A Theoretical Review on IT Project Success/Failure Factors and Evaluating the Associated Risks

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Abstract: - There is empirical evidence that information technology projects are exposed to multiple sources of risks because it seems certain that the IT projects are considered as agile, technical and complex projects. However, it is necessary to know why majority of IT projects fail and what the perceived success/failure factors are and to what extent the risk management concept is of central importance in every IT projects. This study fills the gap in the current literature by unpacking comprehensive project level factors, risk areas that may influence the risk perception of project managers and consequently, lead to fail in infant, toddler and mature stages of IT projects. Therefore, a theoretical revision on this topic was performed. Although many studies have explored success/failure factors in projects, a few of them are comprised of the perception that to what extent project's success/failure factors are noteworthy.

Key-Words: - IT Project, Critical Success Factor, Risk Perception, Risk Mitigation, Success/Failure Factors and Project Management

1 Introduction

There is empirical evidence that failure is a persistent trauma within project-oriented organizations [1]. Stories of "failed", or "failing" projects, abound in the media, from construction (London's Wembley Stadium), to aerospace (F-35 fighter,) and IT (UK NHS patient record system). As it has been conducted numerous researches, IT project failures are almost so common as to be expected by planners and IT project managers.

Statistically, It is estimated that around 20–30 percent of projects are total failures and abandoned, 30–60 percent partially fail, with time and cost overruns or other problems [2]. Additionally, on the opposite side of the coin, the minority of projects are reportedly successful which include only 29 percent of projects [3]. As recent studies found that failures appear to be more significant in public sector, are approximately 84 percent and the costs of failure are significantly tremendous "Royal Academy of Engineering and British Computer Society [4, 5]. Moreover, the costs of failures in IT projects are deemed to be tremendous. Across both public and private sectors, around $US150 billion is wasted per annum on IS failures in the United States and $US140 billion in the European Union (Association of Salaried Medical Specialists) [6, 7]. In-depth study represents that, IT project manager's worst fears were realized when software project failure rates remain alarmingly high despite surging investment in information systems and their significance for company organizations [8-12]. In accordance with the CHAOS Manifesto [2] only 39 percent of software projects were successful, completed on-time and on-budget, with all features and functions as initially Specified. Notably, another 43 percent of projects were challenged, completed and operational but over-budget, over the time estimate, and offer fewer features and functions than originally specified. Additionally, the remaining 18 percent of software projects have failed; they were cancelled prior to completion or delivered and never used. Other researches are conducted regarding only large software projects that represented, only 10 percent were successful, 52 percent were challenged and 38 percent have failed. This is at least worrying as large software Projects failure may negatively affect the whole implementing enterprise [12-14]. There is a wide range of literatures on information technology project failures comprising both theory and case study which are not unrelated to factors or variables that underpin successful project management and failure avoidance, embracing technical, managerial, planning, resourcing, and environmental factors [15].

Unquestionably, software projects are made manifest in IT complex projects as high risk activities due to the rapid pace of revolutionary technological and the organizational changes, They may impose [8, 10, 12, 16-19]. Therefore risk management is essential for project success [9, 20, 21]. Recently, [22] is identified that why software projects fail frequently. Therefore, several risk factors have been identified, classified in both framework and checklists [10]. In addition to , stepwise tasks, also known as process models, are widely used in theory and practice [10, 16]. Consequently, the importance of It project management and critical success factor approach are manifesting themselves as a perceived solution. Critical success factor approach was first developed by [23] and later on redefined by [23, 24] for the purpose of identifying and measuring an organization's performance. Therefore, as for software development project area, the CSF method has also been considered in recent studies. Critical success factors is defined by [24] as the limited number of areas in which satisfactory results will guarantee successful competitive performance for the individual, department, or organization for the purpose of flourishing business and achieving manager's goal. Additionally, it covers management techniques [25], as well as combination of software engineering and business strategy [26]. [27] is defined development life cycle and estimation and validation to executive management, project management, and resource and strategic-level planning as critical success factors.

The presented study research seeks to identify and provide insight into the IT projects success/failure factors and IT project risk factors comprehensively according to literature review. The fact of the matter is that, the aim of this study is investigating how accountability, controllability of IT project success/failure factors and likewise risk factors are central to perception of successful/failed complex IT projects. The finding of our research will assist enthusiasts to gain access to extensive and organized information in order to recognize and understand IT project complexity, success/failure factors, and perceived risk factors. we seek to engage readers interested in reflecting upon how the relationship between project failure and project management might be understood across different theoretical approaches. The results are pertinent to IT project managers, information system practitioners, and researchers in the field of management information system and project management in IT for the purpose of improving and strengthening their practices and policies in this area.

