A Revaluation Of The Criticality Of The Project Manager To The Project's Success

Jeferson Carvalho Alvarenga[1], Robson Rosa Branco[2], André Bittencourt do Valle[3], Carlos Alberto Pereira Soares[4] and Wainer da Silveira e Silva[5]

Abstract

This paper aims to evaluate the relevance of the project manager to the project's success from the point of view of professionals connected to project management. The project management literature affirms, in a general manner, the importance of the project manager and many researchers presuppose his relevance to the project's success in such way that it can be considered common sense. However, over the last few decades, the project manager and his leadership were omitted in most of the quantitative researches on critical success factors, showing a direct contrast with theoretical and qualitative researches. A survey was applied with 740 project management professionals who evaluated the relevance of 35 critical success factors to a project's success (the factors were obtained through wide literature review). The data was analyzed using parametric procedures and the Pareto Principle was adopted in stratification to distinguish the most critical success factors. The data highlights the project manager as a Project Hypercritical Success Factor, highly relevant to a project's success. The data analyzed confirms the theoretical presumption of project manager relevance to success and reinforce the perception of researchers that project management is shifting to encompass a more human, social and cultural perspective. Project managers will need to demonstrate solid competency as managers and leaders. To achieve this result, their education and training will require a balance between soft and hard skills of project management and the project managers must be aware of their increasing recognition and the responsibility and weight that will follow.

INTRODUCTION

Project Management has been consolidated as an essential tool in order to increase success chances in rapid changing market environments. Indeed, Project Management major objective is to increase the probabilities of a project's success and that is why "project success" has been such a relevant topic for researchers and practitioners over the last few decades. Besides that, it has often been asked, what is the relevance of project managers to project success as a whole?

Project success has been a dominant theme in research over the last few decades (Ika, 2009; McLeod & Doolin, 2012; Williams, 2015). The research on project success split on main branches, being them the success criteria researches (Lim & Mohamed, 1999; Westerveld, 2003; Cserháti & Szabó, 2014) and the critical success factors researches (Andersen, Birchall & Jessen, 2006; Cleland & King, 1983; Pinto & Slevin, 1987; Baker, Murphy & Fisher, 1988; Pinto & Covin, 1989; Pinto & Mantel, 1990; Cooke-Davies, 2002; Ika,2009; McLeod & Doolin,2012; Serrador & Turner, 2015).

However, the critical success factors research raised a controversial issue about the project manager criticality to project success. The present research follows the traditional definition of the project manager

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[1] *Graduate Programme in Civil Engineering, Fluminense Federal University, Brazil.*
E-mail: jeferson.c.alvarenga@gmail.com
[2] *Graduate Programme in Civil Engineering, Fluminense Federal University, Brazil.*
E-mail: robson.branco@gmail.com.
[3] *Graduate Programme in Civil Engineering, Fluminense Federal University, Brazil.*
E-mail: abvalle@gmail.com.
[4] Graduate Programme in Civil Engineering, Fluminense Federal University, Brazil.
E-mail: carlossoares.uff@gmail.com.
[5] Graduate Programme in Civil Engineering, Fluminense Federal University, Brazil.
E-mail: wainer_uff@yahoo.com.

as "the person assigned by the performing organization to lead the team that is responsible for achieving the project objectives" (PMI, 2013, p.16).

By the theoretical literature as well as by common sense, the project manager, with his leadership and competencies, plays a very important role to project success. Nevertheless, the empirical data of the quantitative researches over the last decades indicated results on the opposite way: the project manager rarely appears on the results of critical success factors in quantitative researches (Turner & Müller, 2005; Geoghehan & Dulewicz, 2008; Turner, Müller & Dulewicz, 2009).

Today, more than a decade after the publication of the seminal article of Rodney Turner and Ralf Müller (2005) that brilliantly demonstrated the project manager omission, we return to this polemic topic. Thus, based on a survey among 740 project actors to whom were submitted critical success factors obtained by literature review, this paper aims to investigate the project manager relevance to project success.

In the next section the literature on critical success factors is revisited. After, the research methodology used in data collection and analysis is described and subsequently the results and findings are presented and discussed. Finally, the article concludes with the theoretical and practical implications of the findings and future research suggestions.

THEORETICAL BACKGROUND

Project success research intensified in the early 60s and revealed that some project factors were more critical than others to final project success. These factors became known as "Critical Success Factors" (CSF): the factors with the highest impact on project's success or failure (Belassi & Tukel, 1996, p.141; Cooke-Davies, 2002, p.185; Kerzner, 2009a, p.62). In other words, CSF's "either facilitate or impede project success" (Lim & Mohamed, 1999, p.243).

The polemic around the project manager's relevance to success begins in the late 60s, with the empirical study of Rubin and Seeling (1967) on project success. The researchers initiated the investigation with the presumption that the project manager would have a direct impact on the project final performance (Rubin & Seeling, 1967, p.131). Nonetheless, after analyzing the data collected from 40 managers of large projects, the authors reached a polemic conclusion: "Years total experience bears no direct relationship to technical performance" (Rubin & Seeling, 1967, p.133). The conclusion was project manager exhibited no relevant impact to project performance as a whole.

This research was followed by Avots theoretical study in 1969. In his study, Avots (1969, p.77) tries to identify project failure reasons and concluded that the appointment of an ineffective manager would be among the reasons to project failure. The theoretical study of Avots affirmed the relevance of project manager to project success.

