Handbook on Economics, Finance and Management Outlooks
ISBN: 978-969-9952-03-6
homepage: http://pakinsight.com/?ic=book_detail&id=11
Conference venue : Lebua Hotels and Resorts, 1055 Silom Road, Bangrak, Bangkok 10500 Thailand

Vol.3 , 2015
(27-28 July)

Paper ID : 671/15/3rdICEFMO

Development of Decision Making Method to Success of Software Development Project based on the Discriminant Analysis

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Abstract

In order to achieve software development project succeed, it is extremely important to judge the right or wrong of project objectively at an operation stage after system release and to cast the most suitable project management into the next project. On the other hand, the study on reliable quantitative judgment method of the success of project is not found. In recent years, collection and accumulation of the actual attribute data of the many domestic software development projects are performed by IPA/SEC (Software Engineering Centre of the Information-Technology Promotion Agency Japan). In the precedent study, we have proposed the precise definition of success project and identified the important success factors of success projects. Based on the result of precedent study, in this study, we tried to develop the quantitative decision making technique to judge the right or wrong of project objectively and quantitatively by using discriminant analysis.

Keywords: Software development, Project management, Success degree , Discriminant analysis, Decision making technique, Right or wrong of project.

Contribution/ Originality

This study suggested the new estimation methodology in order to judge the success right or wrong of the project. This paper defined the degree of success of the project in order to judge the success right or wrong of the project precisely. Furthermore, based on the attribute of project, developed the judgement technique of success right or wrong of project by the discriminant analysis.

1. Introduction

Many system introduction projects for an achievement of management issue of organizations are being performed with the development of information-oriented society. On the other hand, in the software development incorporated in these systems, the "success right or wrong" of project after completion is determined by the subjective judgment based on the experience of past resemblance project or feeling of project stakeholders. However, objective judgment of project "success right or wrong" is extremely difficult by the requirement change such as delivery time and demand of customers during development. When we failed a judgment of success, as the result, the project does not converge. When we judge the failed project as a success, PDC (Plan-Do-Check) cycle may not rotate for the improvement of project management in the organization. If an objective judgment of project "success right or wrong" become enabled, we can decide the reasonable failure project and may lead to improvement for the prevention of failure of the next project by the analysis of the failure project by organization. Therefore, it is thought that the judgment technique to estimate "success right or wrong" of project quantitatively and objectively is extremely important for the management of organization. In the precedent study, suggestion about the viewpoint for management of success project (Turner and Zolin, 2012); (Atkinson, 1999) and the suggestion concerning success factors of project are studied (Cooke-Davies, 2002). However, these precedent studies remain in the qualitative argument of the concept level and unreliable because the study of objective and quantitative diagnosis techniques of "success right or wrong" of software development project has not found.

On the other hand, with precedent study (Esaki *et al.*, 2001); (Esaki and Takahashi, 1999). We developed the quantitative prediction technique of the reliability of the developed software product intended to fault density and error detection density of design review that were the attribute of data for testing and the design stage in actual data of the software development. And we tried the development of prediction models to predict outbreak of obstacle after product release from attribute data statistically during these software development and Verify the effectiveness. Furthermore, in the precedent study (Esaki *et al.*, 2001); (Esaki *et al.*, 2000) we tried to clarify relationship of the reliability of design

document which is works of design duties and the human factors of software design stage. We adopted experimental design technique to make up for the lack of actual data and inspected quantitative relations of a human factor and the software design quality by approach of the quality engineering. In late years, as the part of the national project for the purpose of the improvement of project management, collection and accumulation of the actual data (IPA/SEC, 2014) of the software development projects more than 3,000 of the Japanese domestic information service-related company, are pushed forward by IPA/SEC (incorporated administrative agency information processing promotion mechanism technology headquarters software high-reliability center). Therefore, in the precedent study (Esaki, 2004); (Esaki, 2014) we defined the concept of the success of software development project precisely and tried the identification of the attribute data related to the success degree of project. Above assumptions, in this study, we tried to develop the technique that could diagnose "success right or wrong" of software development project quantitatively and objectively by analyzing the attribute data of actual projects statistically.

