

Review

Literature mapping: A bird's eye view on classification of factors influencing project success

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The subject of project success has caught the attention of researchers for the last five decades. The long list of project success factors indicates that there are no common denominators for project success. It also indicates that there was no agreement on the definition of success. The aim of this review paper is to classify relevant literature on project success in order to obtain a greater breadth on this topic. This paper distinguishes the success of project into project success definition, measurement or dimension of project success, traditional success factors, non-traditional success factors, frameworks and models of project success, type of industry, location (country) of research, specific level (individual, group, organisation, and project), and phases of project (project life cycle). This paper further highlights the classification of the success factors of project in construction industry and other industries. The outcome of this paper is a literature review mapping, which provides a holistic picture of this notion to clearly specify the gap in literature.

Key words: Classification, project management, success factors, project success.

INTRODUCTION

The study on the success factors is of great interest to project management practitioners and researchers alike. Findings on these studies are published in most project management literature (Hartman and Ashrafi, 2004). It is worthwhile exploring the factors of success as it could enhance competencies in project management and, thus, ensure project success (Isik et al., 2009). The scholarly studies, for example, on project planning by Zwikael and Globerson 2006 and Aladwani, (2000, 2002), and studies on project management by Atkinson (1999), Larson and Gobeli (1989), and Dvir (2005) have contributed to the Project Management Book of Knowledge (PMBOK). Most importantly, the studies on project success could effectively be the contributors to a more successful practical application of project management practices (Artto,

2002).

Many researches have been able to distil the factors of project success but there is no general agreement concerning common factors for all projects (Chan et al., 2004). The reason being that each project is different from other projects and that "one size does not fit all projects" (Shenhar, 1998). Likewise different projects will display different factors of success (Dvir et al., 1998). Projects can differ "in terms of technology, size, complexity, risk" and other factors or variables (Shenhar et al., 2001).

A rigorous literature review of the factors of project success can be classified into: project success definition (deWit, 1988; Standing et al., 2006; Nguyen et al., 2004), Critical Success Factors (CSF) (or Traditional Factors) (Pinto, 1986; Cooke-Davies, 2002; Muller and Turner, 2005), Non-traditional Factors (Atkinson, 1999; Chan and Chan, 2004), measurement or dimension of project success (Shenhar et al., 1997; Sadeh et al., 2000), frameworks and models of project success (Bryde, 2003;

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Nitithamyong and Tan, 2007; Hartman and Ashrafi, 2004), type of industry (Chan and Chan, 2004; Zwikael and Globerson, 2006), location (country) of research (Nitithamyong and Tan, 2007; Aladwani, 2001, 2002; Cooper and Kleinschmidt, 1995), specific level (individual, organisation, project) (Wixom and Watson, 2001) and phases of project (project life cycle) (Zwikael and Globerson, 2006; Pinto, 1986).

One could look into the success factors depending on whether the focus of study is based on traditional or non-traditional factors. Examples of non-universal factors are by Gemunden et al. (2005), which discussed autonomy and Jang and Lee (1988) presented managing consulting projects. Secondly, the traditional definition of project success means meeting the time (duration), cost (budget) and quality (specification and performance) (Songer and Molennar, 1996; Nguyen et al. 2004). The third selection of factors can be based on the focus on a specific industry or many industries such as measuring of construction success by Chan and Chan (2004), key performance index in the construction industry and benchmarking of project planning in construction and engineering conducted by Zwikael and Golberson (2006). Different industries have different sets of factors as advocated by Dvir et al. (1998). The success factors could be classified according to the context of a specific country. Studies that have contributed substantially to the Project Management Book of Knowledge (PMBOK) and project management in the specific country include the examination of factors of success in construction performed in Vietnam (Nguyen et al., 2004) and the study in the defence industry conducted in Israel by Dvir et al. (1998) and Tishler et al. (1996). The fifth classification of factors addresses concerns the issues of project success in the planning phase of the development project. The planning phase is part of the Project Life Cycle (PLC). As mentioned in the PMBOK (2004) and Kerzner (2009), PLC consists of the initiation or conceptual, planning, implementation and the closure phase of projects. PLC is also part of the project management process (Kerzner, 2009), which cannot be detached from other phases of PLC. Success in the planning stage leads to success in the other stages of the PLC (Pinto and Mantel, 1990; Pinto and Prescott, 1988).