Apparently, the contrast between these two researches became a paradigm: the subsequent studies will show the propensity to exhibit similar results, since on the one hand conceptual and theoretical approaches emphasize project manager as a CSF, and on the other hand, quantitative and empirical researches tend to challenge this perspective.

The following decades witnessed numerous researches on CSF and the results of most of them omit the project manager as a CSF. This can be noted clearly at the researches of Cleland and King (1983), Locke (1984), Morris and Hough (1987), Baker, Murphy and Fisher (1988). A case that can be considered emblematic among classical works is Pinto and Covin's research at the end of the 1980s. They distributed questionnaires to 586 PMI members and received 508 answered ones. The objective was that project managers could point out the critical success factors on each phase of construction projects and R&D projects. A previous list of factors was made available by the authors, in which project manager and his competence and authority were present at item 11 (Pinto & Covin, 1989, p.52). Results demonstrated that the respondents did not evaluate the project manager, his leadership, competence and authority as a critical success factor in any stage of both types of project (Pinto & Covin, 1989, p.57).

This pattern is repeated in other researches made in the 80s, in such a way that Turner and Müller (2005, p.56) conclude that "the 1980s was a period of intense research into project success factors, with many authors producing lists of project success factors. Seldom does the project manager, his or her leadership style or competence appear overtly in these lists as a critical success factor on projects".

The 1990s and the first years of the 21st century showed the same pattern (Pinto & Mantel, 1990), including CSF researches on construction field (Inayat, Melhem & Esmaely, 2015; Hwang & Lim 2013; Tabish & Jha, 2012; Li et al, 2011; Yang et al, 2010) with rare exceptions (Chua, Kog & Loh, 1999; Belassi & Tukel, 1996).

After 2000, the omission of the project manager, their leadership and even their team at the largest of CSF lists became crystal clear, which started to concern project management researchers and practitioners. Project Management Institute commissioned researchers Turner and Müller to investigate the project manager leadership impact on project success. As they researched this issue, they found out the project manager omission on CSF research: "in reviewing the literature on project success factors, we found it largely ignores the project manager, and his or her leadership style and competence" (Turner & Müller, 2005, p.49).

Turner and Müller concluded that in the last few decades of CSF research the project manager and his leadership had been practically ignored in most publications and researches on critical success factors. They point out that "this is in direct contrast to the general management literature, which considers effective leadership a success factor in organizations" (Turner & Müller, 2005, p.49).

The researchers Geoghehan and Dulewicz (2008) published very similar conclusions in 2008, affirming that "no explicit reference is made to the leadership characteristics of project managers and their influence on success […] Interestingly, project manager leadership or even management skills are not mentioned as success factors" (Geoghehan & Dulewicz, 2008, p.60).

The results of most of these researches emphasized the hard side of project management, with very little focus on the human, relational and teamwork side. The research of Cooke-Davies (2002) followed the same hard side pattern, with 12 hard side CSF's as result. Cooke-Davies (2002, p.189) affirmed: "It may appear curious that none of these 12 critical success factors is directly concerned with 'human factors'". Finally, the author called it a "strange omission" (Cooke-Davies, 2002, p.189).

The project manager omission is a very important topic because at the last few decades many researchers investigated project success assuming the presumption that the project manager is relevant to project success. A remarkable example are investigations about project managers' competences and success (Chipulu, Neoh, Ojiako, & Williams, 2013; Dainty, Cheng, & Moore, 2005; Geoghegan & Dulewicz, 2008; Müller & Turner, 2010).

Other examples include researchers that affirm the relevance of project manager role to project success (Loufrani-Fedida & Missonier, 2015; Heijde & Van Der Heijdenl, 2006; Chipulu et al, 2013; Hanna et al, 2016; Ruuska & Vartiainen, 2003; Zhang, Zuo & Zillante, 2013; González-Marcos, Alba-Elías and Ordieres-Meré; 2016).

Besides these, others investigate the relation between the project manager leadership and success, always assuming the project manager relevance to project success (Turner, Müller & Dulewicz, 2009; Geoghehan & Dulewicz, 2008; Müller & Turner, 2010; Müller, Geraldi & Turner, 2012).

These are just some examples of the wide fact that many researchers begin from presumption of the importance of project manager to project success or finish reaching this conclusion. Turner, Müller and Dulewicz (2009, p.199) highlight this paradox affirming that "leadership appears consistently in the highest ranking category amongst project manager competency factors, it is not recognized in the highest ranking category for project success factors", in such way that "the project manager's leadership style is generally ignored when identifying project success factors" (Turner, Müller & Dulewicz, 2009, p.199).

Turner and Müller considered possible causes to this fact formulating hypotheses that attempted to explain the omission of the project manager in research studies. The third hypothesis is there is something about the nature of the project itself and about its project teamwork that makes the project manager less critical to project success (Turner & Müller, 2005, p.57) and the sixth hypothesis is the possibility of the unimportance of the project manager leadership, which would not impact the project success at all (Turner & Müller, 2005, p.59).

Nowadays, decades after researches on critical success factors that omitted project manager and more than a decade after the publication of Turner and Müller (2005), there has been significant changes in project management scenario: the growing complexity of projects, more and more organizations

operating by projects, a more competitive and globalized environment. Furthermore, the last decades saw the impact of the institutions of project management that exercised a crucial role in the establishment of guidelines, standards, processes and certifications.