In this study, we developed the model to estimate management quality of project based on the project attribute in order to judge the "success right or wrong" of project based on a discriminant analysis. In addition, we confirmed the effectiveness of the model which diagnosed "success right or wrong" of project based on the result of multiple regression analysis. In this study, we adopted the approach of the multiple regression analysis based on a precedent study (Esaki *et al.*, 2001); (Esaki and Takahashi, 1999). In this paper, we propose the concept of the project "success right or wrong" in clause 2, summary of this study in clause 3, result of verification of the judgment techniques in clause 4 and conclusion and future study in clause 5.

2. Concept of Project Management Quality

2.1. Planning and Evaluation

A planned and actual value of software development project and the concept of the management process are as shown in figure 1. The quality of planning process of software development project is thought to be an estimate precision of planning level of various attributes such as target quality, delivery time , cost, development scale, number of personnel, man-hour described into the project planning. On the other hand, it is thought that the actual value of attribute data after a project completion shows a result of quality and process of project. The attributes of project planning may influence on the attributes of execution. And an attributes of final result of project may influenced by an attribute of execution as shown in figure1. Therefore, it is thought that an actual value of attribute data of product and process of planning stage and execution stage of a project and result of "success right or wrong" of project have close relation.

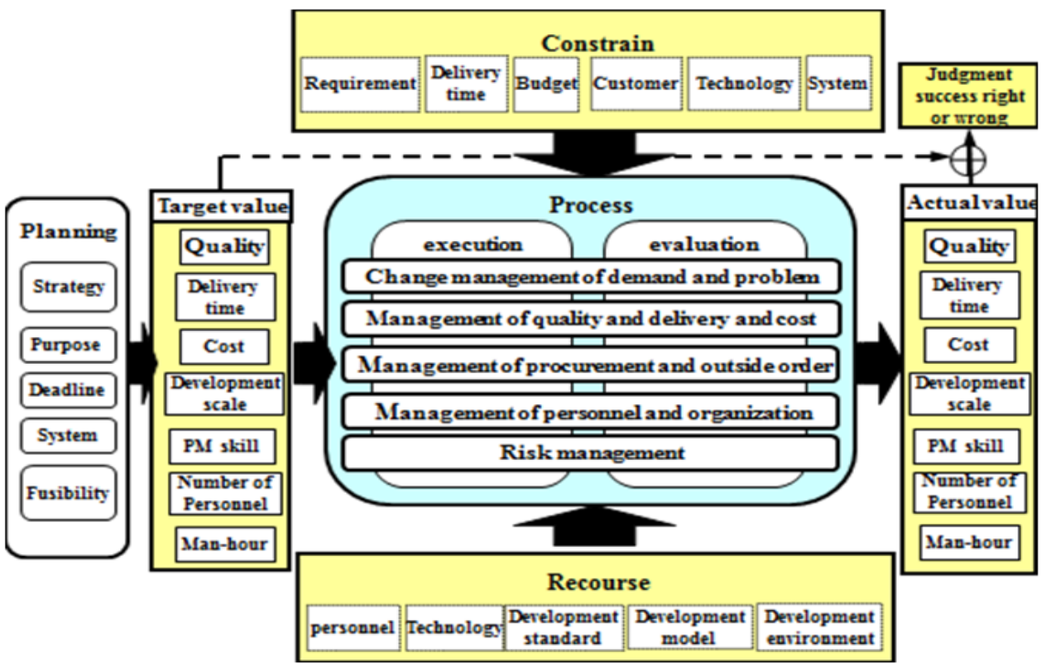

Figure-1. Framework of Planning and Evaluation of Software Development Project

The final judgment of project "success right or wrong" is usually carried out based on the result of hearing or questionnaire survey by the customer or project stakeholders after completion of project generally by a viewpoint of whether a project achieved purpose On the other hand, in this study, We performed a judgment of the project "success right or wrong" in whether a project was accomplished according to planned value described to a plan in other words because the collection of attribute data range by IPA/SEC was limited for time to end from the start of the project, by the viewpoint of difference between planned value and actual value as shown in figure 1.