DEFINITION OF PROJECT SUCCESS

One of the related areas on project success lies in its definition. Most of the earlier studies (in the 1980s and 1990s), which were concerned with project success are determined on the basis of time, cost and quality (Chan and Chan, 2004; Turner, 1999). A much earlier studies hold that the definition of project success is based on cost, schedule, quality, safety and satisfaction to the customers (Ashley et al., 1987; Nguyen et al., 2004).

An example of the definition is that the project is successful if it is “completed on time, within budget, according to specification of customers and stakeholders” (Nguyen et al. 2004). At the project level, project success is defined as duration, monetary cost and performance (Belassi and Tukel, 1996; Atkinson, 1999; Navarre and Schaan, 1990). Furthermore, projects can be considered to be successful if they obtain better results in terms of the “cost, schedule, quality, safety, and satisfaction of participants” (Ashley et al., 1987 cited in Sanvido et al., 1992; Nguyen et al., 2004). Similarly, Diallo and Thuillier (2005), in their study, confirmed that time, cost and quality are the management dimensions for project success in international projects.

Projects exhibit no specific deliberation on project success and failure (Standing et al., 2006) and factors of success are not universal for all projects as different projects embrace different factors of success (Dvir et al., 1998). This may explain the variety of success factors noticed in the literature. Other definitions of project success include “meeting the technical performance specification” (deWit, 1988, 2004 cited in Nguyen et al., 2004). Performance also indicated by other scholars as Belassi and Tukel (1996); Atkinson (1999); Navarre and Schaan, (1990); and Chan and Chan (2004). PMBOK (2004) have similar view about these definitions. The general acceptable definition of project success implies achieving the project’s goals and objectives (Lim and Mohamed, 1999; Baccarini, 1999; Cooke-Davies, 2002).

YARDSTICK OF PROJECT SUCCESS

Project success can be viewed and classified from different perspectives in terms of its measurement or dimension. Shenhar et al. (1997) described measurement of project success through four dimensions: the period of execution, upon completion of project, after project is delivered to the client and assessment 1-5 years after the completion of the project. In contrast, project success can be categorised into four stages (square root), the iron triangle (cost, time and quality), the information system, benefits to the organisation, and the benefit to the stakeholders (Atkinson, 1999).

Another set of dimensions of project success forwarded by Sadeh et al. (2000) were meeting the design goals, benefit to the development of the company and country, and benefit to end user. Others viewed project success from “the perspective of the individual owner, developer, user and general public” (Lim and Mohamed, 1999 cited in Chan and Chan 2004).

Other studies used earlier empirical findings for dimensions of success as a way to re-establish a new measurement of project success. Introducing measurement of success in a selected environmental set up is a vital tool to assess the extent of success of an endeavour.

Table 1. Some models and dimensions of project success.

Classification	Sub-dimension	Reference
Models of Success	Project Excellence Model	Westerveld (2003)
	Project Management Assessment Model (PMPA) model to assess quality management	Bryde (2003)
	The concept of KPI framework of success criteria was introduced. The objective measures used mathematical formulae to calculate the value of project success. Subjective measures the stake holder's opinions and judgments	Chan and Chan (2004; cited by Lam et al., 2007)
	Project Success Index (PSI) used to benchmark the performance of the design and build (D and B) project.	Lam et al. (2007)
	Cost, time, quality and functionality are the principal success criteria for D and B project	
Dimensions of Success	Project Management Consultant (PMC) model with 12 underlying PMC success factor and 5 important criteria in assessing PMC performance	Nitithamyong and Tan (2007)
	(a) The period during project execution, (b) upon completion of project, (c) after project is delivered to clients and (d) assessment after 1–2 years, continued by 3–5 years after completion of project	Shenhar et al. (1997, cited in Chan and Chan, 2004)
	Efficiency on the implementation process measured by the performance of the project team (schedule, budget, meeting technical goals and working relationship).	Pinto and Mantel (1990)
	Confirm the important of management (success) dimensions with time, cost and quality impact developments project	Diallo and Thuillier (2005)
	Four distinct points were identified as the major dimension for project success: "(a) Project Efficiency; (b) Impact on the customer; (c) Direct business and organisational success; (d) Preparing for the future."	Shenhar et al. (2002:699)

endeavour. Therefore, authors like Dvir et al., (1994) and Belassi and Tukel, (1996) pursued studies on success involved in the extension of determining new measurements of success in different set-ups or environments.