Amidst these entities, there can be mentioned the International Project Management Association (IPMA), founded in 1965, the Project Management Institute (PMI), founded in 1969, as well as other institutes such as OGC (Office of Government Commerce) and Australian Institute of Project Management (AIPM). It is really important to emphasize that many of the researches previously quoted had their papers published in the 80s and the 90s while the first PMP certification granted by PMI was in the late 80s.

After more than a decade after the publication of Turner and Müller, the "strange omission" of the project manager at the quantitative researches raised difficult questions: many researchers rely on the presumption of project manager relevance to project success, but would project managers do not agree with that? Is it possible that the audience of these researches – the project managers themselves – do not believe in this presumption? Is it possible that projects have a different nature, in such way that project manager has no relevance to project success, as hypothesized Turner and Müller? Would the theoretical perceptions and common sense be wrong? Would it be necessary to revisit the entire theoretical basis about the importance of the project manager to project success? Or were the research methodologies and collecting data instrument creating biased results?

Considering the time interval from previous researches, what would be the project manager evaluation as a critical success factor in a new quantitative research among project management actors? Would the project manager be once again unconsidered and omitted from data and the final results of this kind of research? What would be the scenario about the criticality of the project manager in a quantitative research?

Therefore, the present research aims reevaluate the project manager relevance to project success and its theoretical and practical implications.

RESEARCH METHODOLOGY
Critical Success Factors Determination

We adopted a strategy of developing a collection data instrument representing a traditional universe of critical success factors at the last few decades and to include the project manager among them in order to accomplish the objectives of the study. Considering that researches on critical success factors evolved at the last few decades (Judgev & Müller, 2005), it was a challenge develop a collection data instrument that represent all these researches and we used six steps to achieve this objective.

The first step was to make a wide bibliographical review. Thus, 19 critical success factors lists (Appendix 1) on project management since 1980s until recently have been chosen considering the following criteria: completeness, coherency, impact and authority (Andersen et al, 2006; Baker et al, 1988; Belout & Gavreau, 2004; Camilleri, 2011; Cicmil, 1997; Cleland & King, 1983; Clarke, 1999; Cooke-Davies, 2002; Cserháti & Szabó, 2014; Dvir, Lipovetsky, Shenrar, & Tisheler, 1998; Kerzner, 2009a; Kerzner, 2009b; Locke, 1984; Morris & Hough, 1987; Pinto & Covin, 1989; Pinto & Mantel, 1990; Pinto & Slevin, 1987; Turner, 2009; Westerveld, 2003).

The second step was to analyze the critical success factors using concepts of Content Analysis Method (Krippendorff, 2004), in special semantics and hermeneutics (Holsti, 1969) to interpret the meaning of each critical success factor in the context (Nachmias & Nachmias, 1976).

The third step was comparing and cross-checking the critical success factors lists considering their meaning, consolidating all of them in one list with 72 critical success factors (Appendix 2).

The fourth step was to define the construct, that can be classified as reflective, formative and mixed (Jarvis, Mackenzie, & Podsakoff, 2003; Petter, Straub, & Rai, 2007; Straub, 1989). The construct was classified as mixed according the four rules of Jarvis, Mackenzie, and Podsakoff (2003) reaffirmed by Petter, Straub, and Rai (2007).

The fifth step was to reduce the number of critical success factors, allowing the respondent focus on a smaller scope of critical success factors in order to raise respondents' concentration and consequently the quality of responses (Straub, 1989). The construct is mixed, so that "individual measures can be removed

to improve construct validity without affecting contenting validity" (Petter, Straub, & Rai, 2007, p.626). The criteria adopted was focus in the competences that exhibited larger bibliographical support, following technical and academic procedure used in similar researches (Hwang & Lim, 2013; Shen, Wu & Zhang, 2010). From the cross-checked list of 72 factors, 37 factors were quoted by one single author, most of them referring to models used by these authors and none of these factors had been a result of quantitative research. These factors were discarded, resulting in 35 critical success factors.

The sixth step was evaluate content validity through expert judges (Straub, Boudreau, & Gefen, 2004, p.387). The method used to check content validity was Lawshes'Coefficient (Lawshe, 1975). Nine experts were selected according the following criteria: senior experience on project management and master or doctorate degree on project management related fields of knowledge related to project management. Experts evaluated each critical success factor as "essential", "useful, but not essential" or "not necessary" to project success. Ayre and Scally (2014, p.82) recalculated original CVR Critical and the N Critical as proposed by Lawshe. According Ayre and Scally the minimal number of expert that evaluate each item as essential when there is 9 experts must be 8. All the critical success factors were evaluated as essential by all experts and were used in data instrument collection (Table 1).

Table 1. Critical Success Factors

1. Align Projects with Business Plans	19. Politics
2. Breaking the Project into Subprojects	20. Progress meetings
3. Budget management	21. Project commitment
4. Client acceptance	22. Project Manager
5. Client consultation	23. Project Monitoring
6. Communication	24. Project objectives
7. Contract management	25. Project Planning
8. Definition of technical specifications	26. Project Team
9. Environment effects	27. Resource Allocation
10. Estimate Realistically	28. Risk Management
11. Feedback capabilities	29. Schedule Duration
12. Financial support	30. Stakeholder Management
13. Legal problems	31. Success Criteria
14. Management policy	32. Technical tasks
15. Operational Concept	33. Top management support
16. Organizational environment	34. Troubleshooting
17. Organizational learning	35. Urgency
18. Personnel selection	

Data collection instrument

Data collection run for 8 weeks and respondents were requested to rate the critical success factors according to a five-point Likert scale, ranging from scarcely relevant to extremely relevant (Clason & Dormody, 1994; Likert, 1932, p.14).

