

IDENTIFYING FACTORS THAT CONTRIBUTE TO PROGRAM SUCCESS

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Department of Defense acquisition programs and projects frequently experience cost overruns, performance deficiencies, schedule delays, or cancellation. Often, a good program manager using proven program management practices can mean the difference between success and failure. By surveying program managers, examining successful programs within DoD and relevant literature on program management and defense acquisition, we have identified factors that contribute to program success.

Department of Defense (DoD) acquisition programs and projects frequently experience cost overruns, performance deficiencies, schedule delays, or cancellation. U.S. defense acquisition is arguably the largest “business” in the world. Annual purchases by DoD of approximately \$178 billion exceed the combined purchases of General Motors, Exxon, and IBM. Defense acquisition involves almost 15 million contract actions annually and employs more than 165,000 civilian and military workers who manage research and development, procurement, logistics, and support activities (Sammet and Green, 1990).

With such a large system, errors and inefficiencies are bound to occur. Examples are frequently reported in newspapers and magazines, which use these examples to illustrate the poor state of the

DoD acquisition system. The real impact (beyond the negative publicity) is on defense readiness, performance, and cost effectiveness. Since World War II, six blue-ribbon commissions have studied DoD acquisition and recommended remedies. Adoption of some of these recommendations, new regulations, and laws has failed to alter the paradigm (“Rx for Ailing Procurement System,” 1990).

This study sought to identify factors that contribute to program success. The factors identified can effectively improve the current acquisition system, vice the multiple attempts to reform the system itself.

We used two techniques to determine these factors. First was a survey in which program managers were asked to identify factors they believed were key to their programs’ success. We also conducted a “factor analysis” of acquisition literature.

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APPROACH AND METHODS

The approach used is based on work by Emory and Cooper (1991), and can be summarized thus:

- Define the management question. (In this case it is “What are the most significant factors contributing to successful DoD acquisition programs?”)
- Identify research population and sample to be questioned.
- Develop questionnaire surveys.
- Collect data.
- Analyze data collected.
- Determine factors that contribute to program success.

POPULATION, QUESTIONNAIRE, DATA COLLECTION

Thirty-two program managers participated in the survey, the text of which is in Appendix A. Survey responses were unsigned and untraceable as to the respondent. Each respondent was provided with a blank copy of the survey and a self-addressed stamped envelope.

The questions were developed to help the respondents identify what they felt

were key factors of program success. Areas addressed include program management, personnel, resources, and user requirements. These factors were used in a literature analysis to identify those that contribute the most to program success.

The survey results were analyzed to select key factors considered important by the respondents. These factors were ranked in order of importance and categorized into common subject areas.

With data from the survey results, we applied McFarland’s (1992) factor analysis technique. This technique measures the occurrence of key factors in a review of relevant literature. The occurrence of a key factor in each article is noted. In a representative sample of literature, one can determine the relative importance of each key factor to the subject by noting and comparing the number of occurrences. We ranked those occurrences in order of frequency and by subject area.

With these results in hand, we compiled a list of factors that contribute to program success. Those mentioned most frequently (as determined by factor analysis) were the ones examined for identification as factors of success. Qualitative indicators such as the degree of applicability and history of success of each factor were considered.

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RESULTS

SURVEY RESULTS AND ANALYSIS

Eighteen surveys were returned—a 56 percent rate of return. This response rate is judged sufficient to validate the survey results. (One program manager cautioned against expecting a high response. “We are all surveyed out,” he said, explaining that program managers are frequent targets of official and unofficial surveys.)

The responses to the first survey question “Please rank the following in order of their importance as indicators of program success: meets initial operational capability date, meets technical performance objectives, meets logistics supportability objectives, works well when fielded, meets cost objectives,” are presented in Table 1.

Two factors, technical performance and actual performance (works well when fielded) were deemed most important. By averaging the ranking from all responses, technical performance was first. Judged least important were meeting logistics supportability objectives and meeting cost

objectives.

