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IS/IT Projects Failure:
– An Investigation in Iranian Organizations

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DISSERTATION

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Abstract

Modern economy and technological development are increasingly necessitating agile responsiveness from the side of businesses. This would not be achievable without having integrated IS/IT projects into the organizational processes and structure. In this global endeavor, Iranian organizations among IS/IT fast growing Middle Eastern nations are not excluded. However, alike so many other countries, the statistical figures and failure ratios for performing these projects are not so promising. To investigate the situation of IS/IT projects failure, it is critical to clarify criteria of success/failure, identify influential factors, and finally propose appropriate recommendations through realizing reasons behind the causes of failure. The research reveals that managerial/strategic and cultural factors have the most influential impact for that matter. It is mandated that Iranian organizations promote the commitment and support of senior management, raise general awareness for IS/IT projects' structure and functionality, and foster a correct cultural context to prevent failure in this kind of projects. Moreover, the smaller the size of a project and the hosting organization are, the lower the risk of confronting complications and the easier managing the project get. Creating rigorous 'lessons learned' processes, risk management and change management would be considered as supportive key issues as well.

Keywords: Project failure, IS/IT projects, Iranian organizations

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List of Abbreviations

CIO – Chief Information Officer
CRM - Customer Relationship Management
CSF - Critical Success Factor
EWS - Early Warning Sign
IOI - Issues of Influence
IPMA – International Project Management Association
IS/IT – Information Systems/Information Technology
KPI - Key Performance Indicator
KPMG - Klynved Peat Marwick Goerdeler
MIS – Management Information System
NAO - National Audit Office
OCD - Organizational Change and Development
PM – Project Manager
PMO – Project Management Office
POM - Processes for Organizational Meanings
PRM - Project Risk Management
QoS – Quality of Service
SOI - Spheres of Influence
SME - Subject Matter Expert

1. Introduction

1.1. Background of IS/IT Projects Failure

Prior to providing a prologue to the issue of failure in IS/IT projects, it is mandatory to present a background of projects failure in its general term. According to Yeo (2002), the Standish Group International study loosely defines project failure as either a project that has been canceled or does not meet its budget, deadline, or business goals. The acclaimed reference of Chaos Report by the Standish Group International in 1994 has summarized the corporate IS/IT development projects in three groups of 'successful', 'challenged', and 'impaired'. 'Successful' projects which are considered those fulfilled on time, within forecasted budget, and meeting all required functions and features only cover a low percentage of 6.2 of cases. The 'challenged' ones which are nominally finished and operational though suffered from budget overruns and/or schedule slips, and provided less functionality and features than what was planned for; correspond to 52.7% of projects, costing 189% of their initial estimates. These figures are against 31.1% of 'impaired' projects which are cancelled or terminated at some point along the course of their design or development (Yeo, 2002). Glass (1998) describes these projects as 'runaway' projects while a second author (Yourdon, 1997) describes these same projects as 'death-march' projects. Professionals' and scholars' predictions indicate that the figures for 'challenged' and 'impaired' IS/IT projects will soar continuously where that of so-called 'successful' ones will plummet (Yeo, 2002).

According to the Standish Group report in 1999 that presents data on 23,000 global IS/IT projects from 1994 to 1998, 31.1 percent of failed projects in 1994 reached a failure rate of 40 percent, and 28 percent cancelled in 1998. The report estimates the cost of cancelled IS/IT projects in 1998 alone to reach $75 billion (Chulkov & Desai, 2005). Regarding projects in the UK and the US as two leading countries in project management discipline, we come across some striking failure rates. The UK's Industrial Society back in the early 1990s collected some shocking figures showing that around 77% of projects in the UK fail, where this figure rises to 83% in the US (Kippenberger, 2000). As it is obvious from these numbers, despite the belief that project management techniques have matured, the rate of failure of all sort of projects has never been higher. These statistics for specific sectors are surprisingly even worse to the extent that only 7% of business process redesign projects and barely 3% of IS/IT projects succeeded (Cooke-Davies & Arzymanow, 2003).

By looking into statistical evidences, the rate of IS/IT projects failure has been one of the highest among hi-tech projects, just to leave alone other non-hi-tech industries. IS/IT projects in different forms are pervasive in a wide variety of business organizations along with so many less hi-tech projects. However, there is a major difference between IS/IT and other engineering projects. An IS/IT project impairment may not be necessarily because of technical short-comings. A well-designed, acceptably implemented and technically well-operational IS/IT project might still suffer from resistance and rejection by the system users and more importantly organization management. This would lead to an under-utilization or even total abandonment of an information system which is regarded as a complete failure. Moreover, the matter of an IS/IT project adaptation might

go overboard just the usability and technical qualification of that system - there are also delicate issues of social and cultural aspect of a project organization not to forget politics in management (Yeo, 2002). All these matters make the investigation of success or failure of IS/IT projects more critical and vital than ever.

Iran among Middle Eastern nations is one of the fastest growing countries in the area of IS/IT in the face of international isolation due to lots of political complications. The organizations both in public and private sector have been no exception to realize the benefit of employing IS/IT systems and integrate them into their business processes. The newly introduced concept of project management in this country and its development into the paradigm of information systems and technology along with growing interests among a vast number of young and veteran professionals have put the spotlights on the pervasive causes of failure in this field. Drawing on the Standish Group International project success/failure classification, Habibi *et al.* (2005), in a research regarding IS/IT projects in Iran, have found out that around 64 percent of IS/IT projects in Iran are strongly 'impaired', 26 percent 'challenged', and only a vague percentage of 10 goes into the category of 'successful' IS/IT projects. However, there is huge lack of academic research and comprehensive study on clarifying criteria of success/failure, influential factors, and reasons behind the causes to failures. This matter along with the writer's personal experience and interest in Iranian managerial styles specifically concerning projects have been main motivations for this research.

1.2. Purpose Statement

The overall purpose of this research study is to investigate the situation of IS/IT project failures in Iranian organizational environment. This examination is conducted in terms of finding out the main protagonist factors causing failures which are quite common place in IS/IT projects embedded in organizations. Generally speaking, success and failure in the context of project management are two sides of the same coin which underlines the fact that identifying the definition or related factors to one of them would clarify to a great extent the scope of the other one. The key issue here is that project participants prior to anything should come to a definite consensus at the very starting point of the project about how success/failure will be assessed by establishing some criteria and definitions for them. Then all relevant factors contributing to success/failure should be determined, and in the end by realizing the reasons triggering these factors, project management approaches are developed to address those success/failure causes to deliver a successful project.

1.3. Goals of Research

The bottom line objectives of this research study could be put into words as following:

1. To find out the main factors (causes) of IS/IT projects failure occurring in Iranian organizations
2. To propose a series of appropriate recommendations to proactively prevent these failure factors

1.4. Scope of Research

As it is delineated in the purpose statement, the range of issues concerning the general topic of IS/IT project failures is vast – defining a criteria for project success/failure, identifying factors, investigating the reasons behind existence of these factors and also bringing up solutions to tackle these causes – which requires a large volume of research to cover all these related aspects. To narrow down this large array of issues and become more specific, this research is aiming to address merely the area of factors triggering the IS/IT project failures in Iranian organizations employing these systems and in the end introduces some recommendations to primarily avoid and reduce the risk of occurrence of such failures – as two main objectives of this writing. The recommendations are built on the academics' and professionals' opinions from literature review.

