

The Impact of Project Management Implementation on the Successful Completion of Projects in Construction

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Abstract—Although project success is the most discussed topic of project management, little is known about the influence of project management success on the success of projects. Despite the vast array of project management literature and trainings available, project management methodologies fail to deliver consistent project success. Accordingly, there is a need to decode the role of successfully applied project management methodologies on project success. This paper examines the current status of project management methodologies and their influence on the elements of project success. Although projects are managed since ancient times, a thorough literature review reveals that the theoretical cornerstones of project management methodologies are not yet agreed upon. Project success depends on project management success and the success of the end-product. This represents the micro and macro perspective of project success, the boundary of which inspires polarized reactions. Project success is influenced by many different factors, outside the control of project management. This research analyses the data of project practitioners, scattered over ten nations. The collected data suggests that the majority of successful projects implement, but do not fully utilize contemporary project management tools and techniques to their capabilities. The influence of project management tools and techniques on project success depends on the practitioners' training, the timing and level of implementation achieved, whereas the human factor plays an essential part for achieving project success. This research concludes that project management success represents one of two essential ingredients for achieving project success, therefore, positively influencing project success.

Index Terms—Project management, project success, tools and techniques, success factors and criteria.

I. INTRODUCTION

Projects have been realised since ancient times [1], which leads to the assumption that its theories have matured into solid practices. Koskela and Howell (2002) [2] argued that as of yet, there is no measurable value added by implementing best practices of project management based on the notion that contemporary concept of project management lacks theoretical foundation and is based on a narrow and implicit theory that requires further development and enrichment. Traditional project management, however, causes self-inflicted problems impacting project performance negatively or worse, causing projects to fail [2]. Recent studies point towards the lack of clear definitions of project management and project success [3].

Despite the vast array of project management literature

available, the complex question about the contribution of project management toward project success remains unanswered. To some extent, the corner stones of project success achieve general agreement, whereas others have massive disagreements [4]. Apparently, scholars, researchers and practitioners fail to agree on the influence of project management on project success and a lot of ground is yet to be explored.

II. WHAT IS A PROJECT?

The BS ISO 10006:1997 defines a project as: “a unique process consisting of a set of coordinated and controlled activities with start and finish dates, undertaken to achieve an objective conforming to specific requirements, including constraints of time, cost and resources” [5]. Projects have specific characteristics and rules in comparison to operational work [6]. Contemporary literature outlines such findings and offers ample definitions, highlighting the uniqueness of every project. Projects are temporary organisations, established to achieve desired goals and objectives [7], resulting in project teams being also temporary, redundant or reassigned after the completion of the project. A major drawback in temporary organisations is that project teams know that their contribution is only required for a limited period of time. Shenhar (2001) [8] places emphasis on the common misconception that projects are alike and argues that one of the reasons why projects fail is that project managers are using the same tools and techniques for all projects similarly. Projects are unique and demand distinctive judgment. Therefore, it appears difficult to implement a static management methodology capable of successfully managing projects on a consistent level as the “*unique*”, “*particular aim*” and the individual project “*objectives*” point towards aiming at a moving target.

III. MANAGEMENT OF PROJECTS

Project management practices attempt completion of the project as intended; getting it done most efficiently by minimizing cost and achieving external goals related to customer needs [2]. Goals appear straightforward and achievable, however, projects continue to run late, exceed their budgets or fail to meet project objectives [9]. Modern project management was introduced during the Manhattan project in the early 50's [10], but certainly, projects have been realised before that time. It is accepted that Henry Gantt developed the nowadays commonly used bar chart in 1916 [11]. Further review into the literature revealed that the Swiss Engineer Hermann Schuerch used a similar tool in 1912, developing and successfully utilizing the bar chart as a scheduling tool on a bridge project leading to the

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conclusion that the inception of modern project management was established approximately 40 years earlier than broadly perceived. Project management is a newly developed concept and thus, its literature is relatively young lacking in concepts and theoretical basis [12]. It can be however argued that project management methodologies date back as far as 2550 BCE and that the Pyramids were delivered by following an approach featuring a project charter and a business justification, incorporated into a life cycle approach [1].

