposed a more generalized model in an earlier work (Brandon, 2004), and in developing that generalized model for IT success factors, the success criteria were divided into the two dimensions of project success defined by Lim and Mohamed (1999). Next, the general criteria suggested by Lim and Mohamed were also used, and these criteria are relatively independent of project type. The third step was to determine the *factors that underlie these criteria for IT projects.*
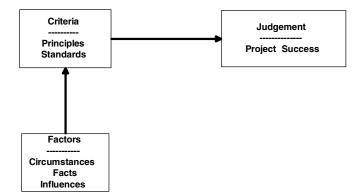
Many authors have studied components of IT project success and risk. The original

Figure 2.1. Success criteria

Figure 2.2. Criteria and factors

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┌─────────────────┐                    ┌─────────────────────┐
│    Criteria     │                    │    Judgement        │
│   ----------    │ ─────────────────▶ │   ------------      │
│   Principles    │                    │   Project  Success  │
│   Standards     │                    │                     │
└─────────────────┘                    └─────────────────────┘
         ▲
         │
         │
┌─────────────────┐
│    Factors      │
│   -----------   │
│  Circumstances  │
│     Facts       │
│   Influences    │
└─────────────────┘
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Standish Group (1994) study found that the three most common causes of project failure were: lack of user input, incomplete requirements, and changing requirements. Conversely they found that the three most important factors for success were user involvement, executive management support, and a clear statement of requirements. The European Software Process Improvement Initiative (ESPITI) performed a study in 1995 and noted that the major IT project failure factors were requirements specifications, managing customer requirements, documentation, quality, and project management methods. Hallows (1998) stated that the major causes of failure involved scope: poor original definition, poor management of scope, and unforeseen changes in scope.

Jones (1994) studied software risks in different IT environments and identified major issues and related metrics. For example, MIS software problems were "creeping" requirements (80%), excessive schedule pressure (65%), low quality (60%), cost overruns (55%), and inadequate configuration control (50%). McConnell (1998) developed a "survival test" for software development projects and detailed a number of success criteria within five categories. Pearlson (2001) assessed project success criteria by asking key questions to minimize risk: "Are we doing the right things?", "Are we doing it in the best way?", "How do we know how well we are doing?", "What impacts are we having on the business?", "Is the project cost-effective?", "Is there clear accountability for the project?", and "Are key assets protected?" In 2004, The Standish Group (1994) updated its list of IT critical success factors to include (Collett, 2005):

- User involvement
- Executive management support
- Clear business objectives
- Experienced project manager
- Minimal scope and requirements
- Iterative and agile process

- Skilled personnel
- Formal methodology
- Financial management
- Standard tools and infrastructure

Based on the detail study of these past works (both scientific parametric-based studies and the expert opinion of practitioners) combined with our own experience and research, we have developed a recommendation for the major IT project success factors, both completion and satisfaction. For the area of completion criteria, these major IT success factors have been identified:

- *Ability to Perform:* Includes having the necessary amount of resources needed and the correct resources to carry out the project plan. The ability to perform is also one of the Software Engineering Institute (SEI) "common features" in their Capability Maturity Model (CMM), which is discussed later in this book.
- *Commitment to Perform:* (Another CMM common feature) includes both project sponsor and upper management support (including organizational and environmental matters).
- *Methodology:* Involves the selection of specific IT software engineering processes (requirements analysis, systems analysis, design, development, documentation, testing, etc.) and how these processes will be organized, utilized, and integrated both amongst themselves and with the project management processes.
- *Verification:* Involves "built-in" quality or "defect prevention" and concerns the quality of the development p*rocesses*, thus answering the question, "Have we built the product right?" Formally, verification is proof of compliance with requirements, specifications, and standards. Verification processes usually result in exception (bug) reports where compliance is not achieved.
- *Technology:* Involves the proper selection of applicable technology for use both in the product and in the process of building the product. It covers architecture, platform, language, tools, and supporting technology selection as well as issues of each including the maturity, stability, and support thereof.
- *Project Management:* Addresses the use of proper project management skills and knowledge in dealing with planning, schedule, cost, scope, risk, human resources, and stakeholders; this is what the Project Management Institute (PMI) calls "knowledge areas." Also included herein are the capabilities and experience of the project manager.