Moreover, as it will be fully explained in the literature review, the failure analysis of projects and in specific those of IS/IT projects is drastically multi-faceted in terms of the perspective from which the topic is examined. The survey subjects being studied in the course of this research are mostly all project managers. This being said, the viewpoints of other key stakeholders such as senior management in hosting organizations (project sponsors), project team members (e.g. software developers), IS/IT system users, etc. are not taken into account for the sake of limiting the scope of the research. The different role players in a project could have different appreciation of failure factors attributing a project which keeps the subject open for further research.

As a final comment on the scope of this research, it is important to underline that this research does not intend to make any distinction among the type of organizations in its investigation and study them collectively regardless of being public or private sector and the nature of the business they are involved in. Time and again academic researches have shown evidence that the typology of organizations employing an IS/IT project could be a significant parameter to be considered when scrutinizing the failure of IS/IT projects that again will keep the doors open for an expansion to the present research.

1.5. Limitation of Research

There are some major limitations to be taken into consideration concerning this research. The major restriction to this research which is reflected in the research method of the work is the special case of project management arena in Iran. The main concern of the writer has been the inapplicability of classical models found in academic literature established by western scholars in the context of Iranian project management context. This mandated the research to be conducted on the grounds of a customized model which is in accordance with managerial norms and conventional issues in a developing country such as Iran. And finally, as one of the common obstacles in performing researches based on social surveys, this research has suffered from limited number of organizations and individuals being investigated as its sample population. This has mostly been due to the bad timing of this research study and summer vacations of businesses. However, the attempt has been made to reach a sufficient quantity of subjects in order to create a quite randomly distributed sample population particularly for questionnaires.

1.6. Outline of Research Method

The research strategy adopted in this work is a combination of qualitative and quantitative approaches. The former is employed to conduct a series of unstructured in-depth interviews with accredited individuals in the field of IS/IT project management in Iran to structure the skeleton of a customized model of factors affecting failures in IS/IT projects. This is perceived appropriate because of special conditions governing the context of organizations in Iran and their strategies towards both IS/IT projects and the concept of project management. This model is evaluated against the findings from literature review later on in the analytical section of research results. Consequently in a qualitative manner, these identified factors – context- and content-related - are used to form questionnaires for being handed in to a host of 39 IS/IT project managers in organizations from an amalgamation of diverse industries. The qualitatively elaborated results from this part unveils not only how context-related factors are ranked on the basis of the importance they have been given but also how content-related factors are related to the failure rates of IS/IT projects in these organizations. The most highly ranked factors are assessed and accordingly the best suiting solutions to control them and avoid failures caused by them are proposed.

1.7. Dissertation Structure Overview

After this introductory chapter, the writing proceeds to its literature review chapters. Chapter 2 - literature review - opens up with clarifying the concepts of information systems and technology along with their implications in organizations in the form of projects, and then gives an explanation on how experts have established criteria to define success and failure for projects. Afterwards, this chapter primarily introduces the critical factors for success and failure in projects in general, and then describes how to classify these factors and expand them to IS/IT projects. In the end of the literature review, some deeper discussions on the most prominent factors in place for IS/IT projects failure are presented. The 3rd chapter deals with a thorough clarification of the research strategy, design and method used in the research. Chapters 4 and 5 include the research results and analytical discussions over them. The writing continues with chapter 6 where appropriate recommendations regarding the results of the research are elaborated. And finally, the last chapter summarizes the dissertation by bringing together all the highlights and bottom line results of the work.

2. Literature Review

2.1. Concept of Information Systems and Technology

In the modern economy of today's world, enterprises are largely investing in information systems and technology and particularly in the ways these can help them managing their businesses. This transition has appeared to be an indispensable change in most of prosperous companies on the ground that it is increasingly believed these investments could be rich sources of competitive advantage (Gardner, 1998).

The term of 'information systems' has originally born to refer to any wide variety of computing hardware, communication technology and software combinations designed to manipulate information related to certain business processes (Flowers, 1996). It is believed that the concept of information systems is fundamentally interdisciplinary to the extent that technological disciplines intersect with managerial, psychological and sociological paradigms (Yeo, 2002).

Turban *et al.* (1996) discriminate between terms of information systems and information technology:

> "Information System (IS) is a collection of components that collects, processes, stores, analyzes, and disseminates information for a specific purpose. Like any other system, an IS includes *inputs* (data, instructions) and *output* (reports, calculations). An IS *processes* the inputs and produces outputs that are sent to the user or to the other systems. A *feedback* mechanism that controls the operation may be included in an information system and like any other system it operates within an environment. The basis components can be listed as: hardware, software, database, network, procedures, people, purpose and social context." (p.7)
>
> "Information Technology (IT), in its narrow definition, refers to the technological side of an information system. It includes hardware, databases, software, networks and other devices. As such it can be viewed as a subsystem of an IS. Sometimes, the term IT is also used interchangeably with IS, or it may even be used as a broader concept that describes a collection of several ISs, users, and management for an entire organization." (p.9)

Avison & Fitzgerald (1995) elaborates more on the term 'information' and argues that it basically has diverse meanings and usages to different 'recipients' in different settings which explains for why the information should be chosen, packaged and represented in such a manner that best matches the contexts and the requirements of particular 'recipients' in different circumstances. In other words, "information can be defined as structured data which can have a certain contextual meaning and eventually can provide its user with relevant knowledge to make decisions" (Bell & Wood-Harper, 1998)

Yeo (2002) alternatively states that IS are user-interfaced systems that are meant to supply information and information processing mechanisms to uphold the strategy, operations, management analysis, and decision-making qualities within a business.

Manual procedures, models and knowledge bases, databases and in particular information technology as the main components of information systems provide applications in an organization that can elevate operational efficiency, create new functional innovations and ultimately reengineer business processes. The instances of these implications could vary from back office administration support such as payroll, sales orders, inventory control and personnel records to even a companies strategic management tools. Drawing on Avison's & Fitzgerald's (1995) belief, this author emphasizes on the feature of information systems that they can store, process and provide data only to those e.g. managers, staff, clients and suppliers, who essentially need those information. Checkland & Scholes (1990) have taken a system point of view arguing that information systems serve, help or support individuals to take any kind of 'action' in the real which would improve the effectiveness of the workplace or augment the quality of the resources of any kind.

