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Abstract: In a quest to meet ever more ambitious goals, industry is increasing its standardization efforts at an impressive rate. These efforts are in a large part directed towards costs, time, quality, and customer satisfaction. Most major companies have tackled standardization through ISO 9000, QFD, TQM, as well as other techniques. Typically of operational nature, these aspects of corporate policy have shown mixed results. One of their primary selling points is their ability to provide measurable performance and increased efficiency. It is the aim of this paper to expand this one step forward, to project management. Groups such as PMI, as well as several other organizations are beginning to approach project management with a standard set of tools. Through literature review and a survey, it is the hope of the authors to examine the effectiveness of project management on the meeting of the common goals of cost, schedule, quality, and customer satisfaction.

Project Management Standardization Assessment

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EMP-P9774

EMGT 590/690 ENGINEERING SYNTHESIS

TEAM PROJECT

PROJECT MANAGEMENT STANDARDIZATION ASSESSMENT



Submitted to: Dr. Dragan MILOSEVIC

Submitted by:

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Portland State University Engineering Management Program 14 August 1997

Abstract - In a quest to meet ever more ambitious goals, industry is increasing its standardization efforts at an impressive rate. These efforts are in a large part directed towards costs, time, quality, and customer satisfaction. Most major companies have tackled standardization through ISO 9000, QFD, TQM, as well as other techniques. Typically of operational nature, these aspects of corporate policy have shown mixed results. One of their primary selling points is their ability to provide measurable performance and increased efficiency. It is the aim of this paper to expand this one step forward, to project management. Groups such as PMI, as well as several other organizations are beginning to approach project management with a standard set of tools. Through literature review and a survey, it is the hope of the authors to examine the effectiveness of project management on the meeting of the common goals of cost, schedule, quality, and customer satisfaction.

I. INTRODUCTION

Today's market competition is based on the ability of companies to fulfill cost, quality, customer satisfaction, and schedule goals. Entering continuous improvement loops with systematic processes companies need to evaluate their performance through systematic These four goals are widely identified as deterministic to measuring measures[1]. projects' effective improvement and success [2][3][4][5][6]. As a result, project cycle times are ever decreasing while corporate profits are increasing. What makes this possible? In many cases, standardized methods have made great inroads to increase corporate vitality: Why decrease cycle time? It has been proposed that the profitability is negatively influenced by the square root of increasing development time [7]. Boeing, Cummins Engine HDD, Red Spot TPO, Texas Instrument AVFLIR, and Thomson DSS, face challenges in new product development efforts focused on three program priorities: design quality, product cost, and product introduction speed [8]. A recent study illustrates that the "The strongest driver of profitability is the existence of a high-quality, rigorous new product process." Merely having a formal process does not impact performance at all [9]. Pacific Bell's reengineering process, which implements some standardized project management (SPM) concepts, is driven by the measurements of four goals: cycle time, cost, quality and customer satisfaction. For each of these goals they formulate plans that directly measure the results in these areas[10].

In reality, much of this has been around for a while, many of the recent trends in the business world are standardized projects in themselves. Before undertaking any reengineering project it is essential to follow certain guidelines to insure success [28][29][30][31]. Even concurrent engineering in itself is a means of project standardization. Its basic principles apply to virtually all organizations regardless of their size, product, or level of technical sophistication. The implementation of concurrent engineering processes leads directly to attaining low product life-cycle costs, decreasing timing of new product's entry into marketplace, respecting quality and market requirements[32][33]. Concurrent engineering directly impacts standardization effectiveness and "composite" standardized forms of organizations can be proposed for reducing product development time and cost[34][35]. The old paradigm involved a standardized approach involving a long chain of value added functional departments in which products were created. The concurrent engineering approach aims to parallelize as much as possible through implementation of some common practices [36][37][38]. A key to consistent quality is the reduction of variance by limiting the amount of independent free riders from implementing their own quality initiatives. If this is not done, it will often lead to a wide array of incompatible quality procedures [39]. This however is in conflict with what some to believe to be essential to reengineering, a maverick [40][41].