In the area of satisfaction criteria, these major success factors have been identified:

- *Business Justification:* Involves some type of cost-benefit model. Line management, users, and the project team must "buy-into" and support this model. Business

justifications, financial models, and project feasibility are discussed later in the book.

- *Validation:* Involves the *product* that is the subject of the project and checks all user (customer) requirements (both stated and expected) and answers the question, "Have we built the right product?" Formally, validation is proof that the customer and end users are satisfied with the system. Proper user involvement is vital to this aspect of the development and/or integration process. Validation processes usually result in change orders when the user is not satisfied with an aspect of the product.

- *Workflow and Content:* Involves the effective integration of the new product into the organization and each user's workflow. Content includes all deliverable information including: documentation, help system, data, and media content (especially in the sense of modern and internet applications).

- *Standards:* Relate to compliance with applicable industry, corporate, and user (customer) standards in regard to both external (i.e. user interface) and internal issues (i.e. coding standards). Standards are also discussed later in this book under quality management.

- *Maintainability and Support:* Involves the inherent maintainability of the developed product and the willingness and timeliness of the developing (or support) organization in responding to the customer's concerns about usage or integrity (real or perceived) issues.

- *Adaptability:* Relates to the flexibility of the product to be adapted (successfully modified) for evolving changes in the environment in which the product is deployed; this includes both technical changes and business changes.

- *Trust and Security:* Relates to both the security built into the product and to the security of the process for building the product. Product security and trust involves the customer's willingness to fully utilize the system in all necessary modes without concern for compromise of any of the customer's assets including information assets.

Figure 2.3 summarizes our general modern model for IT success factors. In the last chapter of this book, we discuss project management from a strategic perspective and in particular the collective management of multiple projects. Probably the most effective method of modern strategic management is the Balanced Scorecard Method (BSC), which divides strategic metrics into four perspectives: financial, process, learning and growth, and the customer's perspective. Our general model uses just two perspectives for management at the individual project level (completion and satisfaction) and the reasons for that will become clearer with each chapter of this book. However, our completion criteria map to the BSC financial and process perspectives; and our satisfaction criteria map to the BSC learning, growth, and satisfaction perspectives.

The Slevin-Pinto Profile (Pinto & Slevin, 1998) discussed earlier has often been used to identify IT project success factors in order to focus management attention on the key issues. A more recent *Project Management Journal* article illustrates the application of such a profile (Finch, 1993). Figure 2.4 shows a mapping of our broader IT Success Criteria

Figure 2.3. Critical IT success factors

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┌─────────────────┐       ┌─────────────────┐              ╭──────────────╮
│   Completion    │       │  Satisfaction   │              │  Overall IT  │
│    Criteria     │   +   │    Criteria     │      =       │   Project     │
│  -----------    │       │  -----------    │              │   Success     │
│     Scope       │       │    Utility      │              ╰──────────────╯
│     Time        │       │   Operation     │
│     Cost        │       │   Quality       │
└─────────────────┘       └─────────────────┘
         ▲                         ▲
┌─────────────────┐       ┌──────────────────────┐
│ Completion Factors│     │ Satisfaction Factors  │
│  -----------    │       │  -----------------    │
│Project Management│      │ Business  Justification│
│  Methodology    │       │    Validation         │
│Commit  to Perform│      │ Workflow  & Content   │
│Ability  to Perorm│      │    Standards          │
│  Verification   │       │Maintainability  & Support│
│  Technology     │       │    Adaptability       │
│                 │       │    Trust/Security     │
└─────────────────┘       └──────────────────────┘
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Figure 2.4. Success factors vs. Slevin-Pinto Profile

	Completion Factors						Satisfaction Factors					
Slevin-Pinto Profile	Project Management (KA)	Methodology	Commitment to Perform	Ability to Perform	Verification	Technology	Business Justification	Validation	Workflow & Content	Standards	Maintainability & Support	Trust/Security
Project Mission							X					
Top Management Support			X									
Project Schedule/Plan	SM/TM											
Client Consultation	CM	X										
Personnel	HRM			X								
Technical Tasks				X		X						
Client Acceptance	QM	X						X				
Monitoring and Feedback	TM/CM											
Communication	CM	X										
Troubleshooting	RM											

model to the Slevin-Pinto model. For the "Project Management" column, the PMI project management "knowledge area" is shown, and these are discussed later in this book.