Projects are better designed to respond to expected uncertainties [13], whereas project tasks demand proper planning and may be more challenging to project teams, when compared to routine work. In addition, the *PMBOK® Guide* (2000) points out that its project management mythology is only "...applicable to most projects most of the time". This leads to the questions "what" shall be used "when?" Most surprisingly, these questions remain unanswered [14].

Project management methodologies are not designed to be generic but applicable to all projects at any given time, as they need to be adapted to individual project objectives, in order to achieve consistent project management success. Therefore, it appears that either PM methodologies are wrongly applied or project management does not directly influence the success of projects.

IV. PROJECT SUCCESS

The ultimate purpose of implementing project management practices is to achieve consistency in project success. Yet, there is no agreed definition of project success, which only further complicates the achievement of such. Table I shows a summary of literature on the criteria of success for management of projects.

The experience of the project manager directly influences the success of projects [16], [17]. Munns and Bjeirmi (1996) [18] highlight that project management has its role in achieving project success, but several other factors beyond the control of project management, also affect project success. Peters and Horner (1997) [19] argue that project management does not possess the power to control time, cost or quality. These measures are traps, purely to be seen as either self-created or imposed, but rarely objective yardsticks. Some projects miss all three parameters and are still hugely successful. Also Dvir *et al.* (2006) [20] highlight that traditional project success measures are incomplete and may be misleading. Although all three constraints are met as planned, a project may not meet the sponsor requirements [20]. Such findings lead Baccarini (1999) [21] to conclude that only the combination of project management success with product success will create project success, whereas Lim and Mohamed (1999) [22] suggest that a project is only successful, when achieving its objectives. Typically, project success is perceived as a single measure, either the project was a success or it failed [23]. Lim and Mohamed (1999) [22] introduced the micro and macro perspective that looks at project success from a different perspective. The micro view focuses and assesses project management success at project completion, whereas the macro perspective incorporates the operational aspect of projects and

concentrates on long-range customer satisfaction [22]. Such a concept is an analogue to De Wit's (1988) [24] distinction between project success and project management success. De Wit (1988) highlights that project success is measured against the overall project objectives following project completion.

TABLE I: LITERATURE SUMMARY OF PROJECT SUCCESS CRITERIA. PARTIALLY (ADAPTED OF WESTHUIZEN, D. AND FITZGERALD E., 2005) [15]

PROJECT SUCCESS CRITERIA	Booch 1996	Wateridge 1998	Baccarini 1999	Kerzner 2002	Thomsett 2002	Marchewka 2003
Quality of Project management process			X	X		X
Within time	X	X	X	X	X	X
Within budget	X	X	X	X	X	X
Specified quality	X	X	X	X	X	X
Specified service quality		X	X	X		
Project stakeholder satisfaction		X	X	X	X	X
User satisfaction	X	X	X	X	X	X
Net benefits		X	X		X	X

Nevertheless, project management success is measured during the project life cycle via the classic performance measures [24]. Milosevic and Srivannaboon (2006) [25] focus on the link between project management and the projects final product as the new dimension for achieving project success, whereas project success is not achieved by completing the project within its constraints, but only after achieving end-user satisfaction [25], [26]. Even so, this approach may intend to deliver individual business outcomes, rather than managing project activities successfully for achieving successful project completion [26]. Moreover, other researchers highlight that measuring success shall be done from the perspectives of the individual owner, developer, contractor, end-user as well as the general public [22], [27]. Thus, it is broadly accepted that different projects may have individual success factors [28]. Liu (1999) [29] highlights that every project may even have its unique set of success measures. Apparently, this complicates deriving an agreed definition of project success. Interestingly, stakeholder satisfaction is commonly agreed to be a valuable addition to the iron triangle whereas a successful project shall also satisfy its stakeholders [21]. Kam and Müller (2005) [23] argue that if the end product of the project does not perform to customer satisfaction, although the project is delivered within the time, cost and quality constraints, the project appears successful from the project management perspective, but the product could result in a failure. They further highlight this contradiction with their statement "*The operation was a success, but the patient died*". Therefore, in simplistic terms, project success comprises of two main ingredients, project management success as well as product success [21]-[23].