Turban *et al.* (1996) by referring to the annual surveys conducted by *Datamation* (a leading practitioner journal of information systems) summarizes the major supporting implications of information systems as to:

- Increase productivity
- Improve quality
- Create competitive advantage
- Attain company's strategy
- Reorganize and reengineer
- Make better and more effective decisions
- Respond promptly to changes in the business or its environment
- Access a wealth of information
- Improve creativity and innovation

The same authors in another writing classify implications of IS/IT projects in an organization under four main categories of: *commercial* e.g. customer relationship management (CRM), e-commerce, knowledge management; *strategic* e.g. re-engineering, information architecture; *organizational* e.g. centralization vs. decentralization, outsourcing, resource management; *technological* e.g. database, internet and intranet. (Turban *et al.*, 2005)

2.2. Project Success and Failure Criteria

Belassi and Tukel (1996) believe that it is far too difficult today to determine whether a project is a success or failure. In addition to this ambiguity, they argue that the reason for this confusion is that the list of suggested criteria varies tremendously in different studies in most of the literature. Pinto and Slevin (1989) in their paper claim that different parties engaged in a project have different opinions about definition of success and failure. In most cases parties evaluate project success differently and therefore give value to the results differently. In this regard, Kirby (1994) takes a general approach and highlights the basic principle that people observing the same event from different perspectives can attribute differently in terms of interpretations to the very same event. This being said, any single perspective on a project provides merely a fractional view of the matter not

being able to shed light on the other possible meanings the other engaged parties ascribe to the success or failure of that project. In other words, he claims that if project managers recognize the existence of the alternative standpoints coming from diverse key stakeholders in a project, they will definitely avoid endangering a project's success. Apart from the fact that the lists of characteristics to successful or failed projects vary a lot in their scope and purpose, they are either very general or very specific related only to a special case (Pinto & Slevin, 1989). Horine (2005) also has come up with some sensible reasons to answer why finding attributes of a successful/failed project is not at all a straightforward matter. He believes that lack of a universal harmony to compromise project success/failure metrics, lack of common collective acceptance standards among all key stakeholders engaged in a certain project, and the discrepancy between what business companies call project success/failure and that of textbooks which investigate the matter from a theoretical and utopian viewpoint are amongst the most important reasons.

2.2.1. Success

From a global perspective, Kerzner (2003) has described a successful project with seven characteristics as 'critical success factors' (CSFs); within the planned time, within the predicted budget, aligned with expected performance and specification level, accepted by the client, minimum or mutually agreed on scope alterations, minimum disturbance of the main stream of work flow in the host organization, and finally the least effect on the corporate culture. The first four notations are those that have been norm during the last twenty years - Duncan (1987), Blaney (1989) and Redmill (1990) also explicitly have nominated these criteria for a project success; whereas the last three ones are more contemporary needing more speculation. Kerzner (2003) discusses that in modern project management, it is almost impossible to see that a project is finished without any alteration in its initial scope which in turn might diminish the morale of the work or eventually even bring the project to a total halt. It is advisable to keep the level of change for project scope to its minimum and those really needed to be taken into account should be in complete consensus of both project manager and client. Possible disruptions occurring in the everyday's work flow in the host organization because of the ongoing project is the other issue. By mistake many project managers might think of the project as a stand-alone entity happening in an organization which is not always possible. A viable project should be managed within the guidelines, policies, procedures, rules and directives of the host company. The corporate culture is the other focal issue. A project destined to success can not deviated from cultural norms reigning a certain parent company even though the project's nature, its management and team are essentially not aligned with those cultural values. Successful project notation and excellence in project management in an organization is only and only achieved through a continuous stream of managed projects which requires strong and visible corporate commitment to project management concept.

Morris & Hough (1987) have added some new perspectives to the criteria of success. They argue that as a project generally should deliver its pre-stated functionality and objectives, it should commercially be profitable to its contractor and also should get terminated sensibly and effectively if it is sensed that it is destined to failure. Turner

(1993) by underlying the satisfaction of the needs of the key stakeholders such as the project team members, users and owner also has contributed to this definition.

Wateridge (1995) has looked into the success criteria from the IS/IT project angle and the results of his findings demonstrate that however there is great agreement on being on time, to budget and meeting the users' requirements and functionality for a successful project, there is great disagreement on how different role-players such as project users or project managers are weighing success/failure definitions. When it comes to project managers' point of view, while they believe in 'meeting user requirements' as both a success and failure criterion, they prioritize 'meeting timescales and budgets' as to avoid project failures and 'meeting expected quality' and 'organization's commercial prosperity' as significant signs for a successful project. On the other hand, from project users' perspective, where 'meeting user requirements' and 'staying in the planned budget' are recognized as criteria for both success and failure, they specifically identify their own 'happiness' as a success criterion and 'achieving project purpose' as a failure criterion. These results will bring out two main conclusions; firstly the criteria for project success must be agreed on by all the engaged parties far before the actual project gets started and it should get reviewed constantly as the project goes ahead. Since most of the success criteria are subjective issues, they are strongly prone to change. Secondly, there is the question of defining 'good quality'. The image of quality should be clearly depicted in the mind of all main stakeholders at the very beginning of the project. Project managers might define quality as maintainability, capacity for expansion or efficiency where project users could describe it completely differently e.g. usability or responsiveness to system request (Wateridge, 1995). Going through stages of brainstorming, project start, diagnosis, planning, formal start and implementation has been known as one of the requisites of a successful IS/IT project (Cannon, 1994). Cannon also believes that in order to conduct successfully an IS/IT project, the project team should be in total control of the employed technology and the project itself must have applications in organizational process that are well comprehended.

Shenhar *et al.* (2001) visualizes the matter in his own words with proposing a four-dimensional project success description with 13 distinctive measures related to them:

1. Project efficiency (meeting schedule and budget goals, or 'meeting design goals')
2. Impact on the costumer (meeting functional performance and technical specifications, fulfilling customer needs, solving a customer's problem, customer using the product, customer satisfaction)
3. Business success (commercial success and creating a new market share)
4. Preparing for the future (creating a new market, product line, or technology)

Besides using critical success factors (CSF), Kerzner (2003) believes that Key Performance Indicators (KPI) measuring the quality of the process used to achieve the end results, could be utilized to gauge the success of the project as well. KPIs are internal measures or metrics that can be looked over on a periodic basis across the life cycle of the project. Most prominent KPIs inform the project manager with the degrees of proper project management methodology usage, establishment of the control processes, usage of interim metrics, quality of resources assigned versus planned for, and finally client involvement.