2.2. Criteria of Right or Wrong of Success

The quantification standard of success degree of “Quality”, “Delivery time” and “Cost” concerning the planning and execution of project and the subjective quantification standard of project member are as shown in table 1.

(1) Quantification of the success degree of planning and execution

The subjective description of the qualitative evaluation result of the planning “Quality”, Delivery time” and “Cost” included in attribute data of IPA/SEC as shown in table 1, we settled as the value from -1.0 to 1.0. Similarly, in response to the evaluation result of execution, we defined as the value from -1.0 to 1.4.

(2) Project success degree

Table-1. Definition of Quantitative Project Success Degree

Judgment	Quality		Delivery time		Cost		Self-evaluation
	Plan precision	Performance	Plan precision	Performance	Plan precision	Performance	
Over	a=1.0: Quality target is clear and feasibility has been examined.	a=1.4:Fewer than a plan value more than 20% (0≦x≦80)	a=1.0：The grounds of the time of delivery time plan are clear and has been examined feasibility.	a=1.4：Earlier than time of delivery time. (z<Delivery time plan)	a=1.0: Grounds of the cost calculation are clear and feasibility has been examined.	a=1.4：Accomplished with the cost that is lower than 20% of plans. (0≦y≦90)	----------
Success	a=1.0：Quality target is clear and feasibility has been examined.	b=1.0：Fewer than plan value. (80<x≦100)	a=1.0：The grounds of the time of delivery time plan are clear and feasibility has been examined.	b=1.0:According to the time of delivery time (z=Delivery time plan)	a=1.0： Grounds of the cost calculation are clear and feasibility has been examined.	b=1.0：According to plan. (Less than ±10%) (90<y<110)	a=1.0: All of QCD succeeds.
Failure	a=1.0：Quality target is clear and feasibility has been examined.	c=0.6:The excess within 50% of plan value. (100<x≦150)	a=1.0：The grounds of the time of delivery time plan are clear and feasibility has been examined.	c=0.6：Less than 10 days late on time of delivery time. (Delivery time plan<z<Delivery time plan+10)	a=1.0：Grounds of the cost calculation are clear and feasibility has been examined.	c=0.6：The excess within 30% of plan value. (110≦y≦130)	b=0.60: Two succeed among QCD.
		d=0.2:The excess within 100% of plan value. (150<x≦200)		d=0.2：Less than 30 days late on time of delivery time. (Delivery time plan+10≦z<Delivery time plan+30)		d=0.2：The excess within 50% of plan value. (130<y≦150)	c=0.2: One succeed among QCD.
		e=-1.0：The excess more than 100% of plan value. (200<x)		e=-1.0：More than 30 days late on time of delivery time. (Delivery time plan+30≦z)		e=-1.0：The excess more than 100% of plan value. (150<y)	d=-1.0: There is no success.
	b=0.0：Quality target is not clear or feasibility is not examined.	---------	b=0.0：The grounds of the time of delivery time plan are not clear and feasibility is not examined.	---------	b=0.0：Grounds of the cost calculation are not clear or feasibility is not examined.	---------	
	c=-1.0：No plan		c=-1.0：No plan		c=-1.0：No plan		

We defined the value for "success degree" that quantified a qualitative evaluation of the result of “success right or wrong” of the project that intended from the viewpoint of "Quality”, “Delivery time” and “Cost" of planning based on the quantification standard as shown in table 1. Furthermore, we defined the "Synthetic success degree" of the project from the grand total of the success degree of the "Quality”, “Delivery time” and “Cost".