Answers to the second survey question (“List the factors you believe contribute to the success of a program or are indicative of program success”) fell into eight categories:

- total team concept;
- program manager skills;
- program manager responsibility and authority;
- well-defined requirements;
- stability;
- quality people;
- adequate staffing; and
- acquisition strategy.

Program managers were next asked whether they were helped or hindered by the user, support agencies, higher commands, Congress, and the General Accounting Office (GAO). They responded that user involvement and input helped their program, and that for the most part,

Table 1. Survey Results

Rank of Program Success Indicators			
Most Important	Least Important	Average Rank*	Program Success Indicator
12.5%	31.3%	3.1 (3)	Meets Initial Operational Capability Date
37.5%	6.2%	2.2 (1)	Meets Technical Performance Objectives
0%	31.3%	4.2 (5)	Meets Logistics Supportability Objectives
37.5%	18.7%	2.4 (2)	Works Well When Fielded
12.5%	12.5%	3.1 (4)	Meets Cost Objectives
*(1 = highest)			

they viewed involvement from support agencies and higher commands as a hindrance. All those who responded felt that involvement of Congress and the GAO in specific programs was a detriment to program success. Table 2 presents their responses.

Finally, program managers were asked to rank a list of program success factors identified from a preliminary literature review using a Likert scale (1, not very important; 2, somewhat important; 3, important; 4, very important; 5, critical). The factors and results are presented in Table 3.

The respondents felt that program manager communication and leadership skills were important. They also felt that the type and quality of people assigned to support the program was important, as was a good relationship with the user organization. Adequate resources and stability (requirement, design, and funding) were judged to be next in level of importance. They did not believe that the degree of technical difficulty (low or high) of the program affected program success. The results also indicated that the program manager's technical ability or use of a total quality management program were

not considered to be very important to program success.

LITERATURE FACTOR ANALYSIS

The factor analysis technique (MacFarland, 1992) measures the occurrence of key factors in a survey of literature. The occurrence of a key factor in each article is noted. In a representative literature sample, the relative importance of each key factor to the subject area can be inferred.

By comparing the occurrences of a key factor in a number of articles against occurrences of other key factors in the same articles, one can calculate the relative importance of each factor. For example, if a key factor is mentioned in 5 out of 10 articles, it has an importance of 50 percent for comparison purposes. This figure can be compared to those calculated for other factors and conclusions drawn as to the importance or emphasis the literature places on each factor.

The results from the first, second, and fourth survey questions were used in developing factors used in the literature review. The factors were divided into two main areas: acquisition factors and

Table 2. Survey Results

Has Program Success Been Helped or Hindered?		
Factor	Helped	Hindered
User	71%	29%
Support Agencies	20%	80%
Higher Commands	20%	80%
Congress	0%	100%
General Accounting Office	0%	100%

Table 3. Survey Results

Program Success Factors Rank By Importance	
Average Score	Program success factor
4.42	Program manager's ability to communicate
4.25	Type and quality of people associated with program
4.25	Program manager's ability to lead
4.25	Good relationship with the user organization
4.17	Resources: People, facilities, money
4.08	Product requirements and design stability
3.91	Funding stability
3.83	Good relationship with the prime contractor
3.58	Program's acquisition strategy
3.58	Program manager's acquisition experience
3.25	Program personnel continuity
3.00	Program manager continuity
3.00	High degree of technical difficulty
2.92	Program manager's field experience
2.67	Program manager's technical ability
2.33	Total quality management program
2.25	Low degree of technical difficulty
1 = Not very important 2 = Somewhat important 3 = Important 4 = Very important 5 = Critical	

resource factors. Tables 4 and 5 give the results of the literature survey, with each source denoted by a letter. Table 6 lists the correspondence to the actual source in the bibliography.

