

CRITICAL FACTORS IN PROJECT SUCCESS

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It seems that the definition of project success is quite illusive. Numerous authors have researched the subject but the concept of project success remained ambiguous. Early researches equated project success to the triple objectives of Time, Cost and Quality. Further researches concluded that apart from the triple objectives there are other dimensions to project success. Collectively these includes project management techniques, policy & strategy, team & leadership, project manager, stakeholder management, communication, financial resources, learning from experience, external environment, contractual, technical, contractor and innovation. Subsequently, by the turn of the century, researches began to differentiate between these variables as the “What” that is the success criteria and the “How” that is the success factors. Consequently, this study defined project success as achieving the success criteria (“What to achieve”) of stakeholder’s appreciation, completion on time, on cost and quality through the success factors (“How to achieve”) of human management, process, contractual and technical, and organization. A questionnaire survey was conducted to rank these success criteria and critical success factors and to correlate the project success factors to project success criteria. The analysis reveals that ‘*Stakeholders’ Appreciation*’ is found to be the most important success criteria among the respondents, followed by ‘*Quality*’, ‘*Time*’ and ‘*Cost*’. The analysis also reveals that ‘*Human Management*’ is placed at the top as the critical success factor, followed by ‘*Process*’, ‘*Contractual and Technical*’ and ‘*Organization*’.

1.0 INTRODUCTION

Construction is one of the largest industries in Malaysia. In most developing countries, the construction sector is a significant contributor to the country’s economy because 50% of the investment of the country constitutes investment in construction (Dlakwa M.M 1990).

The amount spent by the Government on development expenditure is enormous. According to the Malaysian Economic Report 2007/2008, the budget for the year 2008 totals RM176,917 million of which 27.2% of the budget amounting to RM48,118 million was allocated for development expenditure. Development expenditure are for economic, social and security services namely for the constructions of schools, clinics, hospitals, public facilities and infrastructure. The national development expenditure estimated by sectors from 2004 to 2008 as tabulated in Table 1 shows an the amount increases yearly from RM31,960 million in 2004 to RM48,118 million in 2008.

SECTOR	2004		2005		2006		2007		2008	
	RM MIL	%	RM MIL	%	RM MIL	%	RM MIL	%	RM MIL	%
ECONOMY	13,779.2	43.1	13,914	49.2	14,395	40.6	20,827	44.8	20,618	42.8
SOCIAL	11,154.1	34.9	7,587	26.8	9,951	28.0	14,218	30.5	15,554	32.3
SECURITY	2,683.1	8.4	3,046	10.8	5,599	15.8	6,817	14.7	7,032	14.6
GENERAL ADMIN	2,343.1	7.3	2,757	9.7	3,557	10.0	2,648	5.7	2,914	6.1
CONTINGENCIES	2,000.0	6.3	1,000	3.5	2,000	5.6	2,000	4.3	2,000	4.2
TOTAL	31,960	100.0	28,304	100.0	35,502	100.0	46,510	100.0	48,118	100.0
GDP	449,609		487,379		530,637		596,843		661,729	
ESTIMATE/GDP	7.1 %		5.8 %		6.7 %		7.8 %		7.3 %	

Table 1: Development Expenditure estimates by Sectors from 2001 to 2005

The enormous expenditure allocated and spent for development projects make it imperative to ensure the success of the projects implemented. However, Dlakwa M.M (1990) notes that project overruns on time and cost often happens and it not only affect the construction industry but also the economy of the country. It is thus felt that it would be most beneficial to attempt to answer the question of what are the critical factors for project success in the context of the Malaysian construction industry. The main objectives of this study are as follows:

1. To develop the components of project success
2. To find significant success criteria by ranking the criteria
3. To find significant success factors by ranking the factors
4. To correlate the project success factors to project success criteria

The research will be a contribution to the stakeholders in the Malaysian Construction Industry as it will be a basis for them to give emphasis on what matters most in project success in the Malaysian construction industry. With the scarcity of resources, choices and priorities are necessary to be made by stakeholders to ensure that what is most important and relevant will be given more consideration.