With ever shrinking time horizons and ever-growing expectations, project management techniques are ripe for standardization within firms. Implementation of project standardization is a strategic business issue [42]. It may also offer a basis on which to differentiate products, cost, time-to-market, quality and performance [43]. With this in mind, many companies are migrating more towards SPM as a possible means to better meet project cost, schedule, quality and customer satisfaction goals. The results of this movement are still to be determined. However, project success are also conditioned by simplicity and flexibility requirements and an over-development of standardization tools could be considered as a barrier to project evolution, creativity and effectiveness[44]. Which orientation and strategy companies should adopt: standardize or had-hoc project management [27]?. It is the aim of this paper to address the issue.

Standardization of projects is an integral part of a company's overall culture. It requires integration of projects to a whole, which is greater than the sum of its parts. Technology implementation, management support, and overall attitude are necessary to implement [45][46]. For any efforts in Internal Technology, it is absolutely necessary to implement technology as a part of the whole rather than a fragmented addition [47]. This paper proposes that companies exercising forms of SPM are more likely to do well then those that do not, project members and managers are likely not to have the same ideas on the project. "Doing well," concentrates on four major goals that corporations often base their projects on, costs, schedule, customer satisfaction and quality.

II. INTERVIEW METHODOLOGY

A survey was compiled to test the impacts of standardized project management on four overall goals that were determined to be the underlying success factors for most companies. Although each company is different, the before mentioned research indicates that project success is typically measured by meeting any combination of the following: cost goals, schedule goals, quality goals and customer satisfaction.

II.I. Survey Sections

One of the main considerations of the survey was a small size. It was the aim of the research team to maintain a one two-sided page survey so as not to deter possible survey participants, this also ensured that the survey would be easy to manage in the window of time available.

The survey was comprised of two sections. The first section covered organization type classification based on size and type; individual's role and experience; and project type, cost, time and number of team members. Section two was designed to assess the amount of project management standardization, global implementation, and present state of affairs in the organization. In addition, section two also requested the degree to which projects met their cost, schedule, quality, and customer satisfaction goals. Additional space was given for individual comments.

Section two questions were based on a five-point scale, ranging from opposite extremes. Seven questions were asked covering the following topics.

- The extent that the project management process was shared and consistent. [Q1]
- Whether project planning was integrated and interrelated to other projects. [Q2]
- Whether management methods were randomly selected and incompatible or consciously selected and compatible. [Q3]
- Whether software was used to better automate individual projects or glue all projects together. [Q4]
- Whether management focused on sporadic metrics and schedule or regular comprehensive metrics. [Q5]
- Whether or not project performance is driven by organizational culture versus individual project managers' aspirations. [Q6]
- The balance between team players and free riders among project managers. [Q7]

These questions hoped to address the interelatedness of an organizations projects, as well as the standardization that may have already occurred. The next question of the last section had participants rate the overall achievement of cost, quality, customer satisfaction, and scheduling goals on a five point scale. The aim of this question was to analyze the correlation of the first seven questions of the section with the overall impact.

II.II. Survey Execution

Surveys were targeted towards project managers and members throughout a 2-month period. A large body of survey participants was obtained through the graduate schools in Engineering and Business Management at Portland State University and different companies in Portland area. Participants were required to be currently working with project management in industry and answer the survey in accordance with those projects. The scope of the survey was not to include student projects, and as such not all students were eligible. This does introduce some means of biasing as the current education of participants may or may not make them more aware of their current surroundings with `

respect to this survey. Other participants were obtained through various industry points of contact.

Participants were asked to fill one survey, relay it to fellow project members and return the filled out surveys of all members. The intentions of the survey were to assess at least one member and manager from each project to get an accurate representation from each and determine any existing differences. The surveys were then analyzed using appropriate statistical methods.

III. DESCRIPTIVE ANALYSIS

III.I. Sample Profile- Organizations

Over a six week period in the summer of 1997, 146 respondents were received. Table 1 illustrates the breakdown of industry types where respondents work for: It is apparent from observation that a large portion of the participants were from electronics and computer/software companies. With smaller amounts coming from design and other.