(3) The self-evaluation of the project success degree

We defined the value for "success degree" of project that quantified qualitative result of evaluation of “success right or wrong” of execution by the project member based on a quantification standard as shown in table1.

(4) The definition of the project success right or wrong

To be exact, we can judge that the project is succeed only when a value of planning and result of execution about "Quality”, “Delivery time” and “Cost" is equal under the condition that the precision of project plan is good.

3. Summary of this Study

In this study, we extracted the project that attribute data as show in figure 2 were described and a qualitative evaluation result of "Quality”, Delivery time” and “Cost" of the project success degree to show in the table 1 was described from attribute data of IPA/SEC (Esaki *et al.*, 2001) for the identification of the project attribute to be related to the “success right or wrong” of project. In this study, we adopted the approach that estimate the success from actual data provided at the project completion based on the concept of frame work of "Planning-Execution-Evaluation" of project management to judge the “success right or wrong” of project as shown in figure1. At first, we quantified the success degree based on the criteria of project success as shown in table 1 and distinguished the “success right or wrong” (1: success, 0: failure). Furthermore, we defined as "-0.5" to failure, and as "+0.5" to success. Next, we tried to correlation analysis with the “success right or wrong” of the target project and the result of actual attribute data of project, and identified the attribute of project that have the strong correlation with success of project as show in table 2 and table 3.

In addition, we thought that we have the possibilities for diagnosis of “success right or wrong” of a project if we could identify an attribute of project success factors. And we tried the development of multiple regression models to estimate the “success right or wrong” of the project from the attribute of execution of project data which identified as shown in table 4. Furthermore, we verified the effectiveness of the model that estimate the project “success right or wrong” as show in table 5.

3.1. Targeted Data for Analysis

Figure 2 is a summary of the collection of project attribute data item provided by IPA/SEC. These attribute data were based on a software development method based on a waterfall model.

And there were the 3325 projects that are collected from 2004 to 2014 and number of items of attribute data were 611. But attribute data is not necessarily being filled out and the loss of data were seen. Therefore, in this study, we extracted the reliable project data that necessary for development of model to estimate "success right or wrong" of project. At first, we extracted the 1650 project data that "planning and execution" of qualitative success degree of "Quality", "Delivery time" and "Cost" of the project were filled in as show in table 1. Next, we extracted 1026 attribute data that attribute data such as the number of personnel of average or the malfunction indication number to be related to the "success right or wrong" of projects that became clear in a precedent study were filled . Furthermore, we extracted 193 analysis object projects that the number of design review indication to be related to the success degree of projects was filled in and the secretariat recognized consistency between attribute data and was determined to have a high reliability (A, B) as defined in data of IPA/SEC. We finally extracted 78 projects that the qualitative self-evaluation result of the project member and the basic attributes such as a development scale and the development man-hour were filled. And the scales of project were higher than 20 personnel per month and there was not loss data.

Data group of attribute	Explanation
Quality	Number of outbreak, The guarantee of quality of system
Number of personnel	The number of personnel of average required every process of an office and outside order
Delivery Time	The time of delivery every process of plan and performance
Man-hour	The phase included in the total man-hour, A review performance man-hour
System scale	Function point, SLOC (software line of code) and other indexes
Personnel skill	PM skill, personnel skill (The experience of the field of duties)
Management of requirement	The duties experience of the user person in charge The clarity of the demand
Development method	A development life cycle model, Having operative tool or not
System Characteristic	A main development language, Architecture, Processing form
Context of use	Type of industry, The use of the system, Ridership
Judgment of management quality of project	An evaluation of a plan and result of execution (Quality, Delivery time, Cost)
Reliability of data	The reliability of data of IPA/SEC
Others	Generalization comment