Shenhari A.J, Tishler A, Dvir D, Lipovetsky S and Lechler T (2002) conclude that there is no conclusive evidence or consensus on the factors for project success through the numerous studies that have been carried out. However, the need to choose appropriate critical success factors at the start of the project is of utmost importance (Wateridge J 1995) as these critical success factors can be used as a guide to stakeholders' behavior (Liu A.M.M and Walker A 1998), and a key determinant of project success (Kanter J and Walsh J.J 2004). In addition, Clarke A (1999) argues that managing equally all the success factors at the same time would be impractical and unachievable. He advocates adopting the Pareto principle of "separating out the important few from the trivial many" by giving attention and concentrating on the critical factors that would most likely ensure project success. Kanter J and Walsh J.J (2004) reiterate this point stating that the key to

success is identifying the critical success factors and expend all the energy on these factors instead of the many lesser important factors.

2.0 PROJECT SUCCESS

It seems that the definition of project success is quite illusive. Numerous authors have researched the subject but the concept of a project success remained ambiguously defined (Lui A.M.M 2005). Shenhar A.J, Andrew J, Levy, Ofer and Dov D (1997) note that project success is probably the most frequently discussed topic in the field of project management, yet it is the least agreed upon even though it was for more than two decades, researchers have labored to identify managerial variables critical to success. Although literatures on project success has been of interest to many researches, yet relatively there is little empirical data (Collins A and Baccarini D 2004).

Project success is a subjective issue. Wateridge (1995) notes that previous researches appear to have differences in defining project success. In their study, Liu A.M.M and Walker A (1998) state that project success is a commonly discussed topic but rarely being agreed. In an effort to find a generic definition of project success, Baccarini D (1999) concludes that literatures on project management by various authors do not present a consistent interpretation of the term project success. According to him, a standardized definition of project success, except in quite general terms, does not exist nor is there an accepted methodology of measuring it. Jugdev K and Muller R (2005) observe that the difficulty in pinning down an exact definition of project success is akin to defining "good art". While others insist that until to-date project success still remained ambiguously defined (Liu A.M.M and Walker A 1998, Chan A.P.C, Scot D and Lam E.W.M 2002, Frigenti E and Comninos D (2002), Chan A.P.C, Scott D and Chan P.L, 2004). As such Prabhakar G.P (2005) concludes that most researchers have agreed to disagree on what constitutes project success.

The concept of a project success can mean differently to different people. Because of varying perceptions and perspectives, this leads to disagreements whether a project is successful or not (Liu A.M.M and Walker A 1998, Skulmoski G.J and Hartman F.T 1999, Gray R.J 2001, Chan A.P.C, Scott D and Lam E.W.M 2002, Rad P.F 2003, Iyer K.C and Jha K.N 2005). Shenhar A.J, Tishler A, Dvir D, Lipovetsky S and Lechler T (2002) agree that there is no conclusive evidence or consensus that has been achieved so far to determine whether the project is a success or failure. Due to the ambiguity Baker et al (1988) suggest the term "perceived success of a project". Stuckenbruck (1986) and Frigenti E and Comninos D (2002) point out that the question of whether project is a success or failure will depend on who ask the question.

Historically, studies on project success started in the mid 1900's and its attributes are being equated to Cost, Time and Quality. For over 50 years, project success has been linked to the achievement of the "Iron Triangle" of Cost, Time and Quality (Atkinson 1999). The traditional view for project success is to deliver projects on time, in budget, to scope (Morris P.W.G 2001, and Chan A.P.C, Scott D and Lam E.W.M 2002, Bryde D.J, Brown D 2004 and Jha K.N and Iyer K.C 2005) or achieving the narrow view of the "so-called golden triangle" (Westerveld E 2002). De Wit A. (1988), and Belassi W and Tukel O.I (1996) note that early project management literature advocates that project success will be realized when the project achieved the three major objectives of completion on time, within budget and to quality or performance specifications. These authors agree

that most of the early studies associate project success with time, cost and quality and if these are not met, the project is considered a failure.

In the 60's and 70's the outlook regarding the components of project success began to expand beyond the time, cost and quality attributes into the project management techniques. Rubin and Seeling (1967) study the effect of project manager's experience on project success. Avots I (1969) reflects that companies that used project management techniques successfully may initially have a competitive advantage over others. Rockart (1979) suggest utilizing the critical success factors that include management techniques and process. Hayfield (1979) claims that project success is also concerned with monitoring and control. Consequently, Liu A.M.M (2005) concludes that studies during this period began to focus on organizational management success.