Field of Work	Count	Percentage
Electronics	44	21.26%
Machinery/Metals	7	3.38%
Computer/Software	45	21.74%
Design	27	13.04%
Business Mgt./Consulting	13	6.28%
Health	3	1.45%
Construction	18	8.70%
Utilities	13	6.28%
Other	37	17.87%

Table 1 Breakdown of company types among respondents.

Companies with percentiles lower than 10% were disregarded for the analysis due to the small number of data points which we had sampled. Others were clustered into four major functional roles to better analyze the data at hand. There is a fairly even distribution of respondents over the four functional areas. The clustering is as follows.

1. Manufacturing

Electrical/Electronics Manufacturing Other Manufacturing

2. Service Industry

Health Services Utility Services

Computer/Software Services Other Services

3. Construction Industry

Machinery / Metals Industry * Construction Other Construction

4. Product Development Industry

Design Industry Other

(*: Company types used for the analysis after clustering)

III.II. Sample Profile- Annual Revenue

Besides company functional classification, respondents were asked their companies' annual revenues. Figure2. and Table 2 - Breakdown of company revenues among respondents. list the breakdown of the survey participants based on company revenue. Over half of the respondents held an annual revenue of over \$50 million.

Revenue	Count	Percentage
Less than 5 million	19	13.87%
Between 5 and 10 million	8	5.84%
Between 1 and 30 million	13	9.49%
Between 31 and 50 million	10	7.30%
More than 50 million	87	63.50%

Table 2 - Breakdown of company revenues among respondents.

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Figure 1 - Breakdown of company revenues.

III.III. Sample Profile- Project Management Role

Although targeted towards both project managers and team members, 68% of the survey participants were managers as illustrated in Figure 2. A small portion of participants declared themselves both while one reported none. For data integrity this was removed.



Figure 2 - Roles of surveyors.

III.IV. Sample Profile- Experience in Project Management

The survey also revealed that most participants had in excess of 5 years experience with the rest displayed in Figure 3.



Figure 3 - Breakdown of project management experience.

III.V. Sample Profile- Projects

Since larger companies typically engage in several different projects covering several different functions, a breakdown of project type was requested. The types of projects engaged are displayed in Figure 4. More than 50% of the respondents were involved in multiple types of projects.

The project size in the respondents' companies ranged from \$600,000,000 to \$5,000. Since some companies were public agencies, the project size was expectedly large. The median and mean for the typical project size turned out to be \$1,000,000 and \$13,784,000, respectively. These typical projects have lasted between 1 and 84 months depending on the project size with a median of 10 months and a mean of 10 months. They have been carried out by a median of 10 project team members and a mean of 40 individuals. The range for the people involved in the project was found to be between 1 and 2,000.



Figure 4 - Breakdown of project types engaged.

Overall, the demographics of the survey group focus on project managers within the high tech industries in the Pacific Northwest who had more than 2 years of experience in companies with in excess of \$50 million in revenues.

IV. ANALYSIS OF RESULTS

Two major hypotheses have been posed by this study. Whether or not project success factors were affected by SPM, and whether or not there is any difference between company characteristics and project management factors.

IV.I. Effects of Company Characteristics on Management Factors

Is there a significant difference between 5 major company and project characteristics - company type, annual revenue, experience in PM, project type and project size- and the following project management and standardization factors.

- 1. Shared Process?
- 2. Global Automation?
- 3. Integrated Planning and Control?
- 4. Conscious Selection of Methods?
- 5. Regular Performance Checks?

- 6. Performance Driven by Culture?
- 7. Management Team Players?

These factors were tested using Analysis of Variance (ANOVA). Company and project characteristics were used as the independent variables with management standardization factors as the dependent. Grouping was conducted as follows.

Company Type	Manufacturing (Electrical/Electronics),
	Service Industry (Computer/Software),
	Construction Industry (Construction),
	Product Development Industry (Design).
Annual Revenue	High Revenue Companies with revenues higher than \$50,000,000,
	Low Revenue Companies with revenues less than \$10,000,000.
PM Experience	High Experience Level with experience more than 5 years,
	Low Experience Level with experience less than 2 years.
Project Type	Construction
	Product Development & Software
	Information Technology
	Facility Maintenance
Project Size	Large Projects with sizes larger than \$50,000,000,
	Small Projects with sizes less than &10,000,000.