The literature factor analysis reveals that there is a broad range of subject matter within the general topic of acquisition

and program management. The highest correlation between a factor and the literature reviewed was 47 percent. A tie occurred between three factors: quality people, well-defined requirements, and acquisition strategy. All had a correlation of 47 percent. This reflects the fact that literature articles frequently focus on these

Table 4. Acquisition Factor Analysis

Factor	Source																Total	Percentage			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P			Q	R	S
Well defined requirements	X		X	X	X		X	X			X		X	X						9	47%
Acquisition strategy	X	X		X	X		X	X	X		X					X		X		9	47%
Works well when fielded	X						X	X	X		X					X		X		6	32%
Stability	X		X	X	X			X								X				6	32%
Good relationship with contractor	X				X		X								X					4	21%
Total quality management program								X									X		X	3	16%
Meets performance objectives	X			X																2	11%
Meets cost objectives				X																1	5%
Meets initial operational capability date																				0	0%

Table 5. Resource Factor Analysis

Factor	Source																Total	Percentage			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P			Q	R	S
Quality people	X		X	X	X			X					X	X	X			X		9	47%
Program manager responsibility and authority	X		X	X	X		X					X		X		X				8	42%
Total team concept	X				X		X				X	X		X	X					7	37%
Program manager skills	X			X	X			X				X	X	X						7	37%
Congressional involvement				X	X									X						3	16%
User involvement							X					X								2	10%
Adequate resources			X					X												2	10%
Adequate staffing															X					1	5%
Support agency involvement							X													1	5%
Higher command involvement							X													1	5%
Program manager's technical ability	X																			1	5%
General Accounting Office involvement																				0	0%

Table 6. Correspondence Between Codes and Sources

A:	Baumgartner, Brown and Kelley
B:	Beltramo
C:	Clay
D:	Gansler
E:	Gregory
F:	Heberling and Graham
G:	Hicks, Rich, Wertheim and Meyer
H:	Hirsch and Waelchli
I:	Kish
J:	Lesser
K:	Nelson
L:	Price and Valentine
M:	"Rx for Ailing Procurement System"
N:	Sammet and Green
O:	Settlemyer
P:	Snoderly and Acker
Q:	Total Quality Management Master Plan
R:	Weiss
S:	Zairi

Please consult References for complete citation.

important aspects of acquisition and program management.

Because the highest correlation was 47 percent, the degree of significance was calculated by using 47 percent as the maximum. Factors with correlations between 32 percent and 47 percent were considered to be the most significant. Factors with correlations between 17 percent and 31 percent were judged moderately significant. Factors with less than 17 percent correlation were considered to be least significant.

DISCUSSION

Elements of program success were identified by surveying DoD program managers. A factor analysis was performed using relevant literature. Those factors with the highest correlation between survey and literature content were identified as those contributing to program success. This two-step method provides a means of cross-checking survey results with current literature works and focusing on factors that are considered important to program success by both.

The most significant elements contributing to program success, as identified in

the factor analysis of the literature, fall into two categories. The first is acquisition factors, which consist of:

- well-defined requirements;
- the acquisition strategy;
- a program product that works well when fielded; and
- stability in the program.

The second category we define as resource factors:

- quality people;
- program manager responsibility and authority;
- total team concept; and
- program manager skills.

These factors also ranked high in the survey of program managers. This high degree of correlation with the survey adds validity to MacFarland's analysis technique. From these results comes the following list of factors that contribute to program success.

WELL-DEFINED REQUIREMENTS

A requirement is a formal description of a desired operational capability. Product stability depends on realistic requirements and minimizing changes. As Baumgartner, Brown, and Kelley (1984) state, systems that have problems are usually those that have many changes during design and production, especially changes driven by the user. Thus users should take care to avoid overstated requirements that delay production and lead to higher costs. And producers must carefully coordinate

with the users to ensure that the requirements are understood and well defined.