The critical success factors were presented to respondents at random to respondents to prevent them from being biased by the order of the factors and were not grouped in any hierarchical model (Gudienė, Banaitis, Podvezko, & Banaitienė, 2014; Hwang & Lim, 2013; Kog & Loh, 2012).

The tool used to prepare and send the survey was the online survey from Google Forms (Web Access <<http://www.google.com/forms>>), which shuffles the sequence of factors, so that each respondent could receive a customized sequence to evaluate.

To estimate data instrument collection and respondents reliability was used Cronbach's Alpha (Cronbach, 1951).

Data analysis

The statistical tests on the Likert scale were performed using SPSS Software 24.0 (IBM, 2016). It was adopted the Pareto Principle in stratification to distinguish the most critical success factors. Pareto Principle, also known as 80/20 rule (Koch, 1998), has been used in critical success factors researches (Talib, Hamid & Thoo, 2015; Fotopoulos, Kafetzopoulos & Gotzamani, 2011). The Pareto Principle was applied in results "differentiating between the 'vital CSF' and the 'useful many CSF'" (Talib, Hamid & Thoo, 2015, p.256). Adopting Pareto Principle 20% top critical success factors were considered hypercritical to project success (Bahia, 2009, p.132).

RESULTS

Altogether 740 professionals in the project management field completed the survey. The first part of the survey is demographic. Figure 1 summarizes the different position of respondents and figure 2 summarizes the length of experience of respondents in different areas of project management. This research made the option of not focus only on project managers, similar to other studies (Chua et al, 1999; Hwang & Lim, 2013), intending to include the widest range of project actors possible.
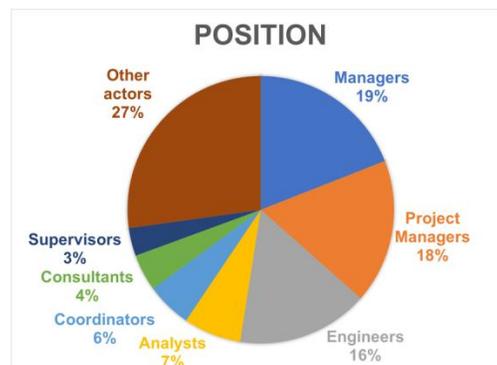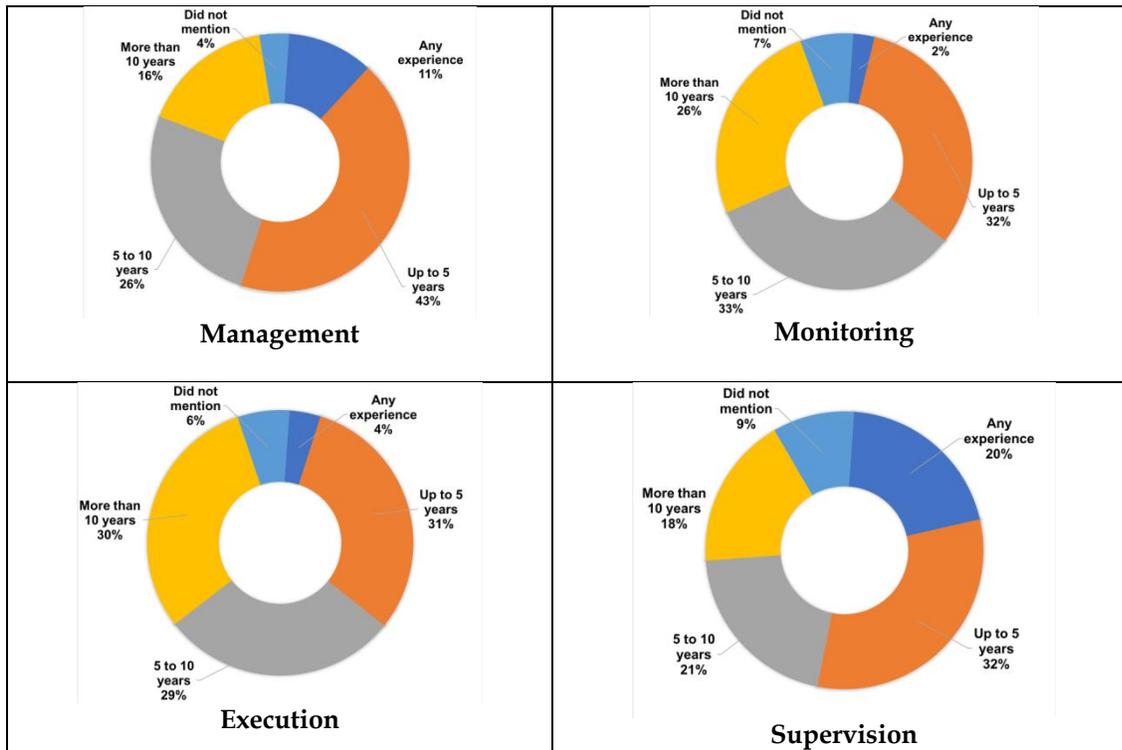
Figure 1. Position

Figure 2. Length of Experience

Management

Monitoring

Execution

Supervision

Cronbach's Alpha reached the value of 0.9125, which is high. This high Cronbach's Alpha value is compatible with the large number of respondents and the number of questions, added to the high level of variance of respondents. Thus, all the critical success factors and all respondents were used in the research sequence.