In construction industry, Ashley (1987) identified five dimensions of project success include: budget performance, client satisfaction, functionality, contractor satisfaction and project manager/team satisfaction. Lim and Mohamed (1999) view project success into two approaches, namely, micro viewpoints and macro viewpoint. Micro viewpoints include smaller components which are parties involved with the final part to achieve the objective in the construction process. While, macro viewpoint include time taken to complete the project and is affected by factors for example, economy, management or weather. A summary of these dimensions of project success is presented in Table 1.

FRAMEWORKS AND MODELS OF SUCCESS

The studies of success formulated and classified in frameworks and models are plentiful. The development of frameworks and models fundamentally allows any concept or theory to materialize in patterns or themes by linking one or more relationship. It can also be a

management tool to help project managers or project management teams to handle complex and large projects (Westerveld, 2003). The unique example is the project excellence model, which was developed to link the criteria of success with critical success factors (Westerveld, 2003). Before this, according to Westerveld (2003), there were no studies that actually played this role. This model, for example, provides guidance to project managers in handling projects.

Another classic example is the development of the PLC based framework performed by Khang and Moe (2008) which "identifies the different success criteria and factors of success criteria for the different phases of the PLC". This framework then links 'the success criteria for each phase with that of the subsequent phases' of the PLC. The "consolidated framework for measuring success of construction projects" formulated by Chan and Chan (2004) prepares another platform for measuring success in the construction industry. The multi-dimensional framework by Shenhar et al. (2002) was another study to measure project success.

Despite the development of many models and frameworks, in principle, these models were developed to meet certain contexts. Similarly, factors of success vary with the type of project or project setting as mentioned by Dvir et al. (1998). Therefore, it is apparent that there may

not be a single model or framework that is totally applicable for every single project or situation setting. Table 1 shows some models of project success.

TRADITIONAL AND NON-TRADITIONAL FACTORS

Literature contains vast number of project success factors that can be classified into traditional (or universal) factors and non-traditional (or soft) factors. The multi-dimensional and non universal approach suggests that project successes “are not universal for all projects” and that “different projects exhibit different sets of success factor” (Dvir et al., 1998). Similarly, project success can be measured “in different ways at different times” by different people and that “project success is multi-dimensional” (Bryde, 2003). Atkinson (1999) links the traditional meaning of project success (cost, time and quality) with project management factors. However, this linkage is apparently not proven empirically. Other studies performed on non-traditional factors are in human resources management (Belout, 1998), competency (Khang and Moe, 2008; White and Fortune, 2002) and motivation (Lim and Mohamed, 1999; Cooke-Davies, 2002; Ikonen, 2009). Other factors of success studied include communication (Ebadi and Utterback, 1984), collaboration (Shelbourn, et al., 2007), autonomy (Gemunden et al., 2005) and benchmarking (Marwa and Zairi, 2008; Chan and Chan, 2004). Table 2 summarizes the two types of factors adopted in this paper.

SUCCESS IN THE INDUSTRY

The review of previous literature involved projects that covered many industries, for instance, construction, information technology, defence, electronics, pharmaceutical and chemical (Kerzner, 2009). Most studies on project success are concentrated in the construction industries (Chan and Chan, 2004). There are numerous studies on project planning and project management in the information technology industries (Aladwani, 2000, 2001). The defence industries popularly performed studies on the multivariate analysis of project management and critical success factors (Tishler et al., 1996; Dvir et al., 1998; Lipovetsky et al., 1997; Shenhar and Dvir, 1996). Another area of success is in the manufacturing industries. The investigation by Kuen et al. (2009); Belassi and Tukul (1996); Gargeya and Brady (2005) are three empirical studies on critical factors that influence successful manufacturing companies and projects, respectively.