Hicks, Rich, Wertheim, and Meyer (1991) believe that not enough time and attention are paid to successful programs that could serve as possible models for the future. They note that the GAO, which seldom compliments the defense acquisition process, identified the Navy's Fleet Ballistic Missile program as one such highly successful program spanning 15 years. The GAO identified open dialogue between the program manager and the prime contractor and continuous communications with the ultimate users as reasons for this success.

ACQUISITION STRATEGY

Like any business strategy or strategic plan, the acquisition strategy is situation and resource dependent. The program manager should examine the internal and external environment to gauge resources and support available. The acquisition strategy should be crafted to help further the program objectives, while meeting constraints placed upon the program by external regulators and regulations.

Snoderly and Acker (1981) cite one strategy used to reduce acquisition time and costs. The Defense Support Program, which produces ballistic missile early warning satellites, had a requirement to purchase four satellites from their sole-source contractor, TRW, over a five-year period. Normally, the four satellites would

"Like any business strategy or strategic plan, the acquisition strategy is situation and resource dependent."

be separately funded, purchased individually, and programmed for delivery in succeeding years. Parts and material purchases for each satellite would be made separately. Administrative costs and potential part obsolescence costs would also be high. Assembly and test production gaps would be created due to uneven production and funding.

The acquisition strategy actually pursued offered cost savings of \$134 million for the procurement. The program office acquired parts for all four satellites at one

“Just as it is difficult to hit a moving target, it is difficult to manage a program that lacks stability.”

time, in more economic quantities. A single qualification test for all four satellites, because of continuity of design

and production, also contributed to efficiency. The above efforts resulted in delivery of the last satellite one year early, saving program administration costs. The acquisition strategy was approved because the program was well established, with validated requirements and little chance of change or cancellation.

WORKS WELL WHEN FIELDIED

The ultimate test and determinant of the success of a program is if the item procured works well in the environment and achieves its mission. Delays in procurement or cost overruns are temporary problems that must be managed in order to keep the program alive. Those problems are forgotten once the system is fieldied. The main concern of the ultimate user is if the system works well when deployed.

STABILITY

Just as it is difficult to hit a moving target, it is difficult to manage a program that lacks stability. Changes in requirements, budgets, and resources make program planning and execution difficult. The program manager must act to maintain stability where possible and manage change where stability is not possible. The program manager, as the prime program advocate, must act to lay the groundwork for external support that will help maintain stability.

Clay (1990) believes that instability is at the core of most defense acquisition problems. He suggests five conditions for creating stability:

- Managers should set out a few key system objectives, consistent with strategies and user needs that are correctly identified and held constant.
- Realistic cost, schedule, and performance estimates must be set. He defines “realistic” as the probability of overperformance being equal to the probability of underperformance.
- Trained and experienced personnel must be assigned to the program who can to achieve the program objectives.
- Resources approved and promised during the planning phase must be provided, unless the program fails to achieve its objectives.
- Commitments to complete acquisition tasks must be fulfilled.

Hirsch and Waelchli (1989) equate program stability with quality expert W. Edwards Demming’s “constancy of

purpose” and state that it has long been recognized as perhaps the single most important contributor to efficiency and effectiveness in acquisition. Often external factors that the program manager has little or no control over affect program stability. As the program’s top advocate, the program manager can still demonstrate constancy of purpose even in these situations.

QUALITY PEOPLE

Well-educated and trained people are essential to the success of a program. A reasonable amount of personnel stability and continuity is desirable. Successful program managers hire or develop a talented workforce, mold them into a cohesive team, and motivate them to help further program objectives.

PROGRAM MANAGER RESPONSIBILITY AND AUTHORITY

The program manager is responsible for the success or failure of the program, yet there are many factors beyond his control. The solution is for the program manager to assume the authority commensurate with the responsibility for ensuring program success. Baumgartner et al. (1984) quote one program manager as stating, “Any program manager has as much authority as he is willing to step up and take.”

