

FLEXIBILITY – A CRITICAL SUCCESS FACTOR OF CONSTRUCTION PROJECTS

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Abstract: *There are several factors that have been identified as the critical success factors for the performance of construction projects. A lot of research work is available identifying the critical success factors for construction projects. Most of the research findings show similar grouping of the critical success factors. However the research papers showing the role of flexibility in the construction process are very few. This paper is an attempt to identify the role of flexibility for reducing risk and increasing probability of project success. The paper deals with the traditional critical success factors and makes an attempt to find out the role of flexibility for managing construction projects. Flexibility as an alternative approach is emerging in the business world. In a flexible process, project managers and their team work together to evolve, and prioritize functionality. The paper attempts a definition of flexibility for construction process and to identify whether flexibility can be added into the list of critical success factors in managing construction projects.*

Keywords: Traditional Critical Success Factors, Flexibility, Construction Projects, uncertainty, risk management, complex projects

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1. Introduction

The traditional project management involves CPM/PERT which assumes static nature of projects (Pundir et al, 2008). With the traditional approach, distinct project life cycle phases are easily recognizable, assuming the projects to be static. However, projects are dynamic in nature. Tasks are completed one after another in an orderly sequence, requiring a significant part of the project to be planned up beforehand. For example, in a construction project, the team needs to determine requirements, design and plan for the entire building, and not just incremental components, in order to understand the full scope of the effort. Traditional project management assumes that events affecting the project are predictable and that tools and activities are well understood. In addition, with traditional project management, once a phase is complete, it is assumed that it will not be revisited. Certain project characteristics provide a basis for determining the appropriate managerial actions required to complete a project successfully, (Baccarini, 1996). Most of the research studies have suggested that it is difficult to manage projects using the traditional methods of project management and have proposed multiple perspectives to identify and manage such projects, [Pundir et al, (2007), Baccarini (1996), Winter et al. (2006), Williams (1999), Turner (2006), Soderlund (2004), Soderlund (2010)]. A study of previous literature suggests that there are several factors that are referred to as project success factors and different researchers have addressed different factors that affect the successful implementation of projects. Project managers and contractors in the construction industry describe some of the causes of project failures from their experiences as complexity of projects, uncertainty and risk in handling projects, directionless process, inability of the client to describe the project, poor project design and poor leadership, uncoordinated built environment professionals and inappropriate staff skills, unrealistic timescales and cost estimation, poor selection of building procurement methods, failure to plan and lack of pre-project planning (Paslawski, 2008). While such research helps identify some of the criteria for project success, the results are more or less giving the same type of grouping of success factors whether there are any other factors that can be responsible for the project success is a big question in today's dynamic environment, where the projects are not static in nature. This paper is an attempt to identify the role of flexibility for reducing risk and increasing probability of project success. The paper deals with the traditional critical success factors and makes an attempt to find out the role of flexibility for managing projects, and throws light on the advantages of flexibility in construction projects. The authors make an attempt through a thorough literature survey to find whether flexibility can be treated as an

important determinant for the success of construction projects. The paper is primarily based on the literature search of flexibility management in construction process.

2. Literature Review:

Despite a lot of research work done in the area of measuring project success, there still remains ambiguity in the question- what exactly project success is? Many models categorizing the success criteria were studied by the previous researchers, but most of them could not give alignment of the short term project objectives with the long term objectives (Al-Tmeemy et al 2010). There are many stake holders involved in a project like user, owner, contractor, project manager, etc. The perception of project success may differ from one stakeholder to another. For instance, a project might be successful for user but the same project is a failure for the contractor and vice a versa (Belassi and Tukel, 1996). Studies of project success are mainly concerned with two broad and related issues namely, the criteria that can help define or decide project success and the factors that influence the project success, viz., the so called critical success factors (Bryde, 2008). Traditionally, the project success criteria mainly concentrated on three parameters, time, cost and quality of projects, described as the “iron triangle” by Atkinson (1999). These parameters are still commonly cited measures of project success (for instance, Fortune and White, 2006). However, the traditional success criteria are inadequate to align with the long term success of the company and hence a framework was developed to incorporate the criteria that align with the company’s short term as well as long term goals and provide an appropriate judgment of success at all stages of the project (Al Tmeemy et al., 2011). While such research helps identify some of the criteria for project success, the results are still ambiguous as there is no single framework considering the perception of all the stakeholders regarding project success. Davies (2002) differentiates project success from project management success. He explains the project success as effectiveness of the project in achieving the objectives and project management success as efficiency of the project in regards with cost, time and quality. Lim and Mohamed (1999) suggest that there are two levels of construction project success, the macro level and the micro level. The macro level deals with the effectiveness part of the project, that is achieving the overall objectives of the project, and is mainly concerned with the clients and user. The micro level deals with the efficiency part of the project following the traditional view of “iron triangle” and is concerned with the contractors and consultants. A construction project involves several stakeholders, processes, stages and phases of work and