Other researched areas in project success with respect to the industry include studies on warehousing (Wixom and Watson, 2001), project planning in construction and engineering (Zwikael and Globerson, 2006), cooperation in construction projects (Phua and Rowlinson, 2004),

information technology (Jang and Lee, 1988) and the defence industry (Dvir et al., 1998). The research on success factors are generally applied research where the findings contributed to the respective researched industries. A clear instance work in the defence industry was conducted by Dvir et al. (1994, 1998) and Sadeh et al. (2000). These findings have proven to enhance the project management, process and planning of this rapidly growing industry. Most of the studies of the factors of success involved data sets collected on the basis of country, for example the study on product success in Slovenia was conducted by Cooper and Kleinschmidt (1995).

SUCCESS AT SPECIFIC LEVEL AND PHASE

The previous literature can also be categorised into specific levels of success, such as the individual, organisational, project level and during the different phases of the Project Life Cycle (PLC). Some studies are on one specific level while other studies cover more than one specific level of project success.

The study of communication on one specific level of success, which is the individual, by Ebadi and Utterback (1984) is just one example. In contrast, both of the studies by Shenhar et al. (1997) and Zwikael and Globerson (2006) addressed success at one level of project life cycle (PLC) and entire stages of PLC, respectively. The first study addressed the applicability of the four dimensions of project success: “project efficiency, impact on the customer, organisational and business success and future preparation during the entire life-cycle of the project”. While, the second study examined project planning in the most critical stage of the PLC for construction, engineering and manufacturing organisations.

The study on the dimension of project success by Shenhar et al. (1997) covers two aspects of specific levels and phases of project success; one at the PLC stage and the other at the organisational level. The success factors were critical in identifying the necessary cost, time and quality to fulfil the customers' desired deliveries, which have to be met throughout the PLC of the project (Kerzner, 2009). Therefore, it was of great interest that the focus on the study of factors of success, (Cooke-Davies, 2002), mentioned that input in any stage of the PLC of the project can directly or indirectly influence success.

LITERATURE MAPPING

Literature mapping is adopted to establish the themes and patterns found in the literature (Creswell, 2008). A rigorous review of past literature was conducted to identify the different patterns or themes encompassing areas

Table 2. Classification of project success factors (traditional and non-traditional factors).

Classification of factors and factors of success	References
Traditional Factors of Success	
PMC's role: "1. PMC interaction skills 2. Efficient management of information 3. Proper planning for project execution 4. Establishment of standard procedures 5. Organisation of collaboration among team members 6. Client support. 7. PMC's commitment and flexibility 8. PMC's adequacy of resources and understanding of the client's requirement 9. Clear delegation of decision making authorities 10. Client's characteristics and contribution 11. PMC's competency and experience 12. PMC's problem solving skill".	Nitithamyong and Tan (2007)
Project Management Factors (effective control and monitoring system reinforce the motivation of the project)	Atkinson (1999); White and Fortune (2002)
Micro project success (project personnel competency and project mission) and macro project success (top management support and project mission)	Kuen et al. (2009)
Quality of Project Planning	Aladwani (2002); Pinto and Slevin (1989); Zwikael and Golberson (2006)
"Clearly defined goals, competent project managers, top management support, competent project team members, sufficient resource allocation, adequate communication channels, control mechanisms, feedback capabilities, responsiveness to client, client consultation, technical task, client acceptance and trouble-shooting"	Jiang et al. (1996)
In defence projects: "The more urgent a project is perceived, the greater the chance the project can be successful".	Tishler et al. (1996)
Other factors include: Design consideration during the early stage of the project, professional qualification, and team spirit.	
Project Structure	Larson and Gobeli (1989)
Partnering	Larson (1997)
Non-traditional factors of success	
In construction: "Four COM's, comfort, competence, commitment and communication"	Nguyen et al. (2004)
Competency, motivation and environment.	Khang and Moe (2008); Pinto and Slevin (1988); Westerveld (2003); White and Fortune (2002)
Communication and Trust	Lievens et al. (1999); Ebadi and Utterback (1984); Diallo and Thuillier (2005)
Cooperation	Phua and Rowlinson (2004); Bennet and Jayes (1995, 1998); Latham (1994)
Focusing on collaboration (soft issue) rather than technology	Shelbourn et al. (2007)
Commitment	Cooke-Davies (2002)
Formality	Naveh (2007)
Consultant Engagement	Jang and Lee (1988); Appelbaum (2000); McLachlin (1998 cited by Appelbaum, 2000); Armenakis and Burg, 1988 cited by Appelbaum, 2000)
Benchmarking	Lam et al. (2007); Maire et al. (2005)
Teamwork and Social Interdependence	Johnson and Johnson (1995, 1999); Tarricone and Luca (2002)
Motivation	Belassi and Tukul (1996); White and Fortune (2002)
Employeeeship and empowerment	Moller (1994)
Autonomy	Gemunden et al. (2005)
Tacit Knowledge and Technical Skills	Koskinen (2000); Tarricone and Luca (2002)
Organisational culture and knowledge sharing	Al-Alawi et al. (2007)
Inter-personal Relationship	Pinto and Pinto (1991)
Personal and Employee roles	Belout (1998); Johnson et al. (2000)