Our critical IT success factors are for IT projects in general, and will be used throughout this book to formulate effective IT project management processes. If some of these factors are not relevant to a particular IT project (or if there are additional critical factors), then the processes, techniques, and metrics described later in this book can be modified accordingly.

Managing for Success

This book focuses on managing for success in modern times. Once the critical success factors for IT projects have been identified, then those factors become the foundation

for effective performance management and management of other key project aspects as risk. Performance management involves the things we know we have to do; risk management involves the things we may have to do. This is illustrated in Figure 2.5.

This book introduces and develops the concept of splitting the traditional stage gate reviews (exit gates or kill points) based upon the critical completion and success criteria.

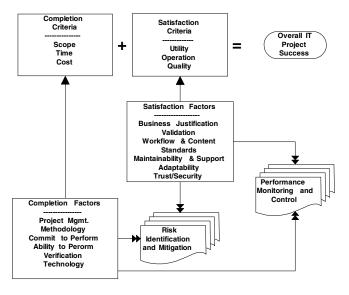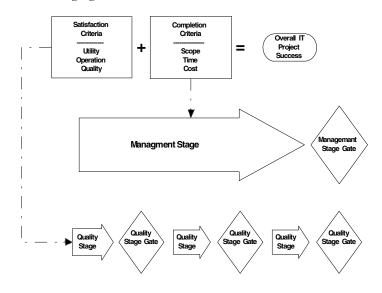*Figure 2.5. Success factors and performance/risk management*

Figure 2.6. Dual stage gates and success criteria

Figure 2.7. Risk framework and success factors

Risk Source Framework											
	Potential Hazards										
	Internal						External				
Threats to:	Product	Process	People	Organization	Other		Product	Process	People	Organization	Other
Completion Factors											
Project Management											
Methodology											
Commitment to Perform											
Ability to Perform											
Verification											
Technology											
Satisfaction Factors											
Business Justification											
Validation											
Workflow & Contents											
Standards											
Maintainability & Support											
Adaptability											
Trust/Security											

Figure 2.8.

Detail Coverage	
Success Factors	**Book Chapter**
Completion Factors	
Project Management	All
Methodology	5
Commitment to Perform	9,14
Ability to Perform	9,14
Verification	6,10
Technology	15
Satisfaction Factors	
Business Justification	3,10
Validation	6,10
Workflow & Content	10
Standards	5,10
Maintainability & Support	5,10
Adaptability	5, 10
Trust/Security	6, 10

Management stage gates are used for the completion criteria and are implemented via management by exception using earned value metrics at regular time periods so that the project can flow quickly with minimal management review delays. Quality stage gates are used to monitor the satisfaction criteria and their timing is event driven by the completion of preliminary product manifestations. This is outlined graphically in Figure 2.6 and discussed in detail later in the book. This dual gating process minimizes the time that both upper management and the project team spends in status meetings by splitting the review process into separate completion and satisfaction reviews with the occurrence of each

based upon the need thereof. However, it ensures that customer involvement is sufficient in the project items that most concern the users.

With the success factor model becoming the foundation for other key project management areas (including quality, security, and risk), frameworks are developed for the detail processes of each management area. For example, a framework for risk identification and quantification is formulated as shown in Figure 2.7.

Chapter Summary

In this chapter the concept of critical success criteria has been developed, and critical success factors for IT projects have been identified and divided into completion and satisfaction groups. More detailed coverage of each critical success factor is contained in succeeding chapters of this book, and Figure 2.8 shows a rough mapping between success factors and book chapters. The notion of a dual stage gate process has been introduced for the comprehensive and effective management of these success factors, and later chapters will define metrics and control methods for both completion and satisfaction criteria.

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