needs a lot of input from both public as well as private sectors for successful completion. According to Atkinson (1999), a construction project is said to be successful if it achieves the stakeholder's requirements, individually and collectively. A stakeholder is an individual or group, inside or outside the construction project, which has a stake in, or can influence, the construction performance (Takim and Adnan, 2008). Belassi and Tukel (1996) emphasise on grouping the success factors and explain the interaction between each of them, rather than identifying the individual factors. Chan and Kumaraswamy (1997) concentrate on the critical factors that caused delay in the completion of construction projects and identified 83 factors grouped into eight major categories related to project, viz. client, design, material, contractor, labour, plant/equipment and external factors. Davies (2002) tried to answer three basic questions in order to find out the critical success factors that affect the performance of any project, namely: What factors lead to project management success, what factors lead to a successful project and what factors lead to consistently successful projects. He identified twelve critical factors that affect the performance of projects. Pundir et al (2006) studied the importance of success factors over a period of time that is how significance of factors changed with the change in time as per various researchers. Akinsola et al. (1997) examined factors influencing variations on building projects and have classified the factors into four main categories: client, project organization, project characteristics and environmental factors. Sauser et al. (2009) find that researchers are still trying to find out the critical success/ failure factors for projects producing a typical list of factors that include project mission, planning, control, feedback, top management support, technical assistance, etc. without paying attention to the success criteria of projects. Sauser et al (2009) also give a contingency theory to understand the project failure due to managerial reasons. Ika et al (2011) suggest five sets of critical success factors categorized as monitoring, coordinating, design, training and institutional environment. Overall one finds that PERT / CPM based models contribute the most dominant tools and techniques that are still in use for managing projects (Pundir et al, 2008). These tools assume that the projects are static in nature. However the projects are much more dynamic. Traditionally, the scope of PM was majorly seen in unique, operational activities, mainly in industries such as construction and defence (Bryde, 2003). Turner (2006) considers projects to be non routine, risky and uncertain. This suggests that there cannot be a rigid or routine method to manage projects. For managing such projects the methods cannot be created in advance but will emerge from the interactions among the elements of the projects and their environment (Pundir et al, 2007)

3. Need for Flexibility in managing Construction Project

Construction projects are more complex and dynamic today as compared to earlier times in terms of the requirements of technology and financial structure. Previously the construction process was very structured following the traditional tools like CPM/PERT. In most of the previous literature, success of construction projects is said to be “within time and within budget” thus mainly focusing on the efficiency of the project. Hence the failure factors that were considered for the construction projects in the previous literature were grouped into those factors that cause either delay or cost overrun like project management related factors, client related factors, procurement related factors, contractor related factors, etc. (Belassi and Tukel, 1996, Shaikh et al, 2010). However seeing the increasing complexity and dynamism of the construction projects it is not only efficiency but the overall effectiveness of the project which is the need of the client. Hence there is a felt need for a flexible project management approach.

4. Role of Flexibility in managing construction projects

Making flexible arrangements in managing projects is not a new concept. Many studies show that to manage the effects of uncertainty in planning, the project plan should be made flexible. There are examples of many projects where changes were made in spite of the “foolproof” planning to address risk of cost overruns (Pundir, et al, 2008). Hence if during the whole period of the projects, some room for flexibility is given, it will surely be utilized. In construction industry, flexibility has often been viewed negatively making construction projects as “one piece projects” such as bridges and tunnels, based on the ‘we do not build half a bridge’ approach, (Olsson, 2006). Flexibility as an ability of projects to adapt changes within short response time has been emphasized in strategic and supply chain management studies by many researchers, (Olsson, 2004). However most of the research studies explain that it requires a clear and well defined scope and definition for a construction project to be successful, (Miller & Lessard 2000). This means that construction project management focuses on stability of project whereas the other management disciplines strongly emphasize on flexibility, Olsson (2004). This is mainly because the construction projects are mainly focusing on efficiency of the projects, that is, completing the projects within time and cost. The effectiveness part of the project is being neglected. Flexibility is primarily an approach to improve effectiveness of projects rather than efficiency. One reason perhaps for flexibility is not being considered important in construction projects is because it reduces efficiency.