Then in the 1980s until late 1990s, further studies begun to research deeper in defining project success, where it was concluded that apart from the iron triangle and project management techniques, other dimensions affect the success or failure of a project. Several authors began to link project success to stakeholders. According to Cleveland D.I 1985 (as cited in De Wit A, 1988) apart from client and contractor, other stakeholders may affect the outcome of the project. Truman (1986) believes that there are the need, concerns and issues from the diverse mix of the project stakeholders. In considering project success, it should not only be restricted to the time- cost-quality objectives but also that of the stakeholders of the project (De Wit A 1988, Wateridge 1998, Lim C.S and Mohamed M.Z 1999, Globerson S and Zwikael O 2002, Kerzner H 2003). Pinto J.K and Slevin D.P (1989) develop a classic ten factors critical to project success, which include client consultation and client acceptance. A Guide to the Project Management Body of Knowledge (Edition 2000) states that "The project management team must identify the stakeholders, determine what their needs and expectations are, and then manage and influence those expectations to ensure a successful project." Van Aken 1996 (as cited by Westerveld E, 2003) agrees and defines project success as "The satisfaction of all stakeholders".

At the time, De Wit A (1988) seems to make a breakthrough from the standard researches and studies of listing the variables critical to project success. He was among the earliest authors to express 3 different lines of thought to project success: (1) to express the view that there are differences between project management success and project success (2) to construct a project success framework; and (3) to express the view that there are two different components to project success. Subsequently various authors formulated project success models or framework that shows the components of project success. Amongst them are:

- Pinto J.K and Slevin D.P (1989) classic ten factors critical to project success which they refer to as the Project Implementation Profile
- Belassi W and Tukel O.I (1996) construct a model that shows the interrelation of all the factors to the project success or failure
- Liu A.M.M and Walker A (1998) construct a Behavior-Performance-Outcome (B-P-O) model integrating the variables of project success
- Turner (1999) develop Seven Forces Model for project success
- Westerveld E (2003) link success criteria and success factors in one coherent model which he called the Project Excellent Model
- Jiang B and Heiser D.R (2004) develop an "Eye Diagram" that illustrates the multifactor project environment to achieve project success

- Chan A.P.C, Scott D and Chan P.L (2004) framework called the new conceptual framework for factors affecting project success
- Kendra K and Taplin L.J (2004) develop a project success model which he calls the Project Management Values Framework

In summary, the understanding of project success changes through the years since 1950's until today. Jugdev K and Muller R (2005) captured the changes in measuring success across the project and product life cycles since 1960's into 4 different periods. Figure 1 graphically shows the evolution of the dimensions of project success adapted from Jugdev K and Muller R (2005).

PROJECT MANAGEMENT LIFE CYCLE					
PROJECT/ PRODUCT LIFE CYCLE					
CONCEPTION	PLANNING	IMPLEMENTATION	HANDOVER	UTILIZATION	CLOSE-OUT
		Period 1: Time, Cost & Quality (1950's – 1960s)			
		Period 2: Project Management Techniques(1960's – 1970s)			
	Period 3: List of Critical Success Factors (1980's – 1990's)				
	Period 4: Project Success Framework/ Models (1990's – 2000)				
Period 5: Project Success Criteria and Project Success Factors (21 st Century)					

Figure 1: Evolution of Project Success since 1950's

The concept of two dimensions of project success namely success criteria and success factors propagated by De Wit A (1988) is echoed by subsequent researchers (Turner J.R 1994, Wateridge 1995, Morris P.W.G 2000, Diallo A and Thuillier D 2004). Wateridge (1995) expresses the view that for projects to be implemented successfully, the two dimensions of project success must be clearly defined, agreed and progressively reviewed by all parties.

Cooke-Davies T (2002) and Collins A and Baccarini D (2004) define the success criteria as the benchmark to measure or judge success or failure and success factors are the management inputs and systems that would lead to project success. Westerveld E (2003) is simpler in his identification of the two components of project success terming them as the "What" and the "How". He postulates that for a project to be successful it has to identify and focus on: firstly the result areas that is the success criteria which he terms it as the "What" and secondly, the organizational areas that is the success factors which he terms it as the "How".