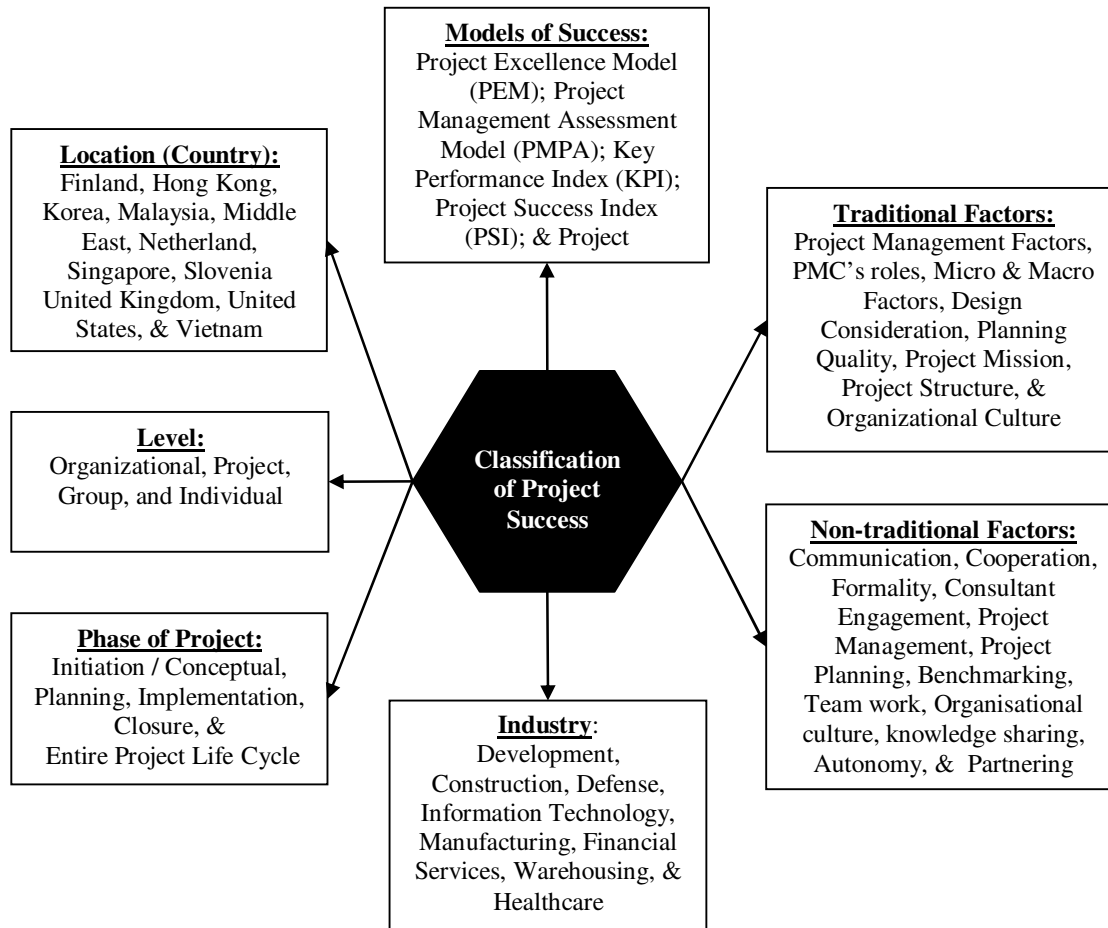


Figure 1. Literature mapping of project success.

areas of success and project success.

