

# A Road Map towards Customer Satisfaction

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## Abstract

Achieving customer satisfaction is one of the most crucial business targets of an organization. In a project environment, the customer usually measures a project's success using the famous "golden triangle", expecting the project to end on time and meet both cost and scope targets. In this paper, we identified the relative importance of each of these three project success measures on customer satisfaction, analyzing more than 400 projects from different industries and cultures. It was found that in most industries, meeting scope targets has the greatest influence on customer satisfaction, while meeting cost targets has the lowest. This was found to be similar among different organization types, but different among cultures. Characteristics unique to each industry and culture are also analyzed in this paper.

**Key words:** Project management, operations management, customer satisfaction.

## Introduction

The famous "golden triangle" helps to measure a project's success using achievements related to time, cost and scope targets. These measures are aimed at assessing project success levels and are commonly used by most organizations. However, these three success measures are not the project manager's objective, but only a common means toward achieving customer satisfaction.

In the business world of project management, the achievement of customer satisfaction is highly important to the organization, since it allows the organization to receive future projects from the same customer or at least a good reference that could serve to bring in new customers. Yet, a critical linkage is missing between the satisfaction of a customer and the three measures of project success. In other words, most project managers have no idea of the relative importance that the customer gives to cost overrun, schedule overrun and meeting the project's scope. The objective of this paper is to identify the relative importance of project success measures on customer satisfaction in different cultures and industries. First, let us review the literature in this area.

## Literature Review

A project is defined as a temporary endeavor undertaken to create a unique product or service (PMI, 2004). The success of a project is usually measured by meeting time, cost and scope (or performance) objectives (Alvarado et al., 2004; Zwikael and Globerson, 2004; Meredith & Mantel, 2003 and others). Hughes et al. (2004) added two more success measures for construction projects – safety and quality. Kasprovicz (2001) claims that these indices are contradictory success measures. One may easily improve the scope of a project, by adding cost or extending the project's duration. Meredith & Mantel (2003) claim that managing a project is about managing these trade-offs and finding the solution in a satisfactory compromise.

In recent years, some other approaches have appeared. Dvir et al. (2003) elaborate on the project success measures list by adding measures that reflect project effectiveness, impact on customers, business impact on the organization and creating new opportunities for the future. Meredith & Mantel (2003) argue that all these measures must be contained in the project specifications. Kerzner (2001) defines project success as a project that was completed within the allocated time period, within the budgeted cost, at the proper performance level, with the customer's acceptance, with the ability to use the customer's name as a reference, with minimum or mutually agreed upon scope changes, without disturbing the main work flow of the organization and without changing the corporate culture.

However, it was also found that from all success measures, "benefits to the customer" is by far the most important success dimension (Lipovetsky et. al., 1997), since it reflects all the other dimensions. Caru et al. (2004) claim that in the project business what is truly relevant is not that the project eventually is finalized in time and according to the budget, but that the customer is satisfied with the overall experience of the company. Kaplan and Norton (2005) find customer satisfaction as one of the three most important operational measures in a balanced scorecard analysis. Kostman & Schiemann (2005) found that the "voice of the customer" was one of the three most effective quality management techniques used by managers.

Actually, improving the benefit to the customer is a basic and critical focus even in Deming's TQM theory (Deming, 1986; Fredendall, 1995). *Customer satisfaction* is defined as 'the result achieved when service or product features respond to customer needs and when the company meets or exceeds customers' expectations over the lifetime of a product or service' (Juran, 1991). Vavra (1997) claims that the subjective assessment of customer satisfaction is the leading criterion for determining the quality actually delivered to customers. Customer satisfaction has been an industry focus for some time as a measure of managerial strength and company profitability (Kelsey and Bond, 2001; Baggs and Kleiner, 1996; Ellis and Curtis, 1995). Kujala & Ahola (2005) lately introduced a new framework of measuring customer satisfaction in a project-based organization

Understanding the importance of high customer satisfaction, we still have to find the project manager's 'road map' – the processes he goes through in order to achieve it. The next section of this paper charts the model developed for this purpose.

## The Model

The objective of this model is to identify the relative influence of project success measures on customer satisfaction. Let us first define the following measures:

**CS** – *Customer Satisfaction* is the dependent variable of this model. This index is measured on a scale of one to ten; one represents low customer satisfaction, while ten represents high customer satisfaction.

The three independent variables of the model are:

**SV** – *Schedule Variance* is measured in percents as the difference between final and planned project schedule.

**CV** – *Cost Variance* is measured in percents as the difference between final and planned project cost.

**SP** – *Scope Performance* is measured on a scale of one to ten; one represents low scope performances, while ten represents high scope performances.