TOTAL TEAM CONCEPT

The program manager should create a program office team atmosphere where everyone must work toward program goals and aggressively manage the program. This team spirit promotes unity of purpose and creates a corporate culture that unifies the program office. Formation of integrated product teams that include

the user and contractor serve to foster communication and a joint approach to identifying and solving problems. Although total quality management did not rank as a success factor, the total team concept is one element of a total quality management program that has been identified as contributing to the success of a program.

PROGRAM MANAGER SKILLS

The ability and skills of the program manager can make or break a program. A combination of leadership ability, communication skills, operational background, and education is important. The pro-

“The ability and skills of the program manager can make or break a program.”

gram manager must be able to garner support for the program at higher levels, motivate the team, and navigate the program toward successful achievement of its goals. The program manager—as the program’s leader and manager—is in charge. Price and Valentine (1992) recommend results-oriented program management as an effective way for program managers to mold organizational culture, emphasize long-term goals and quality, and focus on the big picture. Results-oriented program managers have a sense of ownership in the program, believe in the mission, and communicate this to the program team. They create an environment focused on excellence and successful program completion.

Baumgartner et al. (1984) consider the ability of the program manager to be a vital element in the success of a program. Successful programs have managers who

have the ability to communicate well with all types of audiences, are clearly in charge, take authority needed to perform the job, and hire quality people. The authors state that one important program manager skill is dealing with the external environment. They recount how when one program manager was required to do something he disagreed with, he would explain what the repercussions of that action would be. If the person persisted, the program manager explained that he would tie that person's name to the required change and its related cost, and schedule impacts so that everyone in the program's chain of command would know who was behind that change. The person usually acquiesced. As one program manager observed, many people in the Pentagon can say no, creating problems for your program, but do not have the authority to say

yes. A program manager needs the skills and understanding to deal with the existing acquisition system and bureaucracy, and the ability to adapt to changes in the system.

RECOMMENDATION

The factors contributing to program success that we've provided here give program managers points of reference, which they should evaluate for inclusion in their programs. These factors are widely recognized as contributing to program success by their peers and by the current literature on acquisition. While all these recommendations may not apply to any particular program, they provide an array of strategies that a manager can implement and monitor to gauge their success.

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APPENDIX A
ACQUISITION PRACTICES SURVEY

1. Please rank the following measures of program success in order of their importance:

_____ Meets initial operational capability date
_____ Meets technical performance objectives
_____ Meets logistics supportability objectives
_____ Works well when fielded
_____ Meets cost objectives

2. Please list the factors you believe contribute to the success of a program or are indicative of program success:

3. Has the success of your program been helped or hindered by influences outside the program office such as:

Helped	Hindered	
_____	_____	The user
_____	_____	Acquisition support agencies
_____	_____	Higher command headquarters
_____	_____	Congress
_____	_____	General Accounting Office

4. Please rate the importance of the following factors to program success using this scale:

Not very important	1
Somewhat important	2
Important	3
Very important	4
Critical	5

A.	Type and quality of people associated with program	1	2	3	4	5
B.	Product requirements and design stability	1	2	3	4	5
C.	Funding stability	1	2	3	4	5
D.	Program manager's technical ability	1	2	3	4	5
E.	Program manager continuity	1	2	3	4	5
F.	Program personnel continuity	1	2	3	4	5
G.	Program's acquisition strategy	1	2	3	4	5
H.	Resources: People, facilities, money	1	2	3	4	5
I.	High degree of technical difficulty	1	2	3	4	5
J.	Low degree of technical difficulty	1	2	3	4	5
K.	Program manager's ability to communicate	1	2	3	4	5
L.	Program manager's ability to lead	1	2	3	4	5
M.	Program manager's field experience	1	2	3	4	5
N.	Program manager's acquisition experience	1	2	3	4	5
O.	Total Quality Management program	1	2	3	4	5
P.	Good relationship with the prime contractor	1	2	3	4	5
Q.	Good relationship with the user organization	1	2	3	4	5

5. Please note any comments you have regarding successful acquisition management practices or this survey.