2 IT Project Success/Failure Factors

Preventing software project failure is the main objective of software process improvement as it aims at lowering the costs of development work, shortening the time to market, and improving product quality [28]. While providing a useful checklist for IT project managers or information system experts, project control; that important factors differ across projects; and that the approach fails to account for the dynamics of social, organizational, and political life that surround any IS project should be considered significantly [29]. Additionally, there is no doubt that preventive measures, analyzing the causes of failures becomes important as explain why the failures occur [30]. Any undertaking that involves creating a new service or product is fraught with peril, but when it comes to complex information technology projects regularly fail. As it has been verified by the Standish group of over 50,000 IT projects between 1992 and 2004, only 29 percent could be classified as successes. Accordingly, most project failures causes can be classified into one or more of the following categories:

- Failure to meet the approved schedule,
- Failure to achieve cost objectives, and
- Failure to provide the expected project scope.

[31] identified all aforementioned failure aspects within four categories of failures:

- Correspondence failure: Systems design objectives or specifications not met.
- Process failure: System cannot be developed within the allocated budget or schedule.
- Interaction failure: User attitude, satisfaction, and frequency of use do not correspond to the level of system usage (the system is implemented out of necessity and without increased task performance.)
- Expectation failure: System does not meet stakeholder requirements, expectations, or exchange any values.

Notably, failure or problem research is typically based on lessons learned from a wide range of projects; however they are mostly similar enough to be generalized. Furthermore, ten signs of software

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development project failures identified by [25] that seven of which are determined even before a design or a line of code is written. Additionally, the problems, mistakes, and misunderstandings in agile processes from a macro point of view is studied by [32] as well as in micro point of view is verified by [33]. Undoubtedly, management challenges in implementing agile projects is of central importance in people, process, and technology dimensions of migrating to agile projects [34].

Ultimately, according to the aforementioned literature [35], failures/problem can be categorized into four clusters: organizational, people, process, and technical, summarized in Figure 1.