Figure-2. Attribute of Project Data of IPA/SEC

3.2. Estimation of Project Success

In this study, we formulated the multiple regression models to estimate the "success right or wrong" of the project as equation (1) and Verified the effectiveness of the model. The explanation variable of equation (1) to estimate is correlated with the "success right or wrong" of the project that we identified in table 3. And, the result of verification of estimation model of project is shown in table 4.

$$y_i = r_0 + r_1 a_i + r_2 b_i - - - - - r_5 l_i \qquad (1)$$

y_i : An estimate value of the project success right or wrong

r_n : Partial regression coefficient （$n = 0 \sim 5$ ）

i : The sample number of the project （ $i = 1 \sim N$, $N=78$ ）

Furthermore, based on the equation (2), we found the hitting ratio of the judgement result from the estimated result as show in table 5.

$$A = 1 - \left(\sum_{i=1}^{N} \sqrt{(y_i - Y_i)^2} \right) / N \qquad (2)$$

Y_i : The actual value of the project success

4. Verification of Judgement Technique

4.1. Correlation Analysis of Project Success

Table 2 is the result of correlation analyses between success degree of "Synthetic", "Quality", "Delivery time", "Cost" and the "Success degree" of "self-evaluation" which we defined in table 1. There is the correlation between the success degree of "self-evaluation:Y_1" and the result of objective evaluation of project from the viewpoint of "synthesis:Y_2, quality:Y_{21}, delivery time:Y_{22} and cost:Y_{23}" from table 2. The possibility that the result of success degree of "self-evaluation" can be estimated is recognized by the actual value of "success right or wrong" of project of "quality:Y_{21}, delivery time:Y_{22} and cost:Y_{23}" based on the quantification standard of project success defined in table 1.

Table-2. Result of correlation analysis among Attributes of Project Success

Success right or wrong			Evaluation of the success right or wrong of the project performance				
			Self- evaluation	Objective evaluation			
				Synthetic	Quality	Delivery time	Cost
			Y_1	Y_2	Y_{21}	Y_{22}	Y_{23}
objective evaluation	Total	Y_2	0.4525	1.0000			
	Quality	Y_{21}	0.3214	0.7885	1.0000		
	Delivery time	Y_{22}	0.3273	0.3900	0.2451	1.0000	
	Cost	Y_{23}	0.7040	0.5323	0.2522	0.2570	1.0000

4.2. Correlation Analysis of Project Success and Attribute Concerned

Table 3 listed the "success right or wrong" of project and strong attribute of project and other basic attributes of correlation.

Table-3. Result of correlation analysis among Attributes of Project and Project Success