Flexibility was seen as a threat to delivering the project on time and within budget, (Olsson, 2006). But in today's dynamic world, the project success is dependent not only on efficiency but majorly on effectiveness of the project.

5. Flexibility as the Critical Success Factor for projects

The traditional success criteria focusing on efficiency is inadequate to align with the long term success of the company and hence a framework was developed to incorporate the criteria that align with the company's short term as well as long term goals and provide an appropriate judgment of success at all stages of the project (Al Tmeemy et al., 2011) thus focusing on project effectiveness. The traditional success factors still are (i) being on schedule, (ii) below budget and (iii) delivering a product meeting the needed quality, (Turner 1999). But what is the answer to do well in effectiveness of the project? Flexibility can be the answer for this, where "flexibility is the ability to change or react with little penalty time, effort, cost or performance", Upton (1994). This means that flexibility describes the ability of the project to cope with changes in the project definition or scope and compensate them with little influences on schedule (time), costs and quality by appropriate management policies and actions. Following this definition flexibility is the factor that keeps projects on track regarding the success factors that make up the iron triangle.

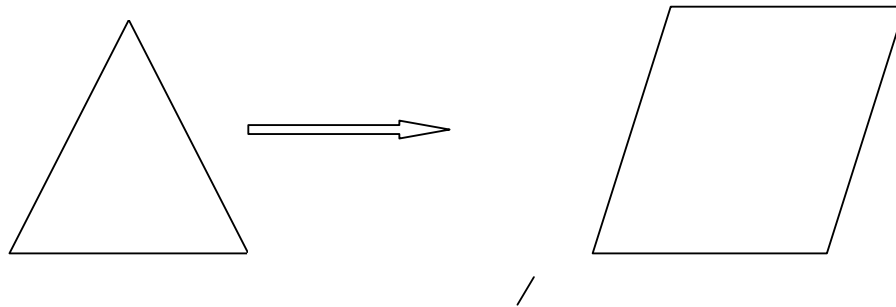


Fig: 1 Converting iron triangle into square with flexibility as one parameter of success (Source: Atkinson 1999 for iron triangle)

6. Conclusions

Bringing flexibility in projects involves costs as well as benefits. The cost of applying flexibility is much lower as compared to cost of managing unexpected changes. Hence it is better to make arrangements for flexible approach rather than dealing with changes on time. For having a proper flexible management it is necessary to identify the parts of the project where flexibility can be applied with little or no penalty costs on projects. While some researchers consider that bringing flexibility in projects will increase costs, cause delays of

projects and thus will hamper the efficiency of projects, but looking at the long term goals, flexibility can be seen as adding value to the projects by improving on the overall effectiveness of projects and customer satisfaction. Thus, flexibility can be one of the success criteria of construction projects.

The success parameters of the construction projects need to be redefined to include project effectiveness. Presently, efficiency is the prime focus of the construction projects which neglects the effectiveness side of the projects. The concept of flexibility is gaining ground to influence the traditional success factors, which make up the iron triangle. The flexibility's influence on the existing factors is not quite so clear yet and there is a need for further research that considers the role of flexibility.