V. REVIEW OF CONTEMPORARY PROJECT MANAGEMENT TOOLS AND TECHNIQUES

There are no agreed definitions for the success of projects and project management [3] and based on Dvir *et al.*'s observation, there are no universal project success factors to all projects and different projects have different project success factors [28], resulting in that contemporary research lacks in sufficient hard evidence, for justifying the positive influence of project management on project success [14]. Nevertheless, in project management there is emphasis on the successful application of tools and techniques against project activities to achieve project success. Due to the rich variety of different tools and techniques, which are applicable to different project life cycle phases, it seems of utmost importance to apply the right tool and technique at the right time. Zeitoun (1998) [30] suggests that the influence of the tools and techniques depends on the practitioners training as well as the implementation process. Hence, several success factors relate to human influenced factors, the so-called soft project management [31] and do not relate directly to tools and technique of the hard project management. Other researchers namely Nguyen *et al.* 2004 [32]; Scott-Young and Samson 2004 [33]; Kloppenborg and Opfer (2002) [31] partially confirm these findings. Based on a study of Thamhain (1999) [34], only 50% of project managers are familiar with project management tools and techniques, whereas only 28% implement them effectively. In a study Al-Hajj & Sayers (2014) [35] concluded similarly that around 42% of UAE practitioners do not utilize the WBS (Work Breakdown Structure) in their projects and around 48% do not feature an OBS (Organisation Breakdown Structure). Nevertheless, the investigated projects achieve a success rate (time, cost and quality) of around 66%. Such findings are surprising findings and one may conclude that project management tools and techniques are not directly influencing project success.

On the other hand, several studies conclude [36]-[39] that properly and timely applied project management tools and techniques may lead to project success. It involves a sensitive decision-making process to choose the right tools or technique for the specific project life cycle phase, in order to produce the demanded deliverables. Moreover, wrongly used project management tools and techniques may trigger the contrary [10], [37], [38], which could even lead

to project failure.

According to Globerson and Zwikael (2002) [40], the project manager is fully accountable for the success of the project. The project manager is ultimately responsible for developing the project execution strategy, which shall align with the parent organisations primary strategy [40], highlighting the importance of properly trained project managers. Eventually, Turner and Müller (2003) [13] conclude that the title "Project Manager" shall be restricted to individuals, possessing professional certificates for creating more confidence and trust to principals or sponsors, during the process of selecting competent project managers [13], [41]. Further studies suggest that competence is essential to achieve project success, but does not guarantee project success [13], [42]. Such studies partially align with the micro and macro perspective for project success of Lim and Mohamed (1999) [22] in that project management success does not necessarily translate into project success. Nevertheless, the competence of the project manager plays a vital role in choosing the right tools and techniques to deliver the necessary project life cycle deliverables. According to Dvir *et al.* (2004) [43] "*Plans are nothing, changing plans is everything*". Certainly, it is unlikely to plan every activity exactly in the exact way it shall be accomplish. Project management practices need to cope with the ever-changing internal and external factors, influencing project success. Thus, it is important to appreciate the competence of the project manager. Turner and Müller (2003) [13] confirm this point, which leads to the conclusion that proper project management training is a predecessor to the top-ranked project success factors.