Table 2 shows critical success factors ranked by results generated by statistical tests on the Likert scale. It is important to remember that the objective of the present research is not developing a new list of critical success factors, but to investigate what would be the evaluation of project manager compared to a traditional universe of critical success factors.

Table 2. Hypercritical and Critical Success Factors Importance

Hypercritical	Mean	SD
1. Communication	4,542	0,691
2. Project Planning	4,538	0,647
3. Top Management Support	4,446	0,724
4. Project Commitment	4,444	0,662
5. Client Acceptance	4,423	0,759
6. Project Manager	4,343	0,748
7. Project Objectives	4,276	0,791
Critical	Mean	SD
8. Project Monitoring	4,259	0,725
9. Project Team Members	4,239	0,718
10. Align Project Plans with Business Plans	4,149	0,827

11. Budget Management	4,140	0,788
12. Risk Management	4,108	0,808
13. Troubleshooting	4,071	0,764
14. Stakeholder Management	4,063	0,822
15. Financial Support	4,034	0,792
16. Definition of Technical and Operational Specifications	4,028	0,829
17. Personnel Selection	3,966	0,814
18. Resource Allocation	3,930	0,768
19. Client Consultation	3,913	0,878
20. Estimate Realistically	3,906	0,817
21. Contract Management	3,810	0,821
22. Legal Problems	3,763	0,936
23. Feedback Capabilities	3,757	0,847
24. Management Policy	3,661	0,859
25. Organizational Environment	3,645	0,830
26. Success Criteria	3,637	0,857
27. Schedule Duration	3,562	1,001
28. Progress Meetings	3,554	0,828
29. Technical Tasks	3,465	0,806
30. Organizational Learning	3,450	0,860
31. Urgency	3,419	0,963
32. Politics	3,316	0,899
33. Operational Concept	3,304	0,805
34. Environment Effects	3,261	0,909
35. Breaking the Project into Subprojects	3,172	0,909

Considering the Pareto Principle, the hypercritical success factors according the respondents are Communication, Project Planning, Top Management Support, Project Commitment, Client Acceptance, Project Manager and Project Objectives.

According the respondents, the project manager was evaluated as the sixth most hypercritical amongst seven hypercritical success factors: 49,5% of the respondents evaluated the project manager as being very much relevant to project success; 37,2% evaluated it as being very relevant; 12,2% evaluated the project manager relevant to the project success; 1,0% of the respondents affirmed the project manager is little relevant and just 0,1% marked the "very little relevant" option. Virtually, one in two respondents evaluated the project manager as being very much relevant to project success. Therefore, the results demonstrate that the project manager is a hypercritical success factor in the view of respondents that collaborated with the survey.

Looking back to the questions raised by present research at its beginning, it is possible affirm that results do not confirm Turner and Müller hypothesis – there is something about the nature of the project itself and about its project teamwork that makes the project manager less critical to project success (Turner & Müller, 2005, p.57) and the possibility of the unimportance of the project manager leadership, which would not impact the project success at all (Turner & Müller, 2005, p.59).

DISCUSSION

The research highlights two theoretical implications of the findings. First, results present solid quantitative data supporting the presumption that the project manager has a direct impact on the project final performance of project. Thus, data confirm theoretical presumption of project manager relevance to success that is in core of many researches and was not confirmed by earlier researches cited above in

literature review. Considering the trend of opposition between qualitative and quantitative approaches on this matter, present research is relevant to reconcile them and dissolve the paradox of ignored project manager (Turner, Müller & Dulewicz, 2009).

Second, the present investigation results may be evidence of a wider theoretical paradigm shift on project management. Lundy and Morin (2013) have pointed out that project management seems to have turned captive by his technical origin: "Seemingly prisoner of its dominant being ontology, much of the project management research and practice has not readily considered the 'soft', human side of organizational change". As a result authors identify that project management has exhibited a historical bias toward techniques, tools and processes (Leybourn, 2006; Ahadzie, Proverbs & Olomolaiye, 2008; Pant & Baroudi, 2008). However, Gemünden (2015, p.3) affirmed that "the optimistic variant of future scenario says that project management will be […] more humane". The fact of four hypercritical success factors (Communication, Project Commitment, Client Acceptance and Project Manager) being related to soft side of project management is a very important evidence that project management still moving gradually to encompass a more humane, social and cultural perspective, closing a historical gap (Gale & Brown, 2003).

The research also highlights three practical implications. First, more and more project managers will need exhibit solid competency as managers and leaders. As the world becomes more aware of project manager relevance to project success, the demand for competent project managers grows accordingly (Fisher, 2011; Pant & Baroudi, 2008). However, many authors suggest that the project manager role itself is changing: "The role of the project manager evolves from being the administrator of the project toward a much more managerial and leadership position, to fulfilling an organizational strategic need" (Ahsan, Ho & Khan, 2013, p.37). Baumotte *et al* (2013, p.42,43) affirm that the role of project manager has changed significantly over the last decades: the project manager must exhibit a remarkable combination of hard skills and soft skills in order to manage and lead effectively. Thamhain (2004, p.539) states: "No longer will technical expertise or good leadership alone be sufficient, but excellence across a broad range of skills and sophisticated organizational support is required to manage project teams effectively".