In the subsequent literature review of this study, the findings of researches on project success are categorized according to the two components of success criteria (the "What") and success factors (the "How"). These two categories are as advocated by authors namely De Wit A (1988), Lim C.S and Mohamed M.Z (1999), Cooke-Davies T (2002), Westerveld E (2003) and Nguyen L.D, Ogunlana and Lan D.T.X (2004) and shown graphically in Figure 2.

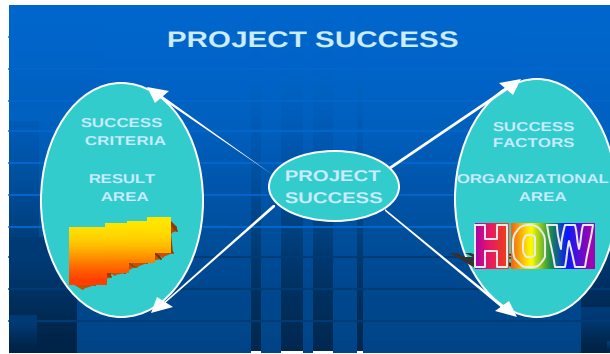


Figure 2: The “WHAT” and the “HOW” in Project Success

3.0 COMPONENTS OF PROJECT SUCCESS

Based on the literature review, the various dimensions of project success comprising the success criteria and success factors are tabulated in Table 2.

SUCCESS CRITERIA	SUCCESS FACTORS
1. Appreciation by Stakeholders 2. Completes within Time/ Schedule 3. Meets the required Quality 4. Completes within Cost/ Budget	1. Team & Leadership 2. Project Manager 3. Communication 4. Stakeholder management 5. Planning 6. Scheduling 7. Monitoring and Control 8. Quality Management 9. Risk Management 10. Organization structure 11. Financial Resources 12. Policy & Strategy 13. Learning from experience 14. External Environment 15. Procurement and Contract 16. Contractor 17. Technical 18. Innovation

Table 2: Success Criteria and Success Factors

Various researchers attempt to group these success factors for easy acceptance. These authors claim that instead of analyzing individual factors affecting the outcome of the project, these factors should be grouped as the combined effects would eventually lead to either the success or failure of the project (Schultz R.L, Slevin D.P and Pinto J.K 1987, Clarke A 1999, Westerveld E 2003, Nguyen L.D, Ogunlana and Lan D.T.X 2004, and Bryde D.J and Brown D 2004).

As such, this study categorized the success factors into four main groups based on the literature review of the principles of management namely Human management, Process, Organization and an additional category of Contractual and Technical based on the implementation of construction project. Factor analysis was carried out using principal

component method of extraction and varimax rotation method. The four factors extracted with their respective items, factor loadings, percent of variance, cumulative variance and reliability coefficients. The first factor, '*Human Management*' contains four items with factor loadings ranged from 0.696 to 0.785. Five items load on the second factor '*Process*' with factor loadings ranged from 0.697 to 0.773. The third factor made up of five items is termed as '*Organization*' with factor loadings ranging from 0.517 to 0.714. Four items formed the fourth factor '*Contractual and Technical*' with factor loadings ranging from 0.459 to 0.620. The four factors explain 61.04% of the total sample variance. All factors were reasonably reliable as the Alpha's coefficients were above the threshold value of 0.70.

As explained in the earlier paragraph, the concept of project success comprises the two dimensions of "What to achieve" and "How to achieve". Consequently, this study defined project success as achieving the success criteria of stakeholder's appreciation, completion on time, on cost and quality through the success factors of human management, process, contractual and technical, and organization. This is shown diagrammatically in Figure 3.