Attribute of the project		An evaluation of the success right or wrong of the project performance				
		Self-evaluation	Objective evaluation			
			Synthetic	Quality	Delivery time	Cost
		Y_{43}	Y_4	Y_{41}	Y_{42}	Y_{43}
Number of average personnel required project	Sa	-0.3542	-0.1566	-0.1179	-0.2238	-0.2677
Number of peak personnel required project	Sb	-0.3593	-0.2031	-0.1510	-0.2378	-0.3172
Number of average personnel required definition of requirements	Sa1	-0.4602	-0.1669	-0.0655	-0.2179	-0.3194
Number of average personnel required basic design	Sa2	-0.4786	-0.2871	-0.1783	-0.2554	-0.3916
Number of average personnel required production	Sa3	-0.4720	-0.2535	-0.1405	-0.2879	-0.3815
Number of average personnel required binding test	Sa4	-0.4467	-0.1998	-0.2400	-0.3278	-0.2803
Review indication number of case – Whole project	Sc	-0.1333	-0.1868	-0.0215	-0.2429	-0.2566
Review indication number of case – Definition of requirements	Sc1	-0.1089	-0.1409	0.0480	-0.2573	-0.2371
Review indication number of case – Basic design	Sc2	-0.1691	-0.2184	-0.0921	-0.2503	-0.2720
Review indication number of case – Production	Sc3	-0.1052	-0.1744	-0.0226	-0.2357	-0.2086
Outbreak malfunction numberserious（6 months）	Sd1	-0.3657	-0.0728	-0.1197	-0.1530	-0.2097
Outbreak malfunction number middle level（6 months）	Sd2	-0.2981	-0.1500	-0.0962	-0.3727	-0.2492
Outbreak malfunction number total（6 months）	Sd3	-0.1142	-0.0633	-0.0391	0.0657	-0.1038
Outbreak malfunction number total（1 month）	Se1	-0.2743	-0.1526	-0.0636	-0.2747	-0.2681
Outbreak malfunction number total（3 months）	Se2	-0.3202	-0.1575	-0.1102	-0.3300	-0.2624
Outbreak malfunction number total（6 months）	Se3	-0.3259	-0.1623	-0.1060	-0.3210	-0.2723
Performance man-hour (in total) requirement definition	Sf	-0.1294	-0.1636	0.0292	-0.2274	-0.2926
Performance man-hour (in total) basic design	Sf1	-0.1615	-0.2239	-0.0144	-0.2252	-0.3263
Performance man-hour (in total) production	Sf2	-0.1812	-0.1964	-0.0312	-0.1755	-0.2896
Performance man-hour (in total) binding test	Sf3	-0.2100	-0.1085	-0.1433	-0.1702	-0.1144
Performance man-hour (in total) whole project	Sg	0.1168	0.1190	0.0842	0.0609	0.1210
Outside order performance man-hour whole project	Sg1	0.0812	0.0726	0.0480	0.0506	0.0902
Performance man-hour inner company total whole project	Sg2	0.0956	0.1079	0.0798	0.0414	0.0929
Performance man-hour management whole project	Sg3	0.0241	0.0263	-0.0027	-0.0025	0.0611
Development scale measurement value _SLOC	Sh	0.0202	-0.0433	0.0167	-0.1242	-0.0410

Strong negative correlation was recognized between the "success right or wrong" of the "self-evaluation:$\boldsymbol{Y_1}$ of project execution" and "number of personnel of average basic design:S*a2"*, "outbreak deficient number serious_(6months): S*d1*" and "number of the outbreak deficient phenomena (6months) :S*e3*" by table 3. Therefore, we can confirm that the success degree of project decreases as the value of these attributes data are big. On the other hand, in "objective evaluation", strong negative correlation was recognized between the "success right or wrong" of "Delivery time", "Cost" and "number of personnel of average basic design: S*a2*", "review indication number basic design: S*c2*", "outbreak deficient number serious (6months): S*d1*", "number of outbreak deficient phenomena (6months): S*e3*" and "performance man-hour basic design: S*f1*". Therefore, we can confirm that the success degree of project decreases as the value of these attributes is big.

On the other hand, the correlation of "success right or wrong" and attributes such as the whole "performance man-hour (total): *Sg*", "development scale measurement value SLOC: Sh of the project" is not recognized. Therefore, we confirmed the need to pay its attention to attributes such as the "number of personnel of average basic design: S*a2"*, "review indication number basic design: S*c2"*, "outbreak deficient number serious (6months): S*d1"*, "number of outbreak deficient phenomena (6months) :S*e3"*, "performance man-hour basic design: S*f1"* for the judgment of the "success right or wrong" of the project. The result of multiple regression analysis of models is shown in table 4. According to the table 4, result of multiple regression analysis of the models to estimate the "success right or wrong" of the "self-evaluation" is multiple correlation coefficient is 0.5364 and decision coefficient is 0.2877, the F-number is 5.8164 (F_0=3.3389, m=5), P-number is 0.0001. Therefore, as for the model, significance of 1% is recognized. Significance of 1% is recognized in F-number of "synthesis: $\boldsymbol{y_2}$" and "delivery time: $\boldsymbol{y_{22}}$" and "cost: $\boldsymbol{y_{23}}$" about the "objective evaluation". We can confirm the effectiveness of the model for the "success right or wrong" judgment as shown in table 4. On the other hand, as for the "quality: $\boldsymbol{y_{21}}$", the

5% significance of the model is not recognized. That's because a multiple correlation coefficient is 0.3181 and a decision coefficient is 0.1012, the F-number becomes 1.6213 (F_0=2.3683, m=5).