This leads us to the second practical implication: there is a need of more balance between soft and hard side of project management in project managers' education and training. Pant and Baroudi (2008, p.124) affirm that "most employers today expect workers to demonstrate and excel in many 'softer' skills". Next, authors demonstrated how project management education need to change to encompass this trend: "A more balanced approach between hard and soft concepts would see them complementing each other and enhancing project management education in the process" (Pant & Baroudi, 2008, p.127).

It is possible to develop many leadership competences through strategic, focused and intentional training (Geoghegan & Dulewicz, 2008, p.65). It means that corporations should envision project managers training, in order to fill in the soft skills' gap, embracing the managerial and technical expertise of their project managers and helping them develop communication, leadership, negotiation, team development, motivation and other soft skills.

Soft skills involve issues which are at many times intangible, such as leadership, vision, motivation, commitment, values, interpersonal relationships, ethics and others. However, it's important to stress on soft skills focused training and development to project managers. Concluding an article about the relation between project leadership, team composition and project performance, researchers affirm "any project leader can improve on his natural leadership style by undergoing leadership training" (Odusami, Iyagba & Omirin, 2003, p.526).

The last practical implication is project managers must be aware of their increasing recognition and the responsibility and weight that it follows, caring themselves in order to maintain mental and emotional health under the pressure to always lead projects to success. The numbers of project failures testify that failure is as usual as success (Frank, Sadeh & Ashkenasi, 2011). Ika (2009, p.6) shows that "despite such scientific activity and the tireless efforts of practitioners, projects' results continue to disappoint stakeholders". Frank, Sadeh and Ashkenasi (2011,p. 31), quoting previous researches, affirm that one main cause of project failure is "poor project management and leadership". Project managers know that the recognition of their criticality to project success has two sides: the honor of appreciation and the responsibility of duty, the weight of high expectations.

Project managers must deal with these elements in appropriate manner, managing stress and keeping emotional health, taking care of themselves to remain stable and sober while handle the pressure for success and victory, particularly when they don't come. The capacity of face the failure in a healthy way and rebuild the self-esteem are important skills in a profession that walks in the thinner line between success and failure all the time.

CONCLUSIONS

Over the last few decades the project manager and his leadership were omitted in most of the quantitative researches on critical success factors. This fact is in direct contrast with theoretical and qualitative researches and reveal a remarkable paradox: many researches rely at the presumption of project manager relevance to project success and yet this presumption was not confirmed by many researches on critical success factors.

Many of these researches that omitted the project manager were published in the 80s and the 90s and now, many decades after these researches, there has been significant changes in project management scenario. Thus, the objective of the present research was to investigate what would be nowadays the evaluation of project manager amongst other critical success factors. Results affirm that the project manager is a hypercritical success factor, vital to project success.

The result of research exhibit a contrast with previous seminal researches: the project manager, omitted in many previous researches, appears now as a hypercritical success factor. Future researches could thoroughly investigate possible explanations of this difference, through a multidisciplinary perspective in the attempt to construct possible explanations to this scenario change and perceive applicable implications.

Appendix 1.

Authors	Critical Success Factors
Andersen et al (2006)	Rich project communications, Stakeholder endorsement of project plans, Well structured and formal project approach, Strong project commitment, Early stakeholder influence, Well understood and accepted project purpose, Clear project constraints, Project execution flexibility and Influence over on-going project processes
Baker, Murphy and Fisher (1988)	Clear goals, Goal commitment of project team, On site project manager, Adequate funding to completion, Adequate project team capability, Accurate initial cost estimates, Minimum star-up difficulties, Planning and control techniques, Task orientation (vs. Social Orientation) and Absence of bureaucracy
Belout and Gavreau (2004)	Project Mission, Management support, Project schedule, Client acceptance, Personnel, Technical tasks, Communication, Monitoring, Trouble-shooting and Client consultation
Camilleri, (2011)[6]	Project Strategic Fit, Project Scope, Project Organization Structure, Project Team Structure, Project Planning and Control, Management and Leadership, Employee Commitment and Participation, Internal and External Communication, Information Flow and Knowledge Management, Project Risk Management, Project Competency Development
Cicmil (1997)	Understanding and identification of the client/customer/end-user needs, Specification of project requirements and project constraints, Organizational behaviour factors (structure, functions, performance, etc), Wide view in the process of project planning and project implementation, Monitoring and control during the project implementation phase and Measurement and assessment of project progress against the plan

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[6] The author actually elaborates these critical factors as macro concepts or categories within which allocates a series of critical factors listed by several authors. For the purpose of the work, only the macro factors were used.