Horine (2005) from an idealistic perspective summarizes a comprehensive score of qualities and traits common among those most successful projects. He from an academic point of view believes that although no two projects are completely identical and each has its own set of unique challenges, there exists always a shared core of principles lying at the heart of any project success. A successful project should:

- Be aligned with organizational objectives
- Have effective top-management support
- Have effective and competent leadership
- Address all key stakeholders' agreement on the purpose, goals, and scope of the project
- Address all key stakeholders' shared common vision on the project results
- Address all key stakeholders' shared realistic expectations for the project results
- Have results that meet the expectations of the key stakeholders
- Be able to manage and validate stakeholders' expectations constantly all the way to the end
- Make an investment in proper planning
- Have clearly defined and agreed upon scope, approach, and deliverables during planning
- Communicate clearly each stakeholder's and team member's role(s) and responsibilities
- Place a high priority on accurate and complete work effort estimates
- Develop and agree upon a realistic schedule
- Make the project team to have a strong results-focus and customer-orientation
- Provide consistent, effective, and focused on 'understanding' project communications
- Measure project progress consistently from the current baseline
- Pursue aggressively project issues and subsequent action items
- Foster a strong sense of collaboration and teamwork
- Manage closely expectations and changes surrounding scope, quality, schedule, and cost
- Provide skilled project resources when needed
- Identify proactively risk and determine mitigation strategies to reduce project exposure
- Anticipate and overcome obstacles to ensure project meets objectives

2.2.2. Failure

Simplistically, the success of a project would be meeting the client's expectations within the limitations of time, cost and quality. This is considered a very crude standpoint because it would standardize the success as a 'point' on the time, cost and quality/performance scales which is basically unrealistic especially when dealing with accomplishing today's highly innovative and dynamic projects. With keeping in mind the necessity of lots of compromises and changes in scope during the accomplishment of a project, Kerzner (2003) claims that the success singular 'point' in terms of time, cost and quality would convert into a 'cube' containing that 'point' of success. So if we assume that success in a project is a 'cube' rather than a 'point' which is only the most ideal success status, is staying in the 'cube' but missing that 'point' considered a failure? The answer most definitely would be no. Oftentimes clients and even internal project sponsors target performance goals which are in essence totally unreasonable, though assume that only reaching 80 to 90 percent of them would be regarded as success.

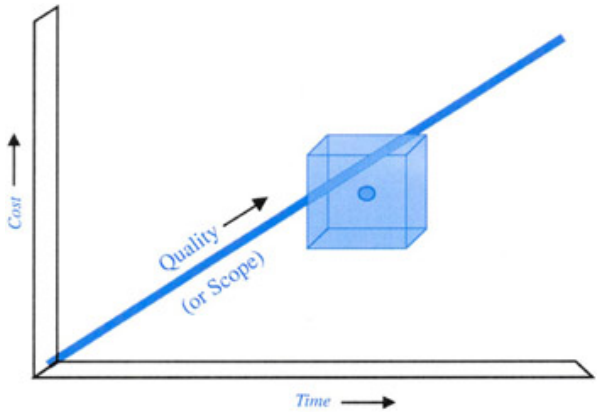

Figure 1 - *Failure 'Cube' vs. Failure 'Point' (Kerzner, 2003)*

In a very subtle approach, Gilbreath (1989) by introducing actual, planned, achievable and perfection target goals suggests two elements of project failure; the concept of 'planning failure' which is the difference between planned target and what was actually achievable, and second, 'actual failure' (poor performance) that is the difference between what was achievable and what in reality was accomplished. In continue; by summing up actual and planning failures one can get to a net sum which Gilbreath names 'perceived failure'. Two scenarios can be envisioned; one is the classic under-planning situation in which planned target is lower than what can be achieved with present resources and circumstances in hand and the actual target even lower than planned one. The second scenario – over-planning - is slightly different in that we set the planned target higher than what is achievable which still assures the 'planning failure' even though no 'actual failure' happens. As it is illustrated in Figures 2 and 3 below, in both cases the 'perceived failure' could vary considerably. Nowadays, 'planning failure' is the critical issue for most of the project managers and reducing it goes hand in hand with good project management methodological practices. Basically if this failure can be minimized, then the 'actual failure' which would become quite close to 'perceived failure' could decrease dramatically.

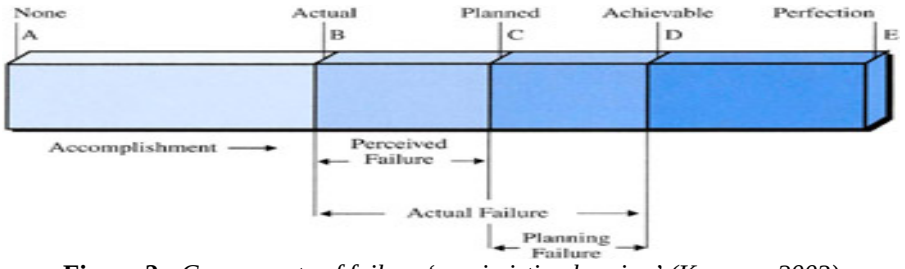

Figure 2 - *Components of failure 'pessimistic planning' (Kerzner, 2003)*

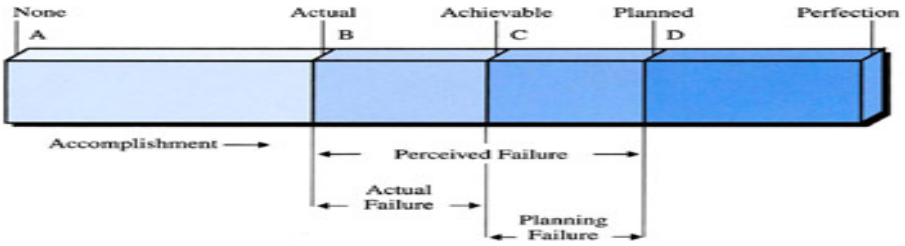

Figure 3 - *Components of failure 'optimistic planning' (Kerzner, 2003)*

Krezner (2003) argues that in the modern project management, 'planning failure' exists largely because of insufficient performance, measures and practices in effective risk management part of project management employed methodology which is addressed in a coming section in this writing.

Lyytinen and Hirshheim (1988) introduce four different notions of IS/IT failure:

1. *Correspondence Failure:* In this case, the overall design goals and requirements which should be clearly defined in anticipation and the level of their achievements should be gauged are not fulfilled. This is the situation in which even if these objectives and specifications are met, the fact that users might not really accept and employ that system is overlooked.
2. *Process Failure:* This failure happens when IS/IT project slips out of the predicted budget and/or time schedule which entails two outcomes; either an immediate failure occurs when there is no trace of existing workable system, or the system is still developed facing overspending on both time and cost jeopardizing the overall benefit of the project. As it is sensible this definition of failure is hand in hand with unsatisfactory project management skills.
3. *Interaction Failure:* This failure definition engages mainly the involvement of end-users to the IS/IT projects as a parameter to measure the performance of the system. Users' attitudes towards the system, users' satisfaction, the frequency of the usage and even the quantity of the transferred data by users are all factors that in the case of obtaining low grades in them, they can make an IS interactively a failure.
4. *Expectation Failure:* An expectation failure translates to an IS/IT failure as the inability of a project to satisfy its stakeholders' expectation and values regarded for that project. So, an IS/IT project failure does not only involve a failure in meeting technical design specifications (correspondence failure), but also as a difference between actual outcome of the project and what was really desired from the side of stakeholder to be performed by the project.