The ANOVA results for each test are shown on the following tables. In all tests, the null hypothesis is that there is no difference among different company and project characteristics. A p-value of 0.05 was used as our rejection/acceptance criterion.

Remark: In all tests, the null hypothesis is that there is no difference among different projects. A p-value that is smaller than 0.05 (confidence level) makes us reject the null hypothesis and conclude that the use of a particular technique varies by the project size.

Test 1. Company Type - Management & Standardization Factors

Table 3 illustrates that organization type seems to have little effect on the level of management standardization factors.

Hypothesis #	Independe nt Variable	Dependent Variable	Test	p-value	Conclusion
1.1	Org. Type	level of shared process	ANOVA	0.6861	No Difference
1.2	Org. Type	level of global automation	ANOVA	0.8189	No Difference
1.3	Org. Type	level of integrated planning/control	ANOVA	0.9730	No Difference
1.4	Org. Type	level of conscious selection of PM methods	ANOVA	0.7604	No Difference
1.5	Org. Type	level of regular performance checks	ANOVA	0.9948	No Difference
1.6	Org. Type	level of performance driven by culture	ANOVA	0.4384	No Difference
1.7	Org. Type	level of management team players	ANOVA	0.3973	No Difference

Table 3 - Organization types impact on management standardization.

Test 2. Annual Revenue - Management & Standardization Factors

ANOVA does indicate that there is a difference among companies with different revenue levels and the amount that regular performance checks are performed.

Hypothesis #	Independent Variable	Dependent Variable	Test	p-value	Conclusion
2.1	Annual Revenue	level of shared process	ANOVA	0.7538	No Difference
2.2	Annual Revenue	level of global automation	ANOVA	0.8284	No Difference
2.3	Annual Revenue	level of integrated planning/control	ANOVA	0.2678	No Difference
2.4	Annual Revenue	level of conscious selection of PM methods	ANOVA	0.2156	No Difference
2.5	Annual Revenue	level of regular performance checks	ANOVA	0.0285	Difference
2.6	Annual Revenue	level of performance driven by culture	ANOVA	0.1670	No Difference
2.7	Annual Revenue	level of management team players	ANOVA	0.0601	No Difference

Table 4 - Effects of revenue on management standardization factors.

This may be because larger companies with larger budgets may keep a closer eye on their projects to ensure success. There also may be a difference in the number of team players

in these larger organizations as well, although the p-value is around .06. This should be mentioned due to the fact that all other factors have much less likely to make a difference.

Test 3. PM Experience - Management & Standardization Factors

ANOVA results indicate that significant difference exists for level of conscious selection of PM methods and level of regular performance checks among different levels of experience in project management. This may coincide with project managers who have made mistakes in the past and now make conscious decisions to avoid them. Performance checks may also coincide with increasing experience for similar reasons.

Hypothesis #	Independent Variable	Dependent Variable	Test	p-value	Conclusion
3.1	PM Experience	level of shared process	ANOVA	0.1065	No Difference
3.2	PM Experience	level of global automation	ANOVA	0.6962	No Difference
3.3	PM Experience	level of integrated planning/control	ANOVA	0.3063	No Difference
3.4	PM Experience	level of conscious selection of PM methods	ANOVA	0.0331	Difference
3.5	PM Experience	level of regular performance checks	ANOVA	0.0374	Difference
3.6	PM Experience	level of performance driven by culture	ANOVA	0.0584	No Difference
3.7	PM Experience	level of management team players	ANOVA	0.7351	No Difference

Table 5 - Project Management vs. Standardization

Test 4. Project Type - Management & Standardization Factors

Further study of the results shows that project type has little effect on the level of management standardization, which supports the theory that there are similarities amongst all projects across industrial and functional lines which can be shared. With this in mind, it is easy to see the usefulness of overall SPM. Similar practices should be able to assist in many fields.