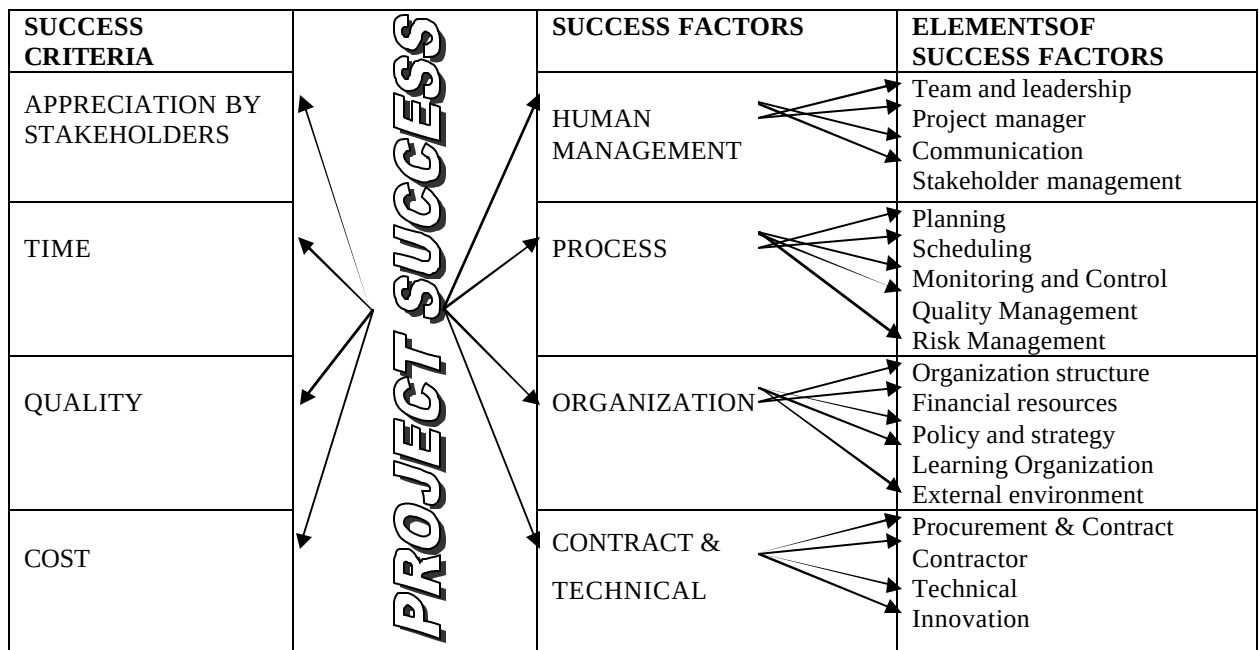


Figure 3: Project Success

4.0 FIELD STUDY

A comprehensive structured questionnaire based on the literature review of the success criteria and success factors was developed and 102 project managers were interviewed. Data collected were analysed using SPSS software.

In this research, the response captured pertaining to the project success criteria and factors were ranked using the Likert scale in the order of importance. The least important is assigned the value of 1 and the most important the value of 5. Hence, high value of the scale suggests importance and alternatively, low value of the scale reflects non

significance of importance as perceived by the respondents. Then for each of the variables being considered, the Cronbach's alpha coefficients were calculated. Data consistency is thus measured by the value of the alpha coefficient obtained. This means that the higher the value of the coefficients obtained the more consistent will be the data set. For this purpose, the cut-off point of 0.70 is used as the benchmark. A mark below 0.70 is considered as lack of internal consistency. All variables investigated recorded alpha coefficients greater than 0.70. Hence, it can be concluded that the data sets were consistent and therefore reflect highly of the validity of the comparisons and assessment made.

5.0 CRITERIA AND FACTORS OF PROJECT SUCCESS

5.1 Project success criteria

Four project success criteria namely time, cost, quality and stakeholders appreciation were identified. The respondents were required to give their preferences, using the scale of 1 to 5, of what they perceived as the important success criteria according to project completion. The results are as shown in Table 3. At the top most of the scale of preference is '*Stakeholders' Appreciation*' with the mean value of 4.18. This is followed by '*Quality*', '*Time*' and at the lowest preference level was '*Cost*'.

Rank	Criteria	Mean Score
1	Stakeholders' Appreciation	4.18
2	Quality	3.98
3	Time	3.88
4	Cost	3.65

Table 3: Ranking of project success criteria

The ranking of these success criteria was further analysed in term of the perception of respondents from two different sectors namely the government and the private sector. The criteria were ranked based on the mean score and the result is summarised in Table 4. Both respondents in the government and private sectors ranked '*Stakeholders' appreciation*' as the most important success criteria for project completion. However, the second most important success criterion was ranked differently by both respondents. Respondents in government sector perceived criterion of '*Quality*' while '*Time*' criterion for respondents in private sector. The opposite ranking was for the third most important criterion. Lastly, '*Cost*' was equally ranked as the least important by both respondents.