Flower (1996) refers almost to the same four categories but in his own words and states that IS/IT project failure can be defined: firstly, when a system performance is far away from what has been expected and technically operates less than the highest standard or quality (suboptimal), secondly, if the system is user-hostile and is rejected by the end-users and underutilized, thirdly, if the cost of the system development outnumbers the benefits it can provide, and finally when the system is too complex or the project management skills are so weak that the development process is terminated before completion.

Sauer (1993) takes a general system standpoint approach and argues that a project should be considered a failure only if it is abandoned at any point in development or operation stages. This criterion for determining failure would explain the behavior of a system that translates to the goal of survival. This means that a system acts on its environment to obtain resources that will maintain the system's continuous operation. Thus, a system is not a failure as long as it will be able to attract the necessary resources for survival. He introduces a 'triangle of dependences' consisting of 'information system', 'project organization' and 'project supporter/promoter'. On the basis of this viewpoint, project sponsors 'support' the project organization, which in return 'innovates' new information systems to resolve the perceived problems in the same organization that these would eventually 'serve' the interests of those very same project sponsors at the end of a loop. In Sauer's opinion failure happens when the level of dissatisfaction of a system reaches a point of no return where no more support will be received to support it.

When it comes to IS/IT industry, Linberg (1999) believes that software developers could be taken as a valid point of reference to judge the degree of success/failure for an IS/IT project. In his framework, it has been echoed the results of other scholars that the generally accepted definition of meeting budget, schedule, and business objective of a project is not sufficient. He challenges the idea that the project failure definition should be based only on project completion or project cancellation. Respectively he claims a project still is a failure no matter if it is completed but does not meet quality expectation or it is cancelled but there was not any learning process in it to be applied to the next project. Table 1 describes different levels of project success/failure from software developer perspective.

Project Outcome	Failure	Low Success	Successful	High Success	Exceptionally Successful
Project Completed	Developing a product that causes customer discontent (not meeting quality expectations)	Below average cost, effort, and schedule performance compared to industry AND meeting quality expectations	Average cost, effort, and schedule performance compared to industry AND meeting quality expectations	Better than average cost, effort, and schedule performance compared to industry AND meeting quality expectations	Meeting all quality, cost, effort and schedule expectations
Project Cancelled	Not learning anything that can be applied to the next project	Learning can be minimally applied to future projects	Learning can be applied to future projects. Some artifacts from the canceled project can be directly used on a future project	Substantial learning can be applied to future projects. Significant numbers of artifacts from the canceled project can be directly used on a future project	A canceled project can not be called "exceptionally successful"

Table 1 - *Project success/failure degrees (Linberg, 1999)*

2.3. Project Critical Success and Failure Factors

Rubin and Seeling (1967) for the very first time did a study on identifying factors contributing to project success/failure from a very generic point of view. They simply emphasized on the project manager's experience as a success/failure indicator and their main finding was that the size of very previously managed project outperforms the impact of general project manager's experience when it comes to technical performance as a success/failure factor. Avots (1969) found out in his research that the insensible choice of project manager, unscheduled project termination and lack of support from senior management are ultimate critical factors for failure. Baker *et al.* (1983) introduced the concept of 'perceived performance' factor to be measured rather than absolute performance as the measures for project outcome quality and proposed ten discerning factors. Hughes' (1986) research suggested inappropriate basic managerial principles and faulty communication of project objectives are major success/failure reasons.

In a very thorough study, Pinto and Slevin (1988) summarized different lists of critical success/failure factors from all previous literature. Table 2 gives a thorough overview on the background of the research results in this field including also Pinto's and Slevin's own identified factors presented in their paper in 1989. While this well-developed list is obviously addressing all the factors related to project manager and the organization hosting the project, they surprisingly appear to neglect project characteristics, team members' qualifications and their related issues, and those important external factors affecting the project.

Martin (1976)	Locke (1984)	Cleland & King (1983)	Sayles & Chandler (1971)	Baker, Murphy & Fisher (1983)	Pinto & Slevin (1989)	Morris & Hough (1987)
Define goals	Make project communication known	Project summary	Project manager's competence	Clear goals	Top-management support	Project objectives
Select project organizational philosophy	Project authority from top	Operational Concept	Scheduling	Goal commitment of project team	Client consultation	Technical uncertainty innovation
General management support	Appoint competent project manager	Top management support	Control systems and responsibilities	On-site project manager	Personnel recruitment	Politics
Organize and delegate authority	Set up communication and procedures	Financial support	Monitoring and feedback	Adequate funding to completion	Technical tasks	Community involvement
Select project team	Set up control mechanisms (schedules, etc.)	Logistic requirement	Continuing involvement in the project	Adequate project team capability	Client acceptance	Schedule duration urgency
Allocate sufficient resources	Set up control mechanisms (schedules, etc.)	Facility support		Accurate initial cost estimate	Monitoring and feedback	Financial contract legal problems
Provide for control and information mechanism	Progress meeting	Market intelligence (who is the client)		Minimum start-up difficulties	Communication	Implement problems
Require planning and review		Project schedule		Planning and control techniques	Trouble-shooting	
		Execute development and training		Task (vs. social orientation)	Characteristics of the project team leader	
		Manpower and organization		Absence of bureaucracy	Power and politics	
		Acquisition			Environmental events	
		Information and communication channels			Urgency	
		Project review				

Table 2 - *A summary of critical success/failure factors (Pinto & Slevin, 1988)*

Wateridge (1995) firstly does a comparison between the results of findings from two major thinkers in the field and then creates a combined list of success/failure factors: project mission (clearly defined objectives), project scheduling, monitoring and feedback personnel and top-management support (Slevin & Pinto, 1986); and goal commitment of project team, adequate project planning and control techniques, adequate project team capability and adequate funding to completion (Baker *et al.*, 1983). Afterwards he comments on the fact that most of the classic success/failure factors provided by scholars have investigated the situation from industry project managers' side and not the sponsors' or users'. Wateridge in his research adds value to the previously done studies and states that there is a vast inconsistency between the views of project managers and users regarding the factors which attribute success or failure. His studies reveals that when both users and project managers commonly pinpoint 'poorly defined objectives' and 'poor planning' as major failure factors, users specifically identify 'lack of adequate user involvement' and 'problems in communication' whereas project managers underline' weak leadership' as top-listed elements. Moreover, he cunningly discovers that users criticize heavily the 'lack of monitoring' of the project from the side of project managers when the situation gets tough as a prominent failure factor to which project managers give the least importance weighing.

As the downside of aforementioned studies, one can obviously notice a lack of classification and also a pattern to follow the causes and also interrelations between these factors. On the other hand, a major strength of the above study review is that they have a very holistic perspective to the project success/failure factors regardless of any particular industry's specifications.

2.3.1. Classification of Project Success/Failure Factors

Schultz *et al.* (1987) were one of the firsts attempting to categorize the project success/failure factors. They distinguished between *strategic* and *tactical* factors. In their view, *strategic* group comprises project mission, top management support and project scheduling, and *tactical* group consists of client consultation, personnel selection and training. In a quite related research work in 1988, Pinto and Prescott discussed the relative importance of strategic and tactical factors in the course of project life-cycle indicating that the significance of these factors is subject to vary at different stages of the project. Beside the timing dimension of failure factors, Pinto and Mantel (1990) regarded the way that failure is defined, how the failure is assessed and also the nature of the project - whether it is R&D, production, service or construction - as three other aspects that might affect significance of the identified success/failure causes.