Hypothesis #	Independent Variable	Dependent Variable	Test	p-value	Conclusio
4.1	Project Type	level of shared process	ANOVA	0.2385	No
					Difference
4.2	Project Type	level of global automation	ANOVA	0.9547	No
		÷			Difference
4.3	Project Type	level of integrated	ANOVA	0.5014	No
	5 VI	planning/control			Difference
4.4	Project Type	level of conscious selection of	ANOVA	0.3409	No
	5 7 4	PM methods			Difference
4.5	Project Type	level of regular performance	ANOVA	0.4496	No
		checks			Difference
4.6	Project Type	level of performance driven by	ANOVA	0.4876	No
		culture			Difference
4.7	Project Type	level of management team	ANOVA	0.2654	No
		players		_l	Difference

Table 6 - Impacts of project type on management standardization factors.

Test 5. Project Size - Management & Standardization Factors

As the project sizes increase, many would expect that the standardization factors would increase, however ANOVA results showed differently. With the exception of performance being culturally driven, there was little difference amongst different sized projects. One possible explanation for the difference in cultural environment vs. individual aspirations may be the fact that the larger the project is, the more important a global drive for high performance becomes.

Hypothesis #	Independent Variable	Dependent Variable	Test	p-value	Conclusion
5.1	Project Size	level of shared process	ANOVA	0.8512	No Difference
5.2	Project Size	level of global automation	ANOVA	0.2456	No Difference
5.3	Project Size	level of integrated planning/control	ANOVA	0.3189	No Difference
5.4	Project Size	level of conscious selection of PM methods	ANOVA	0.8569	No Difference
5.5	Project Size	level of regular performance checks	ANOVA	0.5667	No Difference
5.6	Project Size	level of performance driven by culture	ANOVA	0.0467	Difference
5.7	Project Size	level of management team players	ANOVA	0.4012	No Difference

 Table 7 - Project Size Effects on Management Standardization Factors.

IV.I.I. Summary of Analysis

An overall summary of the results is displayed in Table 8. (A check mark, " \checkmark ," indicates that a difference is detected between variables). As can be seen in Table 9, it is apparent that the type of company has little effect on standardization metrics. However, a difference is noted in the level of experience in conjunction with the level of conscious decisions, regular performance checks, and amount of performance driven by culture. This may be explained by the fact that the more experience the more likely it is that individual has had preconceived notions or made mistakes in the past that they are likely to counter. Revenue level showed a difference in the frequency of performance checks. This may be explained by the fact that larger (high revenue) companies are more cost conscious or have better defined criteria for selection / rejection.

ang Ala dan din sang Ang Ala dan din sang sang sang sang sang sang sang san	Q1	Q2	Q3	Q4	Q5	Q6	Q7
Company Type	•	•	•	•	٠	•	•
Revenue	•	•	•	•	✓	•	•
Experience	•	•	•	~	~	~	•
Project Type	•	•	•	•	•	•	•
Project Size	•	•	•	•	٠	•	•

 Table 8 - ANOVA Results Summary.

IV.II. Effects of Management Factors on Goals

ANOVA testing was then used to analyze the differences between the accomplishment of goals and the 5 major company & project characteristics - company type, annual revenue, experience in PM, project type and project size- and the level of the accomplishments of four major project success goals:

- 1. Cost Goals?
- 2. Schedule Goals?
- 3. Quality Goals?

4. Customer Satisfaction?

The independent variable in all tests were the company & project characteristics while the accomplishment level of goals were the dependent variables. For company & project characteristics, the same clusters as in Test I have been used for the analysis.

Test 6. Company Type - Goals

Organization type seems to have little effect on the level of goal compliance. This would further the notion, that overall, projects are similar across organizational classifications.

Hypothesis #	Independent Variable	Dependent Variable	Test	p-value	Conclusio n
6.1	Org. Type	Cost Goals	ANOVA	0.7305	No Difference
6.2	Org. Type	Schedule Goals	ANOVA	0.9620	No Difference
6.3	Org. Type	Quality Goals	ANOVA	0.9465	No Difference
6.4	Org. Type	Customer Satisfaction	ANOVA	0.7604	No Difference

Table 1 - Organization Type and Impact on Goals.