In order to identify the best relationship among the three independent variables and the dependent variable, customer satisfaction, some models are suggested. Each model represents another relationship among the variables, using either linear or non-linear equations:

$$CS = b_0 + b_1 * SV + b_2 * CV + b_3 * SP \quad (1)$$

$$CS = b_0 + b_1 * SV + b_2 * CV + b_3 * SP + b_4 * SV * CV + b_5 * SV * SP + b_6 * CV * SP \quad (2)$$

$$CS = b_0 + b_1 * SV + b_2 * CV + b_3 * SP + b_4 * SV^2 + b_5 * CV^2 + b_6 * SP^2 \quad (3)$$

$$\text{Ln } CS = b_0 + b_1 * SV + b_2 * CV + b_3 * SP \quad (4)$$

### Research Hypotheses

Following these suggested models and literature review, we may assume the following research hypotheses:

1. Relative influence of project success dimensions, schedule variance, cost variance and scope performances, on customer satisfaction:

H<sub>0</sub>: All of the three project success dimensions have a similar influence on customer satisfaction.

H<sub>1</sub>: Project success dimensions have different influences on customer satisfaction.

- 2. Industry uniqueness:
  - H<sub>0</sub>: In different industry types, project success dimensions have a similar relative influence on customer satisfaction.
  - H<sub>1</sub>: In different industry types, project success dimensions have different relative influences on customer satisfaction.
- 3. Cultural influence:
  - H<sub>0</sub>: In different cultures, project success dimensions have a similar relative influence on customer satisfaction.
  - H<sub>1</sub>: In different cultures, project success dimensions have different relative influences on customer satisfaction.

**Data Collection**

The questionnaire was administered to project managers in Israel and Japan during the years 2001-2004. In Israel, 275 project managers completed the questionnaires, in 26 different workshops, of which 16 were administered as part of internal organizational project management-training programs. Each of these 16 workshops included an average of 17 individuals. The other 10 workshops were open to project managers from different organizations. Approximately half of the organizations, which participated in the Israeli sample, are international organizations (i.e. Motorola). In Japan, 123 questionnaires were completed in 17 organizations. The types of projects sampled in each country are presented in Table 1.

Table 1

Distribution of project types included in the study

Project Type	Japan	Israel
Engineering & Production	27%	16%
Software & Communications	63%	48%
Government	0%	25%
Services	8%	5%
Other	2%	6%
Overall	100%	100%

Analysis of Table 1 reveals that the source of questionnaires in both countries was similar, including about half from software and communications organizations, about 20% from engineering and production organizations, and less than 10% of service projects. In both countries, more than 70% of the projects were performed in the hi-tech industry. In Israel, more projects involved communications, while in Japan most of this group included software projects.

A major difference between samples is the high involvement of government organizations in the Israeli sample, compared to the Japanese. Project managers from both countries estimated a similar level of risk in their projects, which was rated in the questionnaires at 6.6 on a scale of 1 to 10.

The following data were collected for each project: Cost overrun (CV) and schedule overrun (SV) were measured in percents from the original plan. Scope performance (SP) and customer satisfaction (CS) were measured on a scale of one to ten; one represents low scope performance and low customer satisfaction, while ten represents high scope performance and high customer satisfaction.

The average cost overrun quoted by the participants was 25%, ranging from a savings of 20%, up to spending 400% more than the original budget. The average schedule overrun was 32%, ranging from 5% ahead of time, up to a schedule overrun of 300%. Similar overrun findings were found in previous studies (i.e. Johnson et al., 2001). Average scores of scope performance were 8.0, ranging from one to ten and the average scores of customer satisfaction were 8.1, ranging from four to ten.

## Results

Based on the collected data, statistical analysis was performed. Analysis for Japanese organizations and a comparison between cultures will follow the Israeli organizations' analysis.

### *Analysis of Israeli Organizations*

The first statistical analysis is a simple regression analysis, in which customer satisfaction acts as the dependent variable, and each of the three success variables – schedule variance, cost variance and scope performance – acts as an independent variable. Results of three regression runs are presented in Table 2.

Table 2

Simple regression analysis

Independent Variables	R Square	Significance F	Intercept	Coefficients
Schedule Variance	0.028	0.005 **	8.37	-0.71
Cost Variance	0.001	0.591	8.19	-0.14
Scope Performance	0.405	<0.001 **	3.54	0.57

\* P<0.05; \*\* P<0.01

As can be seen in the right column of Table 2, customer satisfaction has a negative correlation with schedule and cost variances. These findings are expected, since a customer is more satisfied when project's schedule overrun is smaller and when cost overrun reduces. Yet, between these two independent variables, only the schedule variance index significantly impacts on customer satisfaction. Customer satisfaction is not significantly influenced ( $p = 0.59$ ) by cost variance. The reason for this may be the fact that most projects are currently budgeted at a fixed cost; hence, the customer isn't influenced directly by the actual project cost.