VI. LINK BETWEEN PROJECT MANAGEMENT AND PROJECT SUCCESS

Project management practices, in combination with several other factors, influence project success and not all project management tools and techniques are directly associated with project success. Nevertheless, even a thorough literature review could not identify any successfully completed project, without having utilized basic project management practices. Thus, many researchers [36]-[39] highlight that correctly applied tools and techniques may positively contribute to project success.

TABLE II: PROJECT SUCCESS FACTORS OF LITERATURE REVIEW

Source: compiled from Ashley *et al.* 1987 [47]; Nguyen *et al.* 2004 [32]; Rohaniyati 2009 [51]; Toor *et al.* 2008 [52].

Rank	Ashley <i>et al.</i> (1987)	Nguyen <i>et al.</i> (2004)	Rohaniyati (2009)	Toor <i>et al.</i> (2008)
1	Organisational planning effort	Competent project manager	Project manager's capabilities and experience	Effective project planning and control
2	Project manager goal commitment	Having adequate funding until project completion	Clarity of project scope and work definition	Sufficient resources
3	Team motivation and goal orientation	Multidisciplinary/competent project team	Organisational Planning	Clear and detailed written contract
4	Scope and work definition	The commitment to project	The use of a control systems	Clearly defined goals and priorities of all stakeholders
5	Project manager capability and experience	Availability of resources	Project manager's goal commitment	Competent project manager
6	Control system	Top management support	Project team motivation and goal orientation	Adequate communication among related parties
7	Safety	Awarding bids to the right designer/contractor	Safety precaution and applied procedures	Competent team members

The contemporary literature refers to project management practices, as the combination of concepts, processes, tools and techniques. Besner and Hobbs (2004) highlight the difference of applying tools and techniques, and using generic concepts and procedures with the metaphor “*An experienced cook can give details about his recipe, but it is really looking at him in the kitchen, using his tools...*” [48]. The metaphor illustrates the importance of correct implementation of generally available tools and techniques, rather than generic concept and procedures, which are partially also applicable in operational management.

Although, the traditional iron triangle seems outdated, it is still the broadly agreed measure for project management success. The arguments, whether the project product success influences project success are also associated with the macro and micro perspective. However, in the long run it is unlikely that a project is considered successful when the project's product encounters failure. Hence, product success is an essential part of project success [21]-[24]. Table II shows the ranking of project success factors appearing in the literature.

VII. RESEARCH METHODOLOGY

This research aimed for collecting hard facts. The literature review revealed interesting facts, supporting the conclusion that project management positively influences project success. A project may have individual sets of success criteria and factors. Thus, it is recommended initiating studies on a global scale, for identifying a possible generic set of project success parameters.

Quantitative data was collected in a survey via a web-based questionnaire, featuring 20 Questions sent to 142 selected project managers. Participants were selected based on their background, geographical location and their employment position. The quality of data received, by having more than 75% of the respondents occupying a managerial position, has achieved the aim of this survey. The questionnaire features closed and five point Likert scale questions in combination with matrix ratings, based on findings from the literature review.

For the framework, the following assumptions were made:

- Successfully delivered projects utilize tools and techniques of project management practices.
- Project failures have patterns related to methods adopted to the implementation of project management tools and techniques.
- Competent project managers have a strong command of project management tools and techniques, relevant to produce the project life cycle phase deliverables. Thus, properly trained project managers have influence on project success.

These assumptions are partially based on Turner and Müller (2003) [13] conclusions that the certification of project managers is essential for high performance. Nevertheless, different projects have different success criteria or success factors [28], [36], whereas recent research [46] revealed that different nationalities and cultures perceive project success differently.