Test 7. Companies' Annual Revenues - Goals

A company's annual revenue seemed to have little effect on anything other than schedule goals. Now this may be explained by a number of factors. Companies who meet their schedules in many industries often get the jump on their competition which could drive the success factors up. If this is a determining factor for success, then larger companies may be more likely to meet these goals. Large companies are often the result of previous successful ventures. It also helps assigning known values in the future. Revenue probably does not directly effect the meeting of scheduling goals, it merely is an indicator that something else may be happening within the company that drives those goals.

Hypothesis #	Independent Variable	Dependent Variable	Test	p-value	Conclusion
7.1	Annual Revenue	Cost Goals	ANOVA	0.8808	No Difference
7.2	Annual Revenue	Schedule Goals	ANOVA	0.0413	Difference
7.3	Annual Revenue	Quality Goals	ANOVA	0.8235	No Difference
7.4	Annual Revenue	Customer Satisfaction	ANOVA	0.4437	No Difference

Table 2 - Annual Revenue Relation with Goals.

Test 8. Experience in PM - Goals

Overall experience of survey participants shows no difference in achieving & meeting of goals. This in part can be explained by the fact that only one or two members of a project were interviewed. Since this is one of many in a project, the overall affect of individuals on the goals may not be recognized.

Hypothesis #	Independent Variable	Dependent Variable	Test	p-value	Conclusio n
8.1	Experience in PM	Cost Goals	ANOVA	0.3367	No Difference
8.2	Experience in PM	Schedule Goals	ANOVA	0.6034	No Difference
8.3	Experience in PM	Quality Goals	ANOVA	0.5609	No Difference
8.4	Experience in PM	Customer Satisfaction	ANOVA	0.2115	No Difference

Table 3 - Experience and its Relation to Goals.

Test 9. Project Type - Goals

Following table shows that there is a significant difference between the type of project and the accomplishment of cost and schedule goals. This may be explained by the diverse nature of the projects at hand. In highly competitive arenas, product related projects must meet schedule goals, while often times operational projects require that cost goals be met.

Hypothesis #	Independent Variable	Dependent Variable	Test	p-value	Conclusion
9.1	Project Type	Cost Goals	ANOVA	0.0101	Difference
9.2	Project Type	Schedule Goals	ANOVA	0.0175	Difference
9.3	Project Type	Quality Goals	ANOVA	0.1797	No Difference
9.4	Project Type	Customer Satisfaction	ANOVA	0.4913	No Difference

Table 12 - Project Type effects on Goals

Test 10. Project Size - Goals

As can be seen on Table 13, there is no significant difference between the size of the projects undertaken and the level to which goals are met. This supports the statement that good project management may have a positive impact on projects of all sizes.

Hypothesis #	Independent Variable	Dependent Variable	Test	p-value	Conclusion
10.1	Project Size	Cost Goals	ANOVA	0.5421	No Difference
10.2	Project Size	Schedule Goals	ANOVA	0.8041	No Difference
10.3	Project Size	Quality Goals	ANOVA	0.3993	No Difference
10.4	Project Size	Customer Satisfaction	ANOVA	0.6437	No Difference

Table 13 - Project Size Impacts on Goals.

IV.II.I. Summary of Analysis

An overall summary of the results is displayed in Table 14. (A check mark, " \checkmark ," indicates that a difference is detected between variables). Table 14 displays the overall findings of the ANOVA tests. With respect to annual revenue, only schedule goals seem to be different among different levels of annual revenues. This could be explained by the NPD drive, and profitability. The more successful a company is, and the quicker products are out to market the more profitable they are in many cases. Bigger companies may be more profitable as a result of this. In addition the type of project seemed to make a difference as to the level of compliance with cost and schedule goals.

	Cost Goals	Schedule Goals	Quality Goals	Customer Satisfaction
Company Type	•	•	•	•
Annual Revenue	•	~	•	•
Experience in PM	•	•	•	•
Project Type	✓	~	•	•
Project Size	•	•	•	•

Table 14. Summary of ANOVA Tests.