Table-4. Multiple regressions analysis among concerning Attributes of Project Success

Attribute of the explanation variable		Variable	Coefficient	Purpose variable to be related to the success				
				Self-evaluation of the success right or wrong	Objectivity evaluation of the success right or wrong			
					Synthetic	Quality	Delivery time	Cost
				y_1	y_2	y_{21}	y_{22}	y_{23}
Number of personnel of average_basic design		*Sa2*	r_1	-0.0321	-0.0454	-0.0403	0.0024	-0.0196
Review indication number _ basic design		*Sc2*	r_2	0.0002	-0.0001	-0.0002	-0.0001	0.0000
Number of outbreak deficient phenomena serious (6months)		*Sd1*	r_3	-0.0614	0.0632	0.0363	-0.0383	-0.0330
Number of outbreak deficient phenomena total_(6months)		*Se3*	r_4	-0.0126	-0.0039	-0.0027	0.0002	-0.0037
Performance man-hour (in total)_basic design		*Sf1*	r_5	0.0000	0.0000	0.0000	0.0000	0.0000
Constant term		---	r_0	0.3336	0.3778	0.3283	0.5008	0.4758
Result of multiple regression analysis	R: Multiple correlation coefficient			0.5364	0.4568	0.3181	0.5025	0.4766
	R^2 : Decision coefficient			0.2877	0.2087	0.1012	0.2525	0.2271
	F-number			5.8164	3.7978	1.6213	4.8639	4.2318
	P-number			0.0001	0.0041	0.1653	0.0007	0.0020
	F_0(m, 78, 0.05)			2.3683	2.3683	2.3683	2.3683	2.3683
	F_0(m, 78, 0.01)			3.3389	3.3389	3.3389	3.3389	3.3389
	M =			5	5	5	5	5

4.3. Verification and Consideration of Judgment Technique

The estimation of "success right or wrong" of the project that we estimated from the model, actual value and hitting ratio are as shown in table 5. According to the table 5, if estimation value of success that we finally found is bigger than 0, we assumed it success as 1, and if its value is less than 0, we assumed it failure as 0. And we find the judgement result and applied the equation (2) to the "success right or wrong" of actual and judgement result. And we confirmed the hitting ratio of "success right or wrong".

Table-5. Result of Estimation of Project Success and Hitting ratio (**Partly shown**)