In 2002 Cookie-Davies and Arzymanow in a different but holistic approach studied 136 European projects and pinpointed 12 'real success factors' categorized under 3 titles related to:

1. Project management success: issues related to project risk management (PRM) e.g. PRM education, ownership of risks, a maintained risk register and a PRM plan; documented organizational responsibilities; project stage duration; mature scope change management process; and maintenance of the performance measurement baseline

2. Individual project success: issues related to collaboration between project managers and operational/line managers in a business
3. Consistent successful projects: issues related to program management to support projects matching business strategy, metrics linking project performance with expected future success, and finally an effective lessons-learned system

From a chronological standpoint, Krezner (2003) proposes that ineffectiveness in planning, scheduling, estimating, cost control and finally 'mobility' feature of project targets as *qualitative* failure factors for projects in 1980s. This is where in 1990s the shift of project failure factors was largely towards *qualitative* issues, among them we can enlist; poor morale, poor motivation, poor human relations, poor productivity, low employee and functional commitment, delays in problem solving, numerous unresolved policy issues and finally conflicting priorities between executives, line managers, and project managers.

Belassi and Tukel (1996) also noticed a lack of classification of individual success/failure factors according to some criteria which makes it impractical to conclude any kind of cause-effect relationship between them. Moreover, many of these factors do not directly influence the success and failure of a certain project. Normally a combination of factors at various levels of project life-cycle might lead to success or failure which would emphasize more the need of categorizing these factors. These two scholars by introducing a new framework for project success/failure factors try to identify the categories these factors belong to. This would put project managers in a position to comprehend better which aspects of projects might be more crucial for their acceptable accomplishment and understand the interrelationship amongst different factors in different groups. Moreover, while this framework is considered to be a general scheme, it is also very adaptable to diverse situations and professional project managers can easily include the elements critically related to their specific project's success. This framework groups the success/failure factors into four categories concerning:

- Project
- Project manager and team members
- Organization hosting the project
- External environment

Figure 4 demonstrates the related factors in each group in detail. Furthermore, the figure clearly shows how these categories are interrelated and might interact with one another. However, grouping these factors and understanding the relationships among them will not suffice. Oftentimes several factors from different groups come into the scene at the same time which in return would create new hurdles for the project. This fact has been addressed by integrating a possible series of 'system responses' into the framework. This will help a practitioner to identify and then rectify or optimistically eliminate the factors that negatively are affecting a certain response from the system.

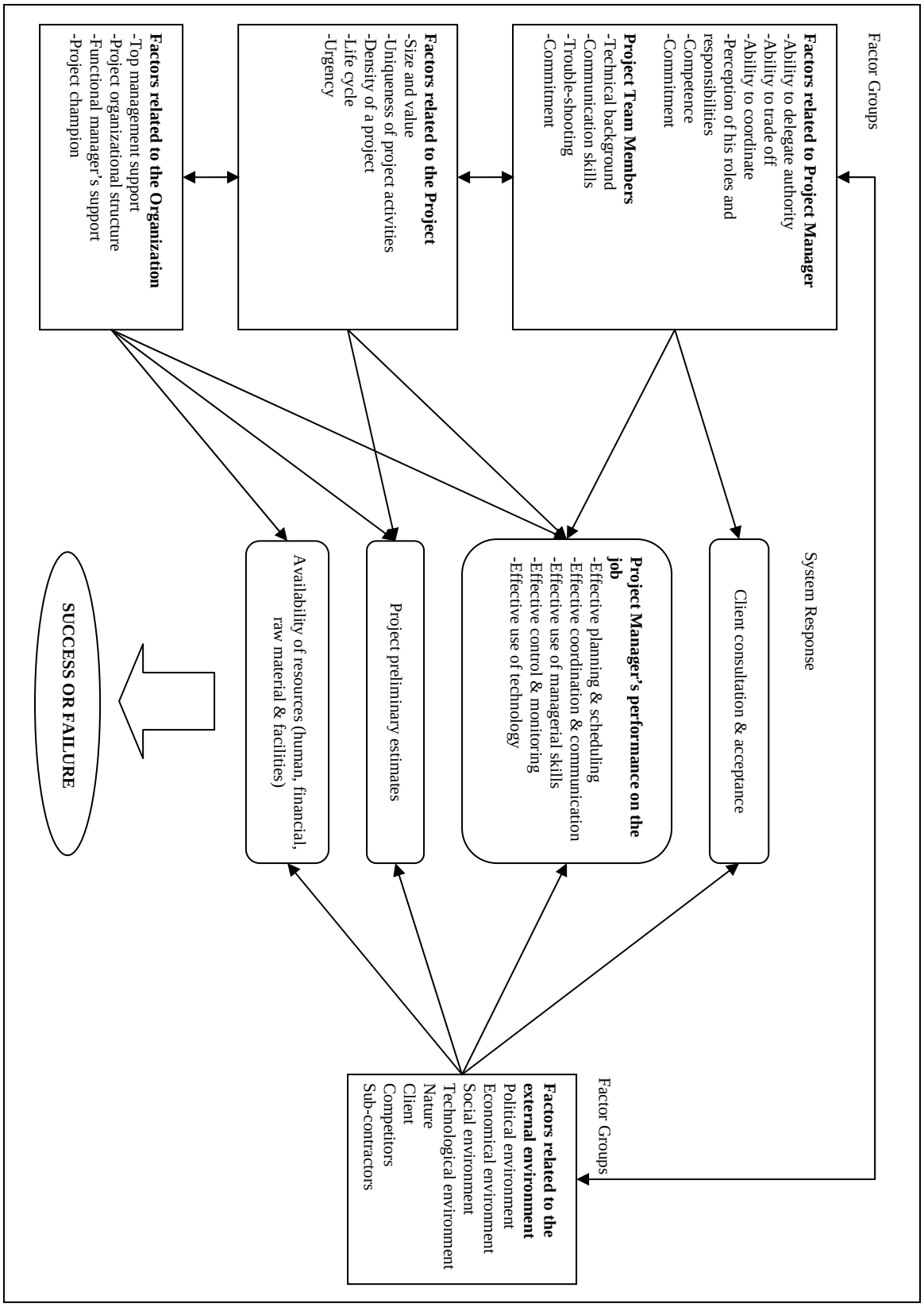

Figure 4 - *Classification of project success/failure factors (Belassi & Tukel, 1996)*

2.3.2. IS/IT Projects Success/Failure Factors

After a general view of project success/failure causes independent from the type of industry, now it is sensible to switch the gear and take the discussion towards IS/IT projects perspective. The scholars and practitioners in IS/IT project management field basically look at the same general perspectives with this exception that they should wear different lenses equipping them with the consideration of IS/IT project specifications and special needs. IS/IT field of study in general is a rather complicated area to investigate and study of systems failures in particular is even more perplex. This complexity is constantly being reinforced as figures are evidence that more and more difficulties are experienced regarding implementation of IS/IT projects. This is happening notwithstanding the more pervasive use of structured analysis/design methodologies, project management methodologies, and automated tools for both development and management of IS/IT projects (Wateridge, 1995). This describes the essential need of an integrative and generic theoretical framework for the purpose of analysis in this matter.