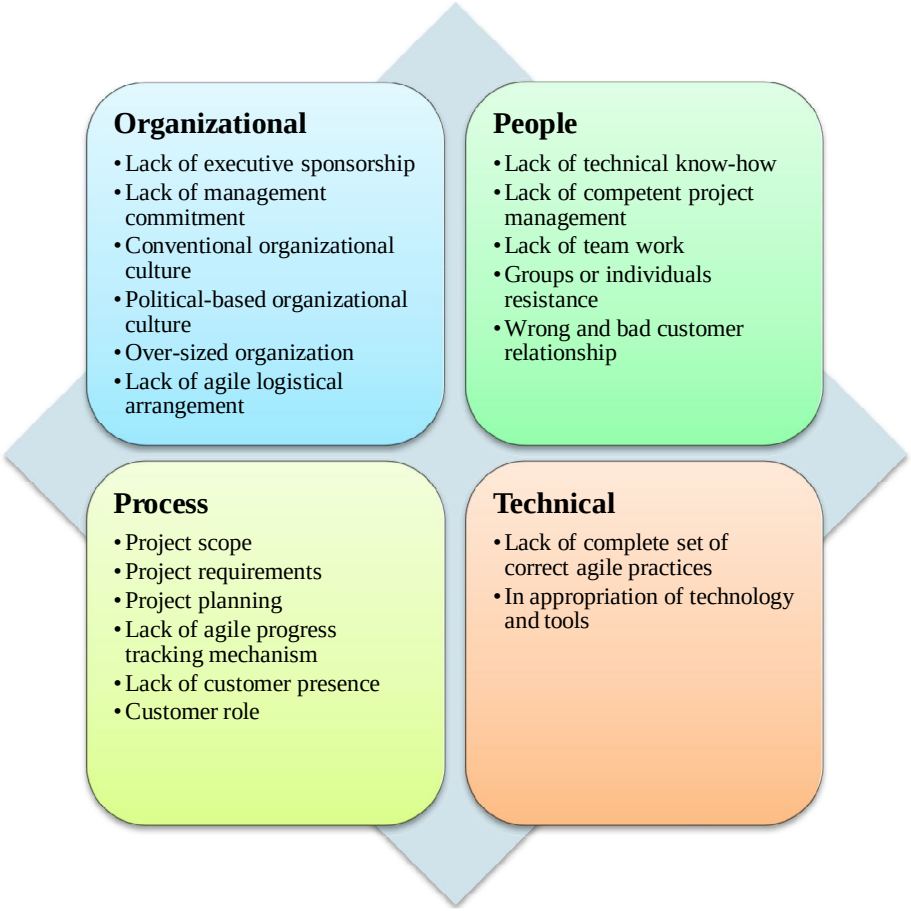

Fig 1. IT Project Failure Factors

The existing software engineering literature on software failures indicates that the causes of failures are commonly caused by the project environment, tasks, methods, and people. The causes of failures occur in various processes, which include management, sales & requirements, and implementation. As it is known there are at least two types of projects to consider when evaluating causes of failure: firstly, are well understood, routine projects with a clearly defined scope and few unknowns , secondly, projects, also considered complex, typically have many unknowns and an unclear scope [36]. Actual failure occurs because there is a discrepancy between what was planned and what was accomplished, whereas planning failure occurs because there is a discrepancy in what was planned and what was actually achievable. [37] acknowledged the fact that human dynamics play an important role in project management failure, citing poor motivation, productivity, and human relations; lack of employee and functional commitment; delayed problem solving; and unresolved policy and stakeholder issues. Moreover, characteristic of tendencies observed in complex projects are identified by [38].

- Unrealistic project scope given the available resources

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- Project development experience.
- Improper management of scope creep,
- The continuous expansion of the project scope.
- New technology that is critical to the project has not been previously developed.
- The organization's issues are not understood.
- Custom work is needed for the organization's business activities.

It seems certain that in all complex IT projects, success and failure are the same side of the coin. Therefore, numerous studies have been conducted to identify the factors or strategies that may differentiate between successful and unsuccessful information system projects. Therefore, [29, 39-41], previously have suggested that the reasons for failure and success might not necessarily coincide [29, 31, 42]. This would suggest that it might be necessary to identify and control both success and failure factors. Consequently, crucial success factors tabulated in Figure 1, considering overall perceived level of success [35] such as quality in terms of delivering good product or project outcome, scope in terms of meeting all requirements and objectives, time in terms of delivering on time, and finally cost in terms of delivering within estimated cost and effort.

Success research cited in the literature is mostly based on case studies or meta-data or compilations and observations of agile projects and practices. Specifically, reports from direct experience with agile implementations[43], while provide results from the Primavera case study[44], and give insight from the Star-Gate case study[45]. Moreover, other success researches which have included a comparative flavor between traditional and agile methods [46-48]. Apart from success researches, risk management is perceived as an inherent part of all projects, specifically complex IT projects. It seems certain that Software projects are fraught with risks, with many risks common to nearly all projects and is defined, [49].

3 IT Projects Risk Factors

Project managers can take appropriate reactive and proactive action if proper risk assessment leads to early identification of a failing project via risk identification, risk classification, and risk evaluation. Moreover, the aforementioned cognitive risk processes are defined respectively; firstly, risk identification is, identifying potential factors that have a negative impact on project outcomes. Secondly, risk classification involves explicit or implicit categorization of these variables. Last but not least, risk evaluation is about assessing the likely impact of these variables or events on project outcomes. Furthermore, the importance of risk factors considering identification and classification are studied widely in several researches [20, 21, 50-55]. However, few studies have paid attention to the risk evaluation processes in IT project management.

Accordingly, [56] have conducted a comprehensive conceptual framework considering the influence of personal, project, informational, and organizational factors on risk perception which in turn influences the willingness to continue a failing project.

The importance of risk management is made manifest itself in software projects because they are considered as high risk activities and the risks are lie at the root of the rapid pace of technological and organizational changes [8, 10, 12, 17-19, 57]. Therefore, risk management is essential for project success [9, 20, 21]. Consequently, lots of researches has been conducted about why software projects fail [22] as well as . Several risk factors have been identified and joined into checklists and classification frameworks [10]. Also, stepwise tasks for managing risks, also known as process models, are widely considered in theory and practice [10, 58].