Cleland and King (1983)	Project Summary, Operational Concept, Top management support, Financial support, Logistic requirements, Facility support, Market intelligence, Project schedule, Executive development and training, Manpower and organization, Acquisition, Information and communication channels and Project review
Clarke (1999)	Communication throughout the project, Clear objectives and scope, Breaking the project into sub-projects or work packages, Using project plans as working documents.
Cooke-Davies (2002)	Adequacy of company-wide education on the concepts of risk management, Maturity of an organisation's processes for assigning ownership of risks, Adequacy with which a visible risk register is maintained, Adequacy of an up-to-date risk management plan, Adequacy of documentation of organizational responsibilities on the project, Keep project (or project stage duration) as far below 3 years as possible (1 year is better), Allow changes to scope only through a mature scope change control process, Maintain the integrity of the performance measurement baseline, The existence of an effective benefits delivery and management process that involves the mutual co-operation of project management and line management functions, Portfolio- and programme management matched to the corporate strategy and business objectives, A suite of project, programme and portfolio metrics that provides direct ''line of sight'', Feedback on current project performance and An effective means of ''learning from experience'' on projects, that combines explicit knowledge with tacit knowledge
Cserháti E Szabó (2014)[7]	Elaboration of objective structure, Elaboration of task structure, Improvement of project plans, Definition of scope and responsibilities, Selection of contractors, Control of contractors, Responsibility sharing in sub-contracts, Financial conditions in sub-contracts, Competence and skills of project leader, Competence and skills of team members, Commitment of project team, Communication within the project team, Information sharing within the project team, Support of teamwork, Support of individual efforts, Organisational learning, Communication with project owner, users, contractors and sponsors and Partnerships with local and national stakeholders
Dvir *et al* (1998)	Definition of operational need, Urgency of need, Alternative solutions, Definition of technical and operational specifications, Pre-contract activities, Customer follow-up team, Project preparations and design policy, Technological infrastructure and design methods, Management policy, Technological infrastructure, Prototypes, Number of design cycles, Design freeze timing, Design considerations, Project milestones, Project control, Effectiveness of project control, Budget management, Discussions and reports, Organizational environment, Manager style, Communication style, Flexibility in management, Delegation of authority, Organizational learning, Team characteristics and Manager qualifications
Kerzner (2009)	Time management, Cost Management, Quality limits, Acceptance by the customer, Follow-on work from this customer, Using the customer's name as a reference on your literature, Commercialization of a product, With minimum or mutually agreed upon scope changes, Without disturbing the main flow of work, Without changing the corporate culture, Without violating safety requirements, Providing efficiency and effectiveness of operations, Satisfying OSHA/EPA requirements, Maintaining ethical conduct, Providing a strategic alignment, Maintaining a corporate reputation and Maintaining regulatory agency relations
Lock (1984)	Make project commitments known, Project authority from the top, Appoint competent project manager, Set up communications and procedures, Set up control

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[7] The author cites these critical factors inside of macro concepts: Project Management Processes, Project Resources, Project Team, Organisational Culture e Communication and Co-operation.

	mechanism and Progress meetings
Morris and Hough (1987)	Project objectives, Technical uncertainty, Innovation, Politics, Community involvement, Schedule duration, Urgency, Financial contract, Legal problems and Implement problems
Pinto and Slevin (1987)	Clearly defined goals, Competent project manager, Top management support, Competent project team members, Sufficient resource allocation, Adequate communication channels, Control mechanisms, Feedback capabilities and Responsiveness to clients
Pinto and Govin (1989)	Mission, Top management support, Project schedule, Client consultation, Personnel, Technical tasks, Client acceptance, Monitoring and feedback, Communication, Trouble-shooting, Characteristics of the project team leader, Power and politics, Environment effects and Urgency
Pinto e Mantel (1990)	Top Management Support, Schedule/Plans, Client Consultation, Personnel, Technical Tasks, Client Acceptance, Monitoring & Feedback, Communication and Trouble-shooting
Turner (2009)	Align Project Plans with Business Plans, Define Procedures for Managing Projects, Communicate Priorities to the Parties Involved, Develop Project Plans Developed on Multiple Levels, Use Simple Planning Tools, Encourage Creativity, Estimate Realistically, Obtain Cooperation, Obtain Commitment of the Resource Providers, Ensure Resources are Available When Required, Define Management Responsibility, Ensure Good Communication, Differentiate between Technical Management and Project Management, Understand the Purpose of Control, Monitor Progress against the Plan, Hold Effective Review Meetings and Combine Responsibility with Authority
Westerveld (2003)	Leadership and Team, Policy and Strategy, Stakeholder management, Resources, Contracting, Project management, Success criteria and External factors

Appendix 2.

Critical Success Factors	Authors
Project Objectives	Cleland and King (1983), Morris and Hough (1987), Pinto and Slevin (1987), Baker, Murphy and Fisher (1988), Pinto and Govin (1989), Cicmil (1997), Clarke (1999), Cooke-Davies (2002), Belout and Gavreau (2004), Andersen et al (2006), Kerzner (2009), Camilleri (2011), Cserháti and Szabó (2014)
Operational concept	Cleland and King (1983), Lock (1984), Cicmil (1997), Dvir et al (1998), Kerzner (2009) Camilleri (2011), Cserháti and Szabó (2014)
Top management support	Cleland and King (1983), Pinto and Slevin (1987), Pinto and Govin (1989), Pinto and Mantel (1990), Belout and Gavreau (2004)
Financial support	Cleland and King (1983), Baker, Murphy and Fisher (1988), Turner (2009)
Logistic requirements	Cleland and King (1983)
Facility support	Cleland and King (1983)
Market intelligence	Cleland and King (1983)
Project Planing	Cleland and King (1983), Baker, Murphy and Fisher (1988), Pinto and Mantel (1990), Cicmil (1997), Dvir et al (1998), Clarke (1999), Belout and Gavreau (2004), Andersen et al (2006), Camilleri (2011), Cserháti and Szabó (2014)
Executive development and training	Cleland and King (1983)