The positive correlation between scope performance and customer satisfaction in Table 2 is due to the attention that a customer pays to meeting the objectives he defined earlier in the project. Moreover, customer satisfaction index has the highest correlation and the greatest significance level with scope performance. This finding indicates the very high importance of meeting project scope in the eyes of the average customer. Finally, a customer who gives the greatest attention to the achievement of scope targets may "pay" in a trade-off causing some delay in the project's conclusion.

Once we have identified the relative importance of each project success measure on customer satisfaction, the most accurate model will be identified. Four models presented earlier in this paper were calculated to identify the best one. Table 3 presents the results of the four models.

Table 3

Analysis of different models

#	Equation	R <sup>2</sup>	F
1	$CS = 3.67 - 0.64*SV + 0.45*CV + 0.57*TP$	0.49	<0.001 **
2	$CS = 0.9 - 1.5*SV + 9.7*CV + 0.9*SP + 0.3*SV*CV + 0.1*SV*SP - 1.2*CV*SP$	0.49	<0.001 **
3	$CS = 7.2 - 1.7*SV + 1.1*CV - 0.4*SP + 0.8*SV^2 - 0.4*SV^2 + 0.1*CV^2$	0.46	<0.001 **
4	$\ln CS = 1.38 - 0.07*SV + 0.03*CV + 0.09*TP$	0.46	<0.001 **

\* P<0.05; \*\* P<0.01

All four equations presented in Table 3 present significant results. Two equations have similar highest values of R-squares (0.49). Since the first equation, a multiple linear regression is more user-friendly and common, and as the second model provides no added value; we have chosen to work with the simpler one. Hence, the best model, the multiple linear regression, repre-

sented by equation 1, has a significant impact on customer satisfaction. This model will be used throughout this paper to analyze data.

We showed that the equation, as a whole, is significant. However, by drilling down into this model, we may find out that different variables have different levels of impact on customer satisfaction, as can be seen in Table 4.

Table 4

Multiple linear regression analysis

	Coefficients	p-value
Intercept	3.67	<0.001 **
Schedule Variance	-0.64	0.038 *
Cost Variance	0.45	0.149
Scope Performance	0.57	<0.001 **

\* P<0.05; \*\* P<0.01

Analyzing the results of the multiple linear regression in Table 4, we can see once again that the most significant influence on customer satisfaction lies with scope performance (p<0.001). Schedule variance has a somewhat lower, but still significant, influence on customer satisfaction, while cost performances have no influence at all on customer satisfaction. Hence, we may reject the first null hypothesis and claim that different success measures have different relative influences on customer satisfaction.

After analyzing these data, we will calculate results for each selected industry, using the multiple linear regressions. P-values are presented in Table 5 for each industry type.

Table 5

Results of multiple linear regressions for four industry types

Organization Type	Engineering	Software	Communications	Government
n	44	95	37	69
R <sup>2</sup>	0.62	0.45	0.54	0.22
Significant F	<0.001 **	<0.001 **	<0.001 **	<0.001 **
Schedule Variance	0.188	0.066	0.268	0.315
Cost Variance	0.268	0.167	0.374	0.400
Scope Performance	<0.001 **	<0.001 **	<0.001 **	<0.001 **

\* P<0.05; \*\* P<0.01

Following the results presented in Table 5, we can't reject the second null hypothesis presented in this paper. All four investigated industry types share the same conclusion – meeting scope performance has the most significant influence on achieving a satisfied customer at the end of a project.

***Analysis of Japanese Organizations***

As was mentioned earlier, this research was conducted in Japan as well, for 123 projects. In order to learn about the difference between Japanese and Israeli management culture, a comparison of project success between the two cultures is presented in Figure 1 for the first two success measures – schedule and cost overruns.

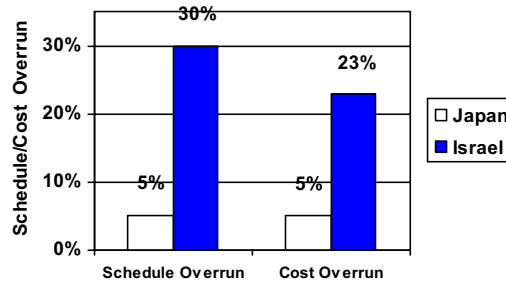


Fig. 1. Average schedule and cost overruns in Japan and Israel

As can be seen from Figure 1, cost and schedule performance are significantly lower in Japan ( $p$ -value $<0.001$ ). The average cost overrun in Israel is more than 4 times higher than in Japan, with the schedule overrun being six times higher in Israel. These findings may be a result of the importance of meeting schedule objectives, as is reflected in the Japanese culture.