References:

1. Al-Tmeemy S.H., Abdul-Rahman H. , Harun Z., (2011) “ Future criteria for success of buiding projects”, *International Journal of Project Management*, 29, 337-348
2. Akinsola, A. O., Potts, K. F., Ndekugri, I., and Harris, F. C. (1997). “Identification and evaluation of factors influencing variations on building projects.” *International Journal of Project Management*, 15(4), 263–267.
3. Atkinson R. (1999), “Project management: cost time and quality, Two best guesses and a phenomena”, *International Journal of Project Management*, 17 (6), 337-343
4. Baccarini D. (1996), “The concept of project complexity: A review,” *International journal of project management*, Vol 14, No 4, pp 201-204
5. Belassi W, Tukel O. (1996), “ A new framework for determining critical success factors in projects”, *International Journal of Project Management*, 14 (3), 141-151
6. Bryde D.J. (2003), “Modelling Project Management Performance”, *International Journal of Quality & Reliability Management*, Vol. 20 , No. 2, pp. 229-254
7. Bryde D.J. (2008), “Perceptions of the impact of project sponsorship practices on project success”, *International Journal of Project Management*, 26 , 800- 809
8. Chan, D. W. M., and Kumaraswamy, M. M. (1997). “A comparative study of causes of time overruns in Hong Kong construction projects.” *International Journal of. Project Management*, 15(1), 55–63.
9. Davies C.T. (2002), “ The real success factors on projects”, *International Journal of Project Management*, 20 , 185- 190
10. Fortune J, White D, (2006), “ Framing of project critical success factors by system model”, *International Journal of Project Management*”, 24, 53-65
11. Ika L, Diallo A, Thuillier D (2011), “ Critical success factors for world bank projects”, *International Journal of Project Management*, available online [www. Science direct .com](http://www.Science direct .com)
12. Lim C.S., Mohamed M.Z., (1999), “Criteria of project success: an exploratory reexamination”, *International Journal of Project Management*, 17, 243–248
13. Miller, R. & Lessard, D. (2000), “The Strategic Management of Large Engineering Projects, Shaping institutions, Risks and Governance”, *Massachusetts Institute of Technology, Cambridge, MA.*

14. Olsson, N.O.E.(2004), "Flexibility in Engineering Projects: Blessing or Curse?", Paper presented at the NORDNET International PM Conference, 29 Sept – 1 Oct 2004, Helsinki, Finland.
15. Olsson, N.O.E. (2006), " Management of flexibility in projects", International Journal of Project Management, 24:1, 66–74.
16. Paslawski J., (2008), "Flexibility implementation in construction process engineering", (2008 Proceedings of the 25th ISARC, Vilnius, Lithuania), Pages 610-615
17. Pundir A.K., Ganapathy L., Sambandam N. (2006), "A success factor approach to project management", 10th annual conference of society for operations management, 21st to 23rd Dec, 2006, at IIM Ahmedabad
18. Pundir A. K., Ganapathy L., Sambandam N., (2007), " Towards complexity framework for managing projects", Emergence: Complexity and Organization, Vol 9, No 4, pp 17- 25
19. Pundir A. K., Ganapathy L., Sambandam N., (2008), " Some approaches to managing flexibility in construction projects", Global journal of flexible systems management, Vol 9, No 1, pp 23- 29
20. Sausser B, Reilly R, Shenhar A (2009), " Why projects fail- how contingency theory can provide a new insight", International Journal of Project Management, 27, 665-669
21. Shaikh A.W., Muree M.R., Soomro A.S. (2010), "Identification of critical delay factors in construction projects", Sindh University Research Journal , 42 (2) 11-14
22. Soderlund J. (2004). "Building theories of project management: Past research, questions for future, International journal of project management, Vol 22, No 3, pp 183- 191
23. Soderlund J. (2010). "Knowledge entertainment and project management- A case of large scale transformation projects, International journal of project management, Vol 28, No 4, pp 130- 141
24. Takim R., Adnan H., (2008), "Analysis of effectiveness measures of construction project success in Malaysia", Asian Social Science journal, 4, 74–91.
25. Turner R.J. (1999), The Handbook of Project-Based Management, London, McGraw-Hill
26. Turner R.J. (2006), "Towards the theory of project management: The functions of project management", International Journal of Project Management Vol. 24, No. 4, pp. 187-189
27. Williams T M., (1999), " The need for new paradigms for complex projects", International Journal of Project Management Vol. 17, No. 5, pp. 269-273
28. Winter M., Smith C., Morris, P. and Cicmil S. (2006), " Directions for future research in project management: The main findings of a UK government- funded research network, International journal of project management, Vol 24, No 3, pp 638-649
29. Upton D.M., (1994), "The management of manufacturing flexibility in California", Management Review, 36 (2), 72-90.