	Success right or wrong of the project																									
	Self-evaluation					Synthetic					Quality					Delivery time					Cost				
	Performance		Estimate		Difference	Performance		Estimate		Difference	Performance		Estimate		Difference	Performance		Estimate		Difference	Performance		Estimate		Difference
S_{63}	-0.5	0	0.1	1	1	0.5	1	0.1	1	0	0.5	1	0.3	1	0	0.5	1	0.4	1	0	0.5	1	0.3	1	1
S_{64}	-0.5	0	0.0	0	0	-0.5	0	0.0	0	0	-0.5	0	0.2	1	1	0.5	1	0.4	1	0	0.5	1	0.2	1	0
S_{65}	-0.5	0	-0.3	0	0	-0.5	0	0.0	0	0	-0.5	0	-0.2	0	0	0.5	1	0.1	1	0	-0.5	0	0.0	0	0
S_{66}	0.5	1	0.2	1	0	0.5	1	0.1	1	0	0.5	1	0.2	1	0	0.5	1	0.4	1	0	0.5	1	0.4	1	0
S_{67}	-0.5	0	-0.8	0	0	0.5	1	-0.2	0	1	0.5	1	-0.3	0	1	0.5	1	0.1	1	0	0.5	1	-0.2	0	1
S_{68}	-0.5	0	-0.7	0	0	-0.5	0	-0.2	0	0	-0.5	0	0.0	0	0	-0.5	0	0.2	1	1	-0.5	0	-0.3	0	0
S_{69}	-0.5	0	-0.5	0	0	-0.5	0	-0.4	0	0	0.5	1	0.4	1	0	0.5	1	0.3	1	0	-0.5	0	-0.3	0	0
S_{70}	0.5	1	0.2		0	0.5	1	0.2	1	0	0.5	1	0.2	1	0	0.5	1	0.5	1	0	0.5	1	0.4	1	0
S_{71}	-0.5	0	-0.3	0	0	-0.5	0	-0.3	0	0	-0.5	0	-0.2	0	0	0.5	1	0.3	1	0	-0.5	0	0.0	0	0
S_{72}	0.5	1	0.1	1	0	0.5	1	0.0	0	1	0.5	1	0.3	1	0	0.5	1	0.3	1	0	0.5	1	0.2	1	0
S_{73}	0.5	1	0.1	1	0	0.5	1	0.0	0	1	0.5	1	0.2	1	0	0.5	1	0.4	1	0	0.5	1	0.2	1	0
S_{74}	-0.5	0	0.3	1	1	0.5	1	0.2	1	0	0.5	1	0.2	1	0	0.5	1	0.5	1	0	0.5	1	0.4	1	0
S_{75}	0.5	1	-0.1	0	1	-0.5	0	-0.3	0	0	-0.5	0	0.0	0	0	0.5	1	0.2	1	0	0.5	1	0.0	0	1
S_{76}	0.5	1	0.1	1	0	-0.5	0	0.1	1	1	0.5	1	0.2	1	1	0.5	1	0.4	1	0	0.5	1	0.3	1	0
S_{77}	-0.5	0	-0.5	0	0	-0.5	0	-0.8	0	0	0.5	1	0.2	1	0	-0.5	0	-0.2	0	0	-0.5	0	-0.6	0	0
S_{78}	0.5	1	0.1	1	0	0.5	1	0.1	1	0	0.5	1	0.3	1	0	0.5	1	0.4	1	0	0.5	1	0.3	1	0
Hitting ratio	0.72					0.76					0.72					0.96					0.83				

As for the hitting ratio of "success right or wrong" of the project of "delivery time: y_{22}", it was with 96% and "cost: y_{23}" was 83%. And we confirmed the high effectiveness of judgment method that estimate the "right or wrong of project" from the result of table 5. On the other hand, the hitting ratio of "synthesis" and the "quality" is low in 76% and 73%. And "self-evaluation" is low with 72%.

Therefore, as for the effectiveness of judgment of "success right or wrong" of these, it is thought insufficiency. It is thought that the cause having low hitting ratio of the "success right or wrong" of "quality" is depend on the "development scale". Furthermore, it is thought that the "synthesis" is affected by the "success right or wrong" of the "quality".

5. Concluding Remarks

In this study, we tried the development of model to enable a judgement of objective and quantitative "success right or wrong" from the actual result of attribute data of project and confirmed the effectiveness. From the result of this study, proposed diagnosis of the "success right or wrong" at the time of the project completion, objective evaluation is higher in the effectiveness than self-evaluation and we confirmed possibility to supplement self-evaluation by an objectivity evaluation. In diagnosis of the "success right or wrong", we confirmed the need to pay attention to attributes such as "review indication number of basic design" or "performance man-hour" or "number of personnel of average". As the future issue, we are going to try improvement of the precision of judgment "success right or wrong" of quality

of project management that we suggested in this paper and development the technique to predict "success right or wrong" of project from the design stage of project as possible as early stage.

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