Opposite results were obtained for the other two criteria, namely scope performances and customer satisfaction, as can be seen in Figure 2.

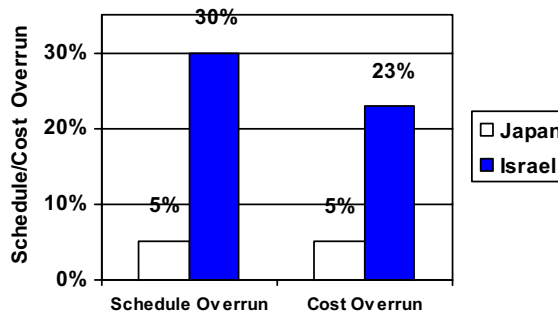


Fig. 2. Average scope performances and customer satisfaction in Japan and Israel

Projects in Israel achieve higher customer satisfaction than in Japan ( $p$ -value $<0.001$ ). This is in spite of the higher cost and schedule overruns generated on projects in Israel.

In order to identify the relative importance of the three success measures on Japanese customer satisfaction, the multiple linear regression analysis was conducted once again. R squared value was found to be just a little lower than in Israel (0.41 vs. 0.49), perhaps due to a lower number of observations. Still, results were very significant ( $F<0.001$ ). Table 6 presents the results of multiple linear regressions in Japan.

Table 6

#### Multiple linear regression analysis

	Coefficients	P-value
Intercept	3.85	$<0.001$ **
Schedule Variance	0.38	0.558
Cost Variance	-1.90	0.025 *
Scope Performance	0.51	$<0.001$ **

\*  $P<0.05$ ; \*\*  $P<0.01$

Analyzing the results of the multiple linear regression in Table 6, we can see once again that the most significant influence on customer satisfaction lies with scope performance ( $p<0.001$ ). In contrast to previous findings, cost performances have a significant influence on customer satisfaction.

faction, while schedule variance has none. This is due to the fact that meeting schedule project targets is commonplace in Japan, occurring in most projects, causing the customer to take this fact for granted and to investigate other success measures. Hence, we reject the third null hypothesis, and claim that in these two cultures, project success dimensions have different relative influences on customer satisfaction.

After analyzing these data, a drill-down analysis will calculate them for several Japanese industries, using the multiple linear regressions. P-values are presented in Table 7 for two industry types.

Table 7

Results of multiple linear regressions for two industry types in Japan

Organization type	Software	Production
N	78	33
R <sup>2</sup>	0.44	0.33
Significant F	<0.001 **	0.008 **
Schedule Variance	0.528	0.914
Cost Variance	0.032 *	0.404
Scope Performance	<0.001 **	0.001 **

\* P<0.05; \*\* P<0.01

Analyzing Table 7, we can see that once again the relative importance of success measures doesn't depend on the industry type. In the Japanese organization types investigated, scope performance has the greatest impact on customer satisfaction, followed by cost overrun.

### Conclusions and Implementation

Different customers pay different levels of attention to meeting schedule, cost and scope performance objectives. Yet, a typical characteristic was found for all industries and cultures investigated – the road map towards achieving customer satisfaction starts with meeting scope performance targets. Most customers may agree to extend the project's duration and increase its budget, as long as it achieves its targets.

In general, a project manager has to direct his decisions throughout the project toward scope, even if it means extending the project's duration. Most customers will appreciate this decision. For example, when a new function that will improve the using of developed software may be added, most customers will agree to extend the duration of the project with another month, since the benefits of this function will be used for many more years to come. An opposite example was found to be a major problem while building the new terminal in an international Israeli airport. During the project, the project manager decided to reduce the number of departure gates in the terminal, in order to reduce the project's duration. The customer, Minister of Transportation, pointed out his objection for this decision very clearly, claiming that scope performance is more important than meeting planned schedule.

Of course, one should be most careful with this recommendation when a project has mandatory constraints regarding the customer's desired due date, i.e. in compliance with regulations and laws. This decision should also be made together with the mutual involvement of the customer.

The relative importance of project success measures was found to be similar among different organization types. In a fixed-cost-project-business-world, the customer doesn't care about a project's final cost and prefers target achievement to meeting a schedule, no matter which industry is involved.

It was also found that the relative importance of project success measures is dependent upon culture. Israeli customers give a high emphasis to both meeting the scope of the project and meeting its schedule. Japanese customers give the highest importance to meeting scope targets. This is due to the fact that meeting a project's schedule in Japan is taken for granted, while in Israel

it is only wishful thinking. This means that in a global project scenario, a project manager has to act differently, while working for different customers. This should be done by adjusting decision making to the success measures that are more important to your current customer.

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