Success criteria	Sector	
	Government	Private
Stakeholders' appreciation	1	1
Quality	2	3
Time	3	2
Cost	4	4

Table 4: Ranking of success criteria by sectors

5.2 Project success factor

Following the analysis on the success criteria, the next stage is the analysis on the success factors namely *Human Management*, *Process*, *Contractual & Technical* and *Organisation*. Respondents were asked to rank the importance of these factors in achieving each of the different success criteria. The result is as shown in Table 5. The analysis shows that to achieve these success criteria, the success factor '*Human Management*' was considered as the most important being ranked on top with a mean score of 4.44. This is followed by the success factors of '*Contractual and Technical*' and '*Process*' with a mean score of 3.77 and 3.36 respectively. Comparatively the least important success factor is '*Organisation*' with a mean score of 2.97.

Success factor	Mean Score
Human Management	4.44
Process	3.77
Contractual & Technical	3.36
Organization	2.97

Table 5: Ranking of success factor

The ranking of these success factors was further analysed in term of the perception of respondents from two different sectors namely the government and the private sector. The factors were ranked based on the mean score and the result is summarised in Table 6. Both respondents in the government and private sectors ranked '*Human Management*' as the most important success factor. However, the second most important success factor was ranked differently by both respondents. Respondents in government sector perceived the factor of '*Process*' while '*Contractual & Technical*' factor for respondents in private sector. The opposite ranking was for the third most important criterion. Lastly, '*Organization*' was equally ranked as the least important by both respondents.

Success factor	Sector	
	Government	Private
Human Management	1	1
Contractual & Technical	3	2
Process	2	3
Organization	4	4

Table 6: Ranking of success factor by sectors

5.3 Elements of success factors

Within each of the four success factors identified, the mean score of the elements were ranked in order of importance as perceived by the respondents. The results are given in Table 7. For '*Human Management*' factor, the element '*team and leadership*' was considered as the most important achieving the highest mean score of 4.68. For '*Process*' factor, '*control and monitoring*' element was the most important; and for '*Organisation*' factor the element '*organisation structure*' was ranked highest. For

'Contractual and Technical' factor, the element 'Procurement and Contract' received the highest mean score and hence was the highest ranked.

Rank	Factors/Elements	Mean Score
Human Management		
1	Team and leadership	4.68
2	Project manager	4.43
3	Communication	4.37
4	Stakeholder management	4.16
Process		
1	Control and monitoring	4.24
2	Planning	4.10
3	Scheduling	4.02
4	Quality management	3.75
5	Risk management	3.31
Organisation		
1	Organization structure	4.27
2	Financial resources	3.83
3	Policy and Strategy	3.82
4	Learning Organization	3.53
5	External Environment	3.17
Contractual and technical		
1	Procurement and contract	4.24
2	Contractor	4.18
3	Technical	4.03
4	Innovation	3.25

Table 7: Ranking of elements of success factors

6.8 Conclusion

This study suggests that the definition of project success as achieving the success criteria ("What to achieve") of stakeholder's appreciation, completion on time, on cost and quality through the success factors ("How to achieve") of human management, process, contractual and technical, and organization. Among the criteria studied, 'Stakeholders' Appreciation' was found to be the most important among the respondents which suggest that the respondents would normally give high priority to clients' needs. This is followed by the criteria of 'Quality' and 'Time'. The least consideration was given to the criteria of 'Cost'. In fact when the correlation coefficient was calculated between project success and 'Cost' the value was highly insignificant. This is in contrast to the relationships between project success and 'Stakeholders' Appreciation', 'Quality', and 'Time'.

With regards to success factors, the analysis ranked 'Human Management' as the critical success factor, followed by 'Process', 'Contractual and Technical' and 'Organization'. In addition, the analysis suggests team and leadership as the highest ranked element for human management; control and monitoring as the highest ranked element for process; organization structure as the highest ranked element for organization; and procurement and contract as the highest ranked element for contractual and technical.