Flower (1996) suggests performance of IS/IT projects as a function of controlling a series of critical failure factors in organizational, financial, technical, human, and political areas, and also the interactivity amongst these perspectives. In his opinion, the IS/IT failure factors can be roughly divided into two major groups of *the organizational and managerial contexts* (the hosting organization in Belassi and Tukel (1996)'s model), and the actual *conduct of the IS/IT project development* (the project and the project manager/team members in Belassi and Tukel (1996)'s model) itself. The former could include hostile company culture, improper reporting structure, political pressures, vested interests, influences and inappropriate level of management commitment, whereas the latter might include pre-occupation with technology in project planning, technology focus over human relations, underestimated complexity, poor stakeholder management, poor consultation, design by committee, technical fix for a management problem, poor competence of project management and project team and finally poor selection decisions.

Yeo (2002) in a very interesting work has created a broad systematic framework capable of presenting a wide range of possible success/failure factors. The main drive for his model comes from the POM (Processes for Organizational Meanings) model suggested by Checkland & Holwell (1998). The POM model introduces three interrelating parts of: 'discourse' processes connecting and conciliating 'organization' context to an established 'information system' by means of embedded information technology and business process contents. Accordingly Yeo in his triple-system(S) model adopts the same philosophy of the POM model and represents three systems of: organizational system (S1) as a primary system which is to be 'served' and is context-driven, formalized information system (S2) as a supporting system which is to be 'serving' S2 and is content-driven and finally strategic project planning and delivery system (Sp) which operates in the organizational context of S1 in order to deliver a successful S2 and thus is process-driven system. Sp has a very holistic role and responsibility that is overseeing the process of preparing, planning, coordinating , and also taking care of rising social, cultural and technical issues in the system's development and implementation. Figure 5 illustrates the interaction and detailed specifications of these three systems:

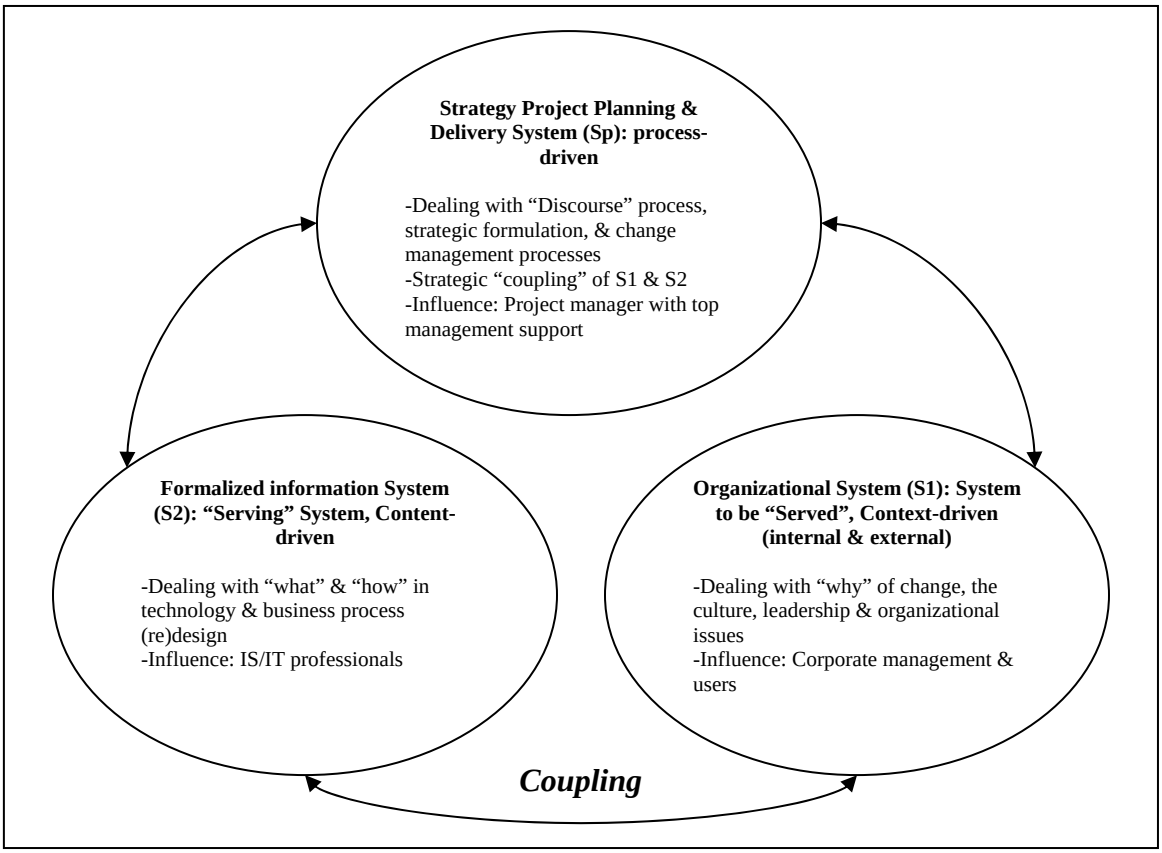

Figure 5 - *IS/IT projects success/failure factors model (Yeo, 2002)*

This consolidating triple-S model provides a rigorous framework to pinpoint, group and analyze a host of success/failure factors when it comes to IS/IT project subject. Yeo in his article names these three systems as *spheres of influence* (SOI) and afterwards nominates 10 main *issues of influence* (IOI) which go under SOIs according to their relevance. These issues in turn are translated to lists of failure factors identified by the researcher from an in-depth literature review. Tables 3 and 4 demonstrate the brief outcome of this endeavor:

Sp Process driven issues	S1 Context driven issues	S2 Content driven issues
Related to	*Related to*	*Related to*
(1) Business planning	(4) Corporate culture	(8) Information technology
(2) Project planning	(5) Corporate management	(9) Business process and system design
(3) Project management and control	(6) Users	(10) IS/IT professional and knowledge sources
	(7) Politics	

Table 3 - *Defining 'Issues of Influence' under three 'Spheres of Influence' (Yeo, 2002)*

Rank	Sp Process driven issues	S1 Context driven issues	S2 Content driven issues
1	Underestimate of timeline	Lack of user involvement and inputs from the onset	Consultant/vendor underestimated the project scope and complexity
2	Weak definition of requirements and scope	Top-down management style	Incomplete specifications when project starts
3	Inadequate project risk analysis	Poor internal communication	Inappropriate choices of software
4	Incorrect assumption regarding risk analysis	Absence of an influential champion and change agent	Changes in design specifications late the project
5	Ambiguous business needs and unclear vision	Reactive and not pro-active in dealing with problems	Involve high degree of customization in application

Table 4 - *Top 5 failure factors under Sp, S1 and S2 (Yeo, 2002)*

As a more pragmatic approach, in 1997, KPMG has conducted a very interesting survey among more than one thousand Canadian leading public and private sector corporations asking their opinions regarding IS/IT projects failure reasons and has revealed a series of results which could be counted on as a good point of reference (Whittaker, 1999). The research subjects were exposed to failure factors in terms of project accountability, project expectations establishment, risk management, project planning, project execution, project team, project employed technology architecture, and organizational culture. On the basis of these failure criteria and factors, three major reasons behind the IT projects failure were discovered; *'poor project planning'*, *'weak business case'*, and *'lack of top management involvement/support'* - in the order of importance.