VIII. ANALYSIS OF RESULTS — PROJECT SUCCESS

Findings from the survey show that 86.3% of the clients and 89.9% of contractors were satisfied with the work completed on projects. Considering that one-third of the surveyed project managers failed to keep their projects within the iron triangle shows that stakeholder satisfaction is perceived independently. Hence, this finding may indicate that project management success influences perceived project success. As at the time of the survey, the majority (78.4%) of the projects were still in execution – monitor and control phase, it is doubtful that the project product success influences the rating of the stakeholder satisfaction, a finding which contradicts the observation of previous researchers [21]-[23], who widely agree that project success is a combination of project management success and product success. Moreover, it appears that projects failing in traditional measures may still satisfy stakeholders.

Most interestingly, 42.9% of unsatisfied stakeholders are reporting their project being on time, 71.4% are within the budget and 28.6% deliver the project as per contract terms and conditions. Demonstrating the iron triangle of Atkinson does not necessarily fully serve as an appropriate success measurement. None of the unsatisfied stakeholders work for a client organisation, whereas 50% of the respondents work for a contractor. Although, the overall result illustrates projects with satisfied stakeholders, the above finding aligns with the reviewed project management literature. Nowadays, considering time, cost and quality, as primary success measures appears insufficient to assess the success of a project. Therefore, as already suggested in the literature, additional parameters shall also be considered for evaluating project success. The survey findings also show that the majority of projects respondents working on are within the planned time (66.7%), within the agreed budget (72.5%) and comply or exceed quality requirements (66.7%). The analysis unambiguously demonstrates that around two thirds of the surveyed projects operate within the iron triangle and achieved stakeholder satisfaction. These projects achieve the broadly agreed definition for project management success. In contrary, merely 47.8% of the respondents predict their project successful completion and only 19.6% of practitioners are confident in achieving project success. Based on the respondents' opinions, the adequate funding until project completion strongly influences the success of a project. However, market or industry fluctuations, on a global scale, may have influenced such rating. Nevertheless, it is apparent that even global changes may influence an individual project success, a finding that consolidates the micro and macro perspective of project success. Nonetheless, a project does not operate in a vacuum.

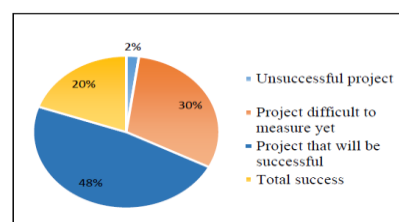


Fig. 1. Project success status.

A. Beyond Stakeholder Satisfaction

Fig. 2 shows that, 19.6% of respondents replied with

“Excellent quality – better than required.” Interestingly, 70% of these answers originate from Asia, mainly Singapore. Although Ashley *et al.* (1987) [47] emphasised that success is only achieved with delivering “*results much better than expected*” this does neither align with advanced quality management thinking, nor with good project management practices. Wang (2006) also highlights this phenomenon in his research earlier. Chinese stakeholders rate the importance of relationships over the iron triangle as a measurement for project success. Also Shenhar *et al.* (1997) [53] rank stakeholder satisfaction before time, cost and quality. Such practice may not be recommended by some professional institutions and be coined as “*gold plating*”. A project manager shall not deliver extras to customers and shall only deliver what is necessary to meet the project objectives. The response to this question would partially indicate that Asian stakeholders attempt to foster relationships by going beyond the contractual agreed obligations. Nevertheless, 47.1% of the participants deliver their projects as per contract terms and condition (see Fig. 2).

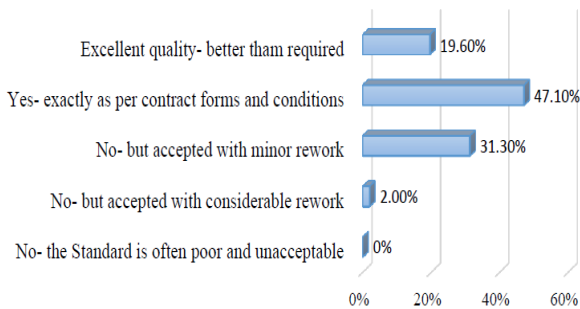


Fig. 2. Project quality standards compliance.