Initially, the themes and patterns were charted out (Previous paragraphs and Tables 1 and 2). From the charting out of these themes and patterns, several phenomena emerged and were mapped out (Figure 1). The mapping process can identify gaps in the areas of project success. The outcome of the mapping enables the study on the factors that influence project success to be formalised according to the classification as discussed in the subsequent sections. Six main criteria of project success were chosen to build up the literature mapping include:

- Classification based on Focus Areas (Traditional Factors and Non-traditional Factors)
- Classification based on Type of Industry
- Classification based on Location (Country of research)
- Classification based on Models of Success
- Classification based on Phases in Project Life Cycle (PLC)
- Classification based on Level of Success

CONCLUSION

Over the last five decades, project success has been traditionally defined along the meanings of time (duration), cost (budget), quality (specification and performance) as in the studies conducted by Songer and Molennar (1996); and Turner (2004).

The factors of success have expanded over the years of research and now also include factors based on non-traditional factors. Two of the many studies on non-traditional factors studies were performed by Gemunden et al. (2005) on autonomy and Jang and Lee (1988) on managing consulting projects. As the factors of success are not universal for every project (Dvir et al., 1998) and different factors are also represented by different settings, (Pinto, 1990); factors of success can either be traditional and/or non-traditional.

The factors of success can also be selected based on the classification of the research works on one particular industry or many industries. Different industries have different sets of factor of success. There are studies that

cover only one industry, for example, the new product development by Tatikonda and Meutoga-Weiss (2001) in the technology industry and the measuring of construction success by Chan and Chan (2004) through key performance index in the construction industry. In comparison, there are studies that are performed on selected industries, for example, a unique study on benchmarking of project planning of four industries (construction, engineering, software and communication) by Zwikael and Globerson (2006).

In addition, the factors of success can also be selected based on the classification of the country or location where the data sets are collected. These researches produce empirical findings in certain parts of the selected country or countries. Some of the studies conducted that have made a significant contribution to the body of knowledge are identification of success factors by Cooper and Kleinschmidt (1995) performed in Slovenia, the examination of factors of success in construction conducted in Vietnam (Nguyen et al., 2004) and in Malaysia (Chan and Chan, 2004), the study in the defence industry established in Israel by Dvir et al. (1994,1998) and the investigation of success factors in the software development projects delivered in the form of a technical report in Finland (Ikonen, 2009).

Likewise, studies on project success that are selected can be based on the classification of certain specific levels. These specific levels depend on the research requirement and the type of research problems or issues to be addressed. Research works on project success can be conducted based on project specifics such as the individual and organisation (Kuen et al., 2009; Al-Alawi et al., 2007) and project level (Lam et al., 2007; Dvir et al., 1994; Chan and Chan, 2004).

Quite commonly, research works on project success have been selected based on the classification of the phases of the PLC (Pinto, 1991, 1987, 1986; Pinto and Prescott, 1988; Dvir, 2005). In another study by Khang and Moe (2008), researched works were performed on "different phases of the PLC and links the success criteria of each phase with the subsequent phase" and project levels of international development projects. Similarly, the project success research work by Shenhar et al. (2002) addressed project definition in the planning and execution phases, two (2) stages of the PLC.

To conclude, the general literature mapping was established by linking and integrating the factors of success and project success. The factors that influenced project success were selected from the review of literature based on the selection criteria established in this paper.

Despite the many studies on the factors of project success, there are apparently limited research works related to factors that influence project success during the planning stage of development projects. From this understanding, it is anticipated that different factors will

impact project success during the planning phase of development projects.

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