IV.III. Observations of Impact on Goals.

A plotting of the initial standardization questions was plotted against the various goals with some interesting results (Appendix B). It is apparent that as the amount of sharing of processes, conscious selection of methods, team players in management all appear to increase with the achievement of goals. Somewhat less obvious include regular measurements which have a positive relationship with customer and quality goals. Integration appears to correlate with a slight although not as obvious increase in all goals. The issue concerning culture vs. personal aspirations is a mixed issue. This is not a large surprise as mavericks are often needed to ensure variety and new thinking. However too many mavericks tend to cause disarray and do not permit for progress due to too much replicated work.

The one issue that seemed rather random is the automating of projects. These results varied immensely, which in part could be explained by perhaps the lack of global tools which have been developed to allow parallel project management and the implementation of sharing resources across them. Indeed, it actually appears that the more automation that is attempted on a global scale, the lower goals seemed to be met. This could have much to do with the fact that this is still a rather new field of application.

Overall correlation of the data points is represented in Table 14. As can be observed, there are rather high correlation between shared processes, integrated planning/control, conscious selection of methods, regular performance checks, and management team

players. This is to be expected as all of these tend to relate to sharing of information and working together for a common goal. Quality goals tend to be highly correlated between conscious selection of methods, regular performance checks and team management approach. Costs goals are most positively correlated to shared processes, conscious method selection, and team player management. Satisfaction goals are correlated with shared processes and management team players as well as conscious methods and regular performance checks.

			Int.	Cons.	Reg.	Perf.	Mgmt				
	Share	Glob.	Plan/	Select	Perf.	By	Team	Cost	Sched	Qual.	Sat.
	PTOC.	Auto	Cont.	Mein.		_Cun.	Play.	Goais	Goals	Goals	Goals
Shared Processes	1.00	.07	.19	.52	,37	.15	.41	.19	.28	.33	.40
Global Automation	.07	1.00	.23	.06	.06	.09	.03	11	.08	02	.08
Integrated Planning/Control	.19	.23	1.00	.31	.15	.12	.17	.11	.15	.14	.14
Conscious Selection of Methods	.52	.06	.31	1.00	.47	.08	.40	.38	.37	.42	.33
Regular Performance Checks	.37	.06	.15	.47	1.00	.10	.25	.23	.16	.37	.27
Performance Driven by Culture	.15	.09	.12	.08	.10	1.00	.16	12	.15	.09	.11
Management Team Players	.41	.03	17	.40	.25	.16	1.00	.34	.43	.46	.38
Cost Goals	.19	11	.11	.38	.23	12	.34	1.00	.43	.33	.25
Schedule Goals	.28	.08	.15	.37	.16	.15	.43	.43	1.00	.46	:51
Quality Goals	.33	02	.14	.42	.37	.09	.46	.33	.46	1.00	.68
Satisfaction Goals	.40	.08	.14	.33	.27	.11	.38	.25	.51	.68	1.00

Table 14 - Correlation Matrix

The initial analysis of the data for a correlation between standardization and the meeting of goals beyond visual was conducted using multiple regression. The dependent variables of the regression were the four goals being measured dependent on each of the seven survey questions measuring standardization and globalization of project management processes. The resulting contributing factors are displayed in Table 15. The correlation matrix numerically illustrates what visual analysis presented. Global automation has little in any apparent regular effect on the achievement of goals. Any overall effect that does seem to be present are cost overruns which is easy to understand because typical software packages are rather expensive, and mapping of such processes is highly time consuming. The only aspect to which automation seemed to be correlated

with was the integrated planning and control of projects. This is to be expected by the fact that the such tasks would seemingly be the next step in integrated planning.

Conscious selection of methods were highly correlated with the sharing of processes, regular performance checks and less so with integrated planning and control of projects, as well as team players in management. Much of this correlation can be explained by the nature of the questions. Although not the same, they each are interrelated. If a company is to share its processes, it is much more likely that it will dictate the conscious selection of methods.