B. Project Manager Competence

Fig. 3 shows that Competence as a trait of project managers is the most important trait of a good project manager. This finding contradicts what Turner and Muller (2005) [49] who concluded that, there is no impact of the leadership style and competence of the project manager on project success.

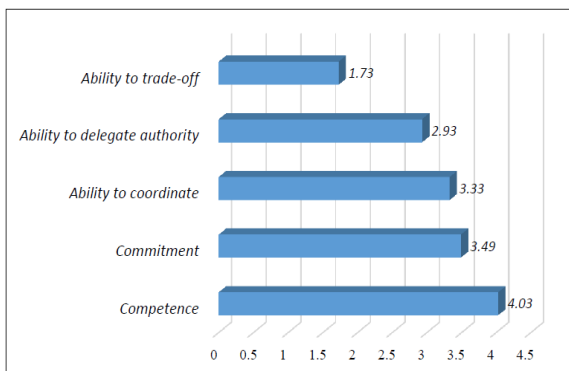


Fig. 3. Traits of project managers.

C. Project Management Traits

A competent project manager should have a proper training as well as a professional certificate [13]. Surprisingly, 60.9% of respondents stated that they do not have proper project management training, whereas only that

practitioners perceive that gaining competence can be professional certification process, which around 20% have an affiliation to a professional project management organisation. Such results indicate that practitioners perceive that gaining competence can be achieved without obtaining professional training or through professional certification process, which contradicts the literature. More than three-quarters of participants occupy a manager position, wherein 22.2% of the respondents are senior project managers or project directors. The age range of the participants is between 25 and 65 years, where the majority of participants (55.6%) have a bachelor’s degree or higher, with only one-third of practitioners having less than five-year project management experience. Nevertheless, the affiliation to internationally recognised Project Management organizations reveals that most of the respondents do not have any recognized project management training. Therefore, based on the collected data one may conclude that specific project management training is not necessarily related to project success. The majority of participating project managers entered the project management profession through experience rather than through a professional certification process, a finding that contradicts Turner and Müller’s position in that the title “Project Manager” shall be restricted to individuals, having obtained professional certificates [13].

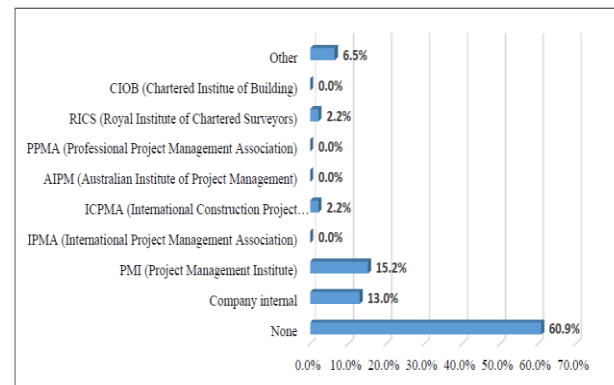


Fig. 4. Professional affiliations.

D. Utilisation of Tools and Techniques

The ranking of tools and techniques in the literature broadly agreed that project success factors show certain similarities to the ranking of this survey. Effective project planning and control achieved a rating of 4.78 out of 5, whereas respondents rank a competent project manager within the top eight success factors, indicating that there could be a universal set of factors leading projects to success, see Fig. 5.

Evidently, this finding contradicts with the observations of Dvir *et al.* (1998) [28] and Liu (1999) [29], as they argue that individual projects may have individual success factors [28], [29]. The majority (78.4%) of the surveyed projects are in the execution, monitor and control phase, which may have limited the responses to tools and techniques only applicable for this project phase. Nevertheless, 9.8% of the respondents, perceiving effective project planning and control as most important, also rate Earned Value Analysis (EVA) as very important, whereas 19.5% report that they rarely use EVA, representing a conflict, see Fig. 6. EVA is