As it has been identified software project risk management seems to be rather immature as risks are still not managed effectively [10, 16, 22, 54, 59-61]. Therefore, there is a significant need to investigate empirically the particular factors that may influence the risk perception of information technology project managers. [62] discussed the importance of post decisional control in risky situations is associated with the ability of managers to utilize their skills appropriately. Also, [52] recognized which if Project risk factors, controllability of outcomes, and risk perception and software environment are ignored , the risk of project failure will increase.

Ultimately, [21] have identified six dimensions of project risks: organizational environment risk, user risk, requirements risk, project complexity risk, planning and control risk, and team risk. Moreover, [20, 53] classified project risk factors into two categories based on the degree of managerial control over the risk factors [63]: endogenous and exogenous risk factors. Endogenous risk factors are variables that can influence the project outcomes negatively, such as project team morale, employee productivity, inadequate training, or inadequate project reviews [63].

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Apart from technical risks, software projects are subjected to organizational risks [64-66]. Accordingly, people are one of the greatest sources of uncertainty in almost any projects, that's why the organizational risks are difficult to manage and knowledge of risks alone is not enough to contribute to project success [22, 67].
Central to importance of IT projects risk assessment, the six-item risk perception scale was created by [68]:

- Likelihood that the project will meet the budget goal,
- Likelihood that the project will meet the schedule goal,
- Estimate of cost overrun,
- Estimate of schedule overrun, and
- Probability of project success and
- Overall risk.

The fact of the matter is that, the first two items tap into the probability of negative outcomes considering dimension of risk whereas the next two items tap into the 'magnitude of potential loss or negative outcomes' dimension of the risk construct.
Another stream of research views IT project investment risks comprehensively and it is not restricted to software projects, but is extended to external factors. Risks originated by market conditions also should be considered and it has been analyzed by [69-71]. On the basis of prior information system literatures, Table 1 tabulates a list of risk areas that threaten the success of information technology projects from investment point of view [21, 72].
[21, 73] are recognized that the influential risk factors in IT investment. Therefore, items are classified in Table 1 are illustrated briefly:

- Organizational risks considering the stability of management regarding investment
- User risks considering lack of user involvement during system development or unfavorable attitude of users toward new system
- Requirement risks considering the strategic orientation of application
- Team risks considering lack of technical know-how amongst team members
- Complexity risks considering whether the new technology is used
- Competition risks considering strong competitor reactions that may prevent the firm from obtaining what set out to gain
- Market environment risks considering acceptance by customers, vendors and stakeholders

Table 1. Key Risk Areas in IT Investment

Risk Category	Description
Private Risks	Organizational Risks Requirement Risks Structural Risks Team Risks Complexity Risks User Risks
Public Risks	Completion Risks Market Environment Risks

All in all, information technology project managers may have limited capacity to influence the organizational environment risk (e.g. factors like politics, organizational support for the project) and requirements risk (change in requirements). [21] is recognized User risk, project complexity risk, planning and control risk and team risk as endogenous risk factors because these factors are mostly internal to the project and project managers will have greater degree of control over these factors.

4 Discussions

IT project managers are notably playing a main role in almost every complex projects in information system areas. Project managers' perceived controllability over project risk factors is likely to influence how they assess the risks of IT projects. Central to debate on the idea of IT project success/failure factors as well as IT project risk factors are the questions of What factors lead to project success?'', and to what extent controllability of project risk factors influences the perception of risk in a failing IT project? The empirical study demonstrate that project managers' managerial skills, team members' commitment and their technical background, project attributes and environmental factors are as viable and can be as critical as the organizational factors, although the criticality of these factors varies between industries. In terms of the impact of factor categories in IT project success/failure, the research findings show a rather surprising unevenness in the consideration of all success/failure and risk factors.
The framework we suggest comprehensively here provides wide understanding and adapting to all IT projects that should be considered without any hesitation.