Manpower and organization	Cleland and King (1983)
Acquisition	Cleland and King (1983)
Communication	Cleland and King (1983), Lock (1984), Pinto and Slevin (1987), Pinto and Govin (1989), Pinto and Mantel (1990), Dvir et al (1998), Clarke (1999), Belout and Gavreau (2004), Andersen et al (2006), Turner (2009), Camilleri (2011), Cserháti and Szabó (2014)
Project review	Cleland and King (1983)
Make project commitments known	Lock (1984)
Project authority from the top	Lock (1984)
Project manager	Lock (1984), Pinto and Slevin (1987), Baker, Murphy and Fisher (1988), Pinto and Govin (1989), Dvir et al (1998), Westerveld (2003), Camilleri (2011), Cserháti and Szabó (2014)
Project control	Lock (1984), Pinto and Slevin (1987), Baker, Murphy and Fisher (1988), Pinto and Govin (1989), Pinto and Mantel (1990), Cicmil (1997), Dvir et al (1998), Cooke-Davies (2002), Belout and Gavreau (2004), Turner (2009), Camilleri (2011)
Progress meetings	Lock (1984), Turner (2009)
Technical uncertainty	Morris and Hough (1987)
Inovation	Morris and Hough (1987)
Politics	Morris and Hough (1987), Pinto and Govin (1989), Westerveld (2003)
Community involvement	Morris and Hough (1987)
Project duration	Morris and Hough (1987), Cooke-Davies (2002)
Urgency	Morris and Hough (1987), Dvir et al (1998)
Contract management	Morris and Hough (1987), Westerveld (2003)
Legal problems	Morris and Hough (1987), Kerzner (2009)
Implementation problems	Morris and Hough (1987)
Project team	Pinto and Slevin (1987), Baker, Murphy and Fisher (1988), Baker, Murphy and Fisher (1988), Dvir et al (1998), Westerveld (2003), Camilleri (2011), Cserháti and Szabó (2014)
Resources allocation	Pinto and Slevin (1987), Westerveld (2003), Turner (2009)
Feedback capabilities	Pinto and Slevin (1987), Pinto and Govin (1989), Pinto and Mantel (1990), Dvir et al (1998)
Client Consultation	Pinto and Slevin (1987), Pinto and Govin (1989), Pinto and Mantel (1990), Cicmil (1997), Dvir et al (1998), Belout and Gavreau (2004), Kerzner (2009)
Estimate Realistically	Baker, Murphy and Fisher (1988), Turner (2009)
Minimum star-up difficulties	Baker, Murphy and Fisher (1988)
Task orientation	Baker, Murphy and Fisher (1988)
Absence of bureaucracy	Baker, Murphy and Fisher (1988)
Personnel	Pinto and Govin (1989), Pinto and Mantel (1990), Belout and Gavreau (2004)

Selection	
Technical Tasks	Pinto and Govin (1989), Pinto and Mantel (1990), Belout and Gavreau (2004)
Client acceptance	Pinto and Govin (1989), Pinto and Mantel (1990), Belout and Gavreau (2004), Kerzner (2009)
Trouble-shooting	Pinto and Govin (1989), Pinto and Mantel (1990), Dvir et al (1998), Belout and Gavreau (2004)
Environment effects	Pinto and Govin (1989), Westerveld (2003)
Definition of technical specifications	Dvir et al (1998), Andersen et al (2006)
Pre-contract activities	Dvir et al (1998)
Technological infrastructure	Dvir et al (1998)
Operational Concept	Dvir et al (1998), Westerveld (2003), Turner (2009), Turner (2009)
Prototype	Dvir et al (1998)
Number of design cycles	Dvir et al (1998)
Design freeze timing	Dvir et al (1998)
Project milestones	Dvir et al (1998)
Effectiveness of project control	Dvir et al (1998)
Budget management	Dvir et al (1998), Kerzner (2009)
Organizational environment	Dvir et al (1998), Kerzner (2009)
Delegation	Dvir et al (1998)
Organizational learning	Dvir et al (1998), Cooke-Davies (2002), Camilleri (2011), Cserháti and Szabó (2014)
Breaking the Project into Subprojects	Clarke (1999), Turner (2009)
Risk management	Cooke-Davies (2002), Camilleri (2011)
Benefits management	Cooke-Davies (2002)
Align Projects with Business Plans	Cooke-Davies (2002), Turner (2009), Kerzner (2009) Camilleri (2011)
Stakeholders management	Westerveld (2003), Andersen et al (2006), Turner (2009), Cserháti and Szabó (2014)
Success criteria	Westerveld (2003)
Commitment	Andersen et al (2006), Camilleri (2011), serháti E Szabó (2014, p.617)
Project execution flexibility	Andersen et al (2006)
Planning Tools	Turner (2009)
Creativity	Turner (2009)
Cooperation	Turner (2009)
Differentiate	Turner (2009)

Technical Management and Project Management	
Understand the Purpose of Control	Turner (2009)
Time management	Kerzner (2009)
Quality management	Kerzner (2009)
Commercialization	Kerzner (2009)
safety requirements	Kerzner (2009)
Support of teamwork	Cserháti and Szabó (2014)
Support of individual efforts	Cserháti and Szabó (2014)

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