an essential tool for performance measurement and control of projects [50]. Most interestingly, 16.7% do not use and 16.7% rarely use a work breakdown structure (WBS). These, in sum 33.4% of participants, rate effective project planning and control as the most important factor leading to project success, representing another contradiction in that the WBS is of utmost important for performing project planning and control. Moreover, the respondents rank clear objectives and scope only on sixth rank of the project success factors. A finding which partially aligns with the responses of EVA and WBS in that it appears that contemporary project practitioners perceive project planning and control as independent tool and technique, rather than integrated concept, leading to the assumption that practitioners do not fully appreciate project management tools and techniques, indicating a lack of professional training of the surveyed practitioners.

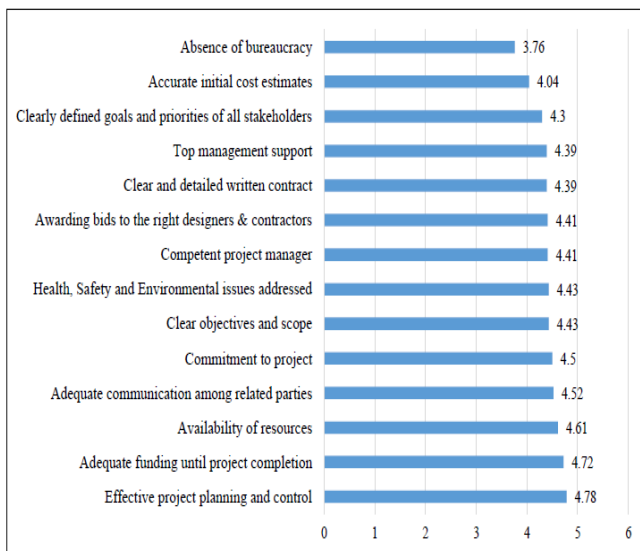


Fig. 5. Project success factors from data.

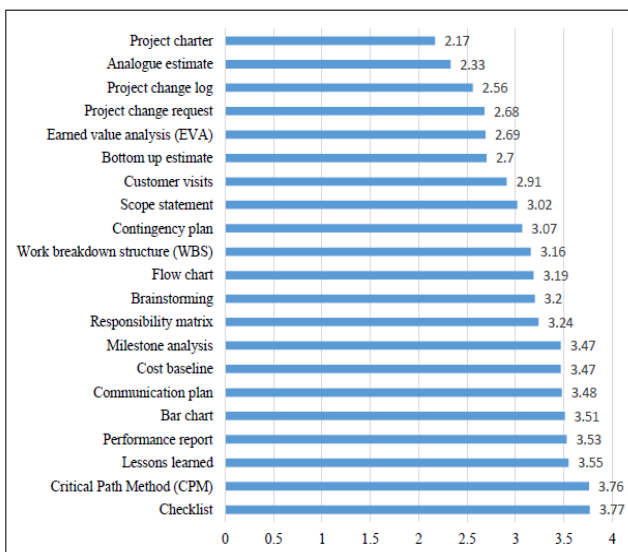


Fig. 6. Use of project management tools and techniques.

IX. CONCLUSION

There is a strong correlation between project management success and successful projects. Although, the traditional

cost, time and quality criteria remain as the preferred method to measure projects' success it does not guarantee stakeholders' satisfaction.

Project success is a perceived measure, irrespective of the individual success criteria and factors. None of the surveyed projects indicate the achievement of project success, without utilizing project management tools and techniques.

There exists a universal set of project success measures, applicable to all projects in the construction industry. This is due to the fact that information collected originates from projects scattered over ten nations. The data features significant similarities representing a new insight whereas, the literature suggests that individual projects have project specific success measures.

Although, data indicates that the project practitioners do not utilize project management tools and techniques perfectly, the vast majority of project managers implement project management methodologies.

Project management practices and techniques are widely used in successful projects and therefore, project management positively influences project success. The majority of surveyed projects are successful.

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