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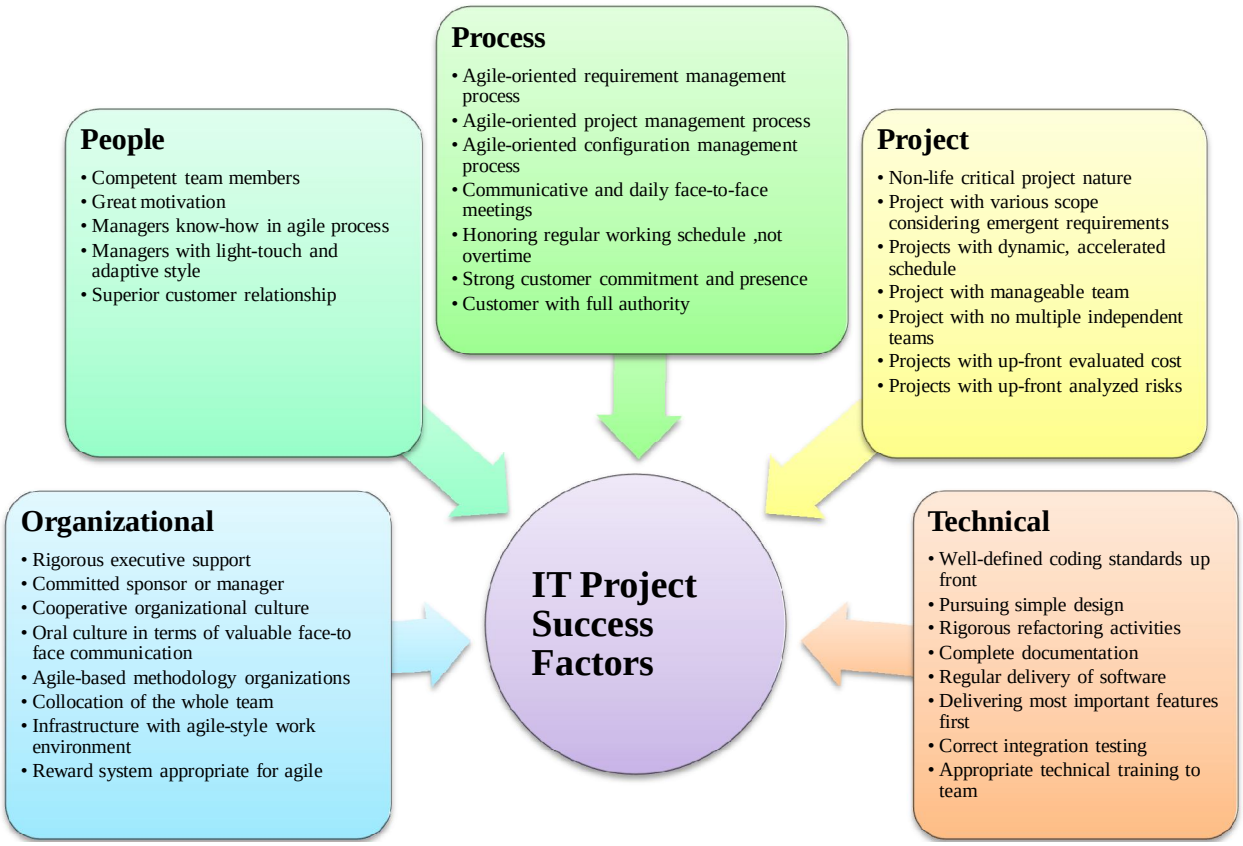

Fig 2. IT Project Success Factors

As today more and more projects consider quality to be the most objective that can be assured by identifying and eliminating the factors that cause poor project performance, ultimately project failure. Thus, this research will provide a wide, project-based perception for project managers to better understanding of critical success/failure factors and likewise project risk factors consideration. As a result, we put spotlight on the importance of comprehending the factors and mutually interactions between all of them. Complexity issues in elaborate IT projects will be present even when the most optimal development methodologies are used to achieve the specific organizational goals. In developing a deeper understanding of these issues, we may hopefully be more adept in managing and structuring them. We considered two dimensions in this paper regarding IT evaluation process; the amount of turbulence caused by project volatility and internal and external uncertainty, and the degree of which the project's structure encompasses a traditional management approach [74]. We present the implications of our results and provide organized recommendations for future works in IT project management considering the causal relationships interconnecting the all success/failure spheres. Ultimately, we tabulated and structuralized the factors related to perceived failure/success as feasible targets for explaining the necessity of a comprehensive framework of aforementioned factors in IT project management verification, in order to prevent failure occurrence in respectively infant, toddler and mature stages of projects. Most notable is the complete lack of contribution of IT project dimension in the list of identified success/failure factors as well as risk management, although there had been ample discussion of this dimension in the literature. We expect to see future research concentrating on comparative analysis considering holistic and micro perspectives in all complexes IT projects.

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