With relatively low values of R^2 these results help hint at correlation, but may not be able to explain them all. It can also be explained by the relative non-linear relation that may be shared by other factors, such as the effects of culture and personal aspirations as well as the implementation of global software tools.

	Goals					
	Cost	Schedule	Quality	Satisfaction		
Extent to which project management is shared and consistent	-			++		
Level of software usage to automate mgmt. Of individual projects vs. glued projects	-	+	-			
Level of integrated planning and control						
How the management methods are selected	+++	++	++	+		
Which project performance measurement receives more attention	+	-	++	+		
Extent to which the project performance is driven by organizational culture		+				
Balance b/w free riders and team players	+++	+++	+++	++		

Table 15- Effect of Practices on Goals.

ANOVA tests were further run on the data to determine those important factors within each organization which dictated success of the project or not. This can be displayed by Table 15. As is apparent through this as well the linear regression, it appears that balance b/w free riders and team players SPM and conscious selection of management methods

seems to have a definite impact on the overall goals of the project. Those projects which hold regularly scheduled attention aside from the schedule also have positive effects.

ANOVA testing revealed that the organization type made little difference on standardization. However corporate revenue did have impacts on planning and control, compatibility of selected management methods and level of which the project performance was driven by organization aspirations. This is not a surprising result as the larger the company is, the more likely they have common procedures and practices. The level of experience also differentiated the amount of shared processes the compatibility of those methods. The project size did effect compatibility and team players.

V. CONCLUSIONS AND RECOMMENDATIONS

It is apparent from the results of the survey that SPM is positively correlated with project success in that it appears that those who use it to meet their goals more successfully. Certain aspects are also made apparent in this study as well.

It is necessary to have a share of team players and free riders in any organization. This is because of the need for new ideas. If a company were to be entirely team players, there would be little source of new ideas and therefor stagnation. The examination of the results echo this sentiment.

Secondly, despite increasing emphasis on global project automation through software, the survey reveals that this has little positive effects on project management. In part this could be due to the naissance of the industry and the lack of knowledge on the subject by industry. In the early phase of any industry move, the path is found through trial and error, in this instance, it appears that we are in the error stage of development. Perhaps a better tackling of projects in general will facilitate the meeting of goals in the future, but at present it is not apparent that they have any result on project success.

Overall, it appears that standardization and sharing of information amongst various projects is highly correlated with the meeting of corporate goals. Particular areas that seem to illustrate this include the need for team players, performance measurements, selection of management methods and cultural drive. It is also apparent that this

standardization is more likely to occur in organizations based on revenue and the differing types of project member experience. One interesting thing to note from our ANOVA testing was that although experience seemed to have an effect on standardization, its effects on the accomplishment of goals were not differentiated. Which seems to conflict with the fact that some methods of standardization did have an effect on the goals. Much of this may be explained by the fact that individuals who participated in the survey may have been more likely to consciously select their methods to avoid past mistakes, but the overall team may not.

Correlation analysis demonstrates that some project management characteristics have significant correlation with the fulfilling of goals. In particular, selection of management methods and the balance between free riders and team members are correlated to all goals. In addition some further filtration could be conducted to take into account the correlated "independent" variables. It is apparent from the analysis that some issues were highly correlated with others.

Scheduling goals are best met through organizational culture. This can be explained by the fact that for larger projects, one single individual is less likely to drive the entire project to success. It can only be met if there is a group consensus on the meeting of goals. Although there are exceptions to this rule, it is for the most part not common.

Customer satisfaction seem best met through regular performance measurement along with shared and consistent project management. The regular nature of performance checks is a good method to ensure customer satisfaction, which is somewhat intuitive. Consistent project management may have a positive effect on customer satisfaction because it is more likely that the customer will know what to expect, and having expectations set appropriately increases the chance of customer satisfaction.

One thing is for certain, every organization has different requirements, cultures, projects, and modes of operation. There is no fixed and straight recipe to implement successful SPM. For each company, standardization effectiveness and performance is dependent on culture, the activity, and the revenues. The ability of a company to integrate its own characteristics and culture is a direct reflection of its ability to improve its processes via SPM.

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