According to Whittaker's (1999) elaboration on the first two reasons, as it comes to poor project planning, two issues of general weaknesses and not addressing all relevant risks in the plan are worthwhile noticing. Incorrectly estimated activity durations, incorrect assumptions regarding resource availability, inadequate assignment of activity accountabilities, and missing or incomplete review and approval activities are among the most obvious deficiencies in the project plan. On the other hand, those major missed and overlooked risks from the plan in the order of mentioned frequencies are: slippage from the schedule; change in the scope of technology, functionality or business case; cost overruns associated with one or more project components and change in any key individuals such as the business sponsor, project manager or vendor manager. Moreover, this research introduces a weak business case as the second most important reason for IS/IT project failure. The results demonstrate that factors such as: considering business and operational changes to deliver benefits, clearly understanding deliverables, quantifying costs and benefits, defining overall scope of project, and taking business and technology risks into consideration could guarantee a high quality for the a business case. In addition to these causes, some other less critical reasons were also pointed out among which we can refer to unproven employed technology, poor estimates and/or weak definitions of requirements at the project planning stage, and finally vendors' inability to meet commitments.

Whittaker (1999) investigates more in depth the results from the KPMG survey in 1997 and investigates more on schedule and budget overruns as two fundamental agents of project failure. This research concludes that the larger the organization, the higher the

risk of budget overrun in comparison to schedule overrun. Moreover, the projects slipping out of budget are more likely to fall into the pitfall of schedule overruns, whereas the opposite is not necessarily true. In the order of ranking; project management, the project team, risk management issues, and project accountabilities are factors attributing schedule and budget overruns to project failures – not to underestimate the custom-developed applications to this list. The project management issues as the top-ranked factor conceal with them some very crucial reasons for the failure. The analysis of interrelationship among factors unravels reasons why shortcomings in project management contribute the most to failure. The list consists of the risks are not well-addressed in certain areas, the project manager's insufficient prerequisites and expertise, lack of proper monitoring of the project progress and/or corrective resolutions, and finally the project manager's incoherent experience, authority and status with the nature, scope and risks involved in the project.

In another real world study, The National Audit Office (NAO) in UK after investigation of some major public sector IS/IT projects failures, has spotted several reasons behind them; failing to appreciate and manage the related risks involved in systems integration projects, trying to reach implementation in rather very short periods of time, shortages in testing the projects, insufficient end-user engagement, inadequate in-house IT skills and human resources, dysfunctional business case, and lots of issues related to suppliers and the procurement processes e.g. over-promising of deliverables to win the bids are among the most well-known factors (Williams, 1996). In a more recent publication from the UK National Audit Office in 2004, with a more holistic view over both public and private sector IS/IT projects, an interesting list of key causes of IS/IT failures has been reported adding some new causes to this list; such as: poor understanding of IS/IT industry implications in diverse organizations and failure to link between IS/IT project and the changes the organizations need to undergo to do business, lack of ownership of projects at higher levels of management layers, and finally failure to do properly work-break-down procedures to break a big IS/IT project into smaller ones (Hinde & Bupa, 2005).

2.4. Some Major Factors

2.4.1. People- and Culture-related Failure Factors

In reviewing the literature, oftentimes many scholars and researchers highlight the fact that people and all the shortcomings related to and derived from them are playing most pivotal role in the success/failure of projects. It is to the extent that Cooke-Davies (2003) believes: "people perform every process, and it is the people who ultimately determine the adequacy. Thus the 'people' side of the success factors is woven into their very fabric." Moynihan (2002) goes even deeper into this perspective and lists issues such as: unrealistic customer expectations, lack of ownership of the project by anyone in the client organization, disagreement about the project's goal within the client organization, lack of skill of the client's project manager, unwillingness of users and finally politics in the client organization among the most well-known 'people-problems'. Staying close to the field of people-related issues, Gray (2001) switches the spotlight on the culture of the organization. He has found out that when there is the risk of failure in a project, there is always a strong threat sensed in the air against project participants in terms of their career

prospects, reputation, financial returns and also self-image. With this circumstance reining the culture of an organization, the projects have a great tendency to fail. On the other hand, the likelihood of project success soars if the organizational culture esteems what Gray calls 'voluntarism' i.e. free expression, questioning of management decisions, participating in defining goals and intrinsic work satisfaction. Ray de Winter from the 15th IPMA World Congress (Kippenberger, 2000) believes that there is a spectrum of attitudes in any organizations towards a certain project and he characterizes five types of people in this regard: 'overt saboteur' who are extremely easily to spot and protest explicitly against a project and do their best to limit the scope and change the direction of it; 'passive resister' who are a bit harder to identify in respect to the former group covertly try to derail the project by stealthily weakening the arraignments for the project progression; ' non-committed' who are essentially neutral, only observe the situation from sidelines and intervene only in case their own interests are at stake; 'well-wisher' who have relatively supportive attitude towards the project but only help reactively when their assistance is required; and finally 'fully-committed' have the highest interest in the success of the project and dedicate all is needed to realize the prosperity of the project.

Standing *et al.* (2006) have used 'attribution theory' in their research and examined how different IT professionals such as chief information officers (CIO) and other senior IT managers, operational/line managers, and IT operations/support staff attribute success/failure in the context of IS/IT projects. According to 'attribution theory' this exploration could be based on a four –dimensional study; internal/external (the extent to which the causes of success/failure could be mapped externally to other people and circumstances or internally to the individual), stable/unstable (the extent to which the same causes will still affect success/failure of projects in future), global/specific (the extent to which the same causes for IT project success/failure would effect other areas of one's work), and finally controllable/uncontrollable (the degree of influence and control of an individual over causes of success/failure). The most important practical and managerial implication of this study is that the IT professionals do not attribute success/failure in exactly the same way. At the lower levels of the organization hierarchy, IT operation and support workers attribute much more the success to themselves than they do the failure meanwhile they show little awareness about the external elements. This is mainly because they are not mature enough to estimate fairly their contribution or undertake the responsibility for failure. On the other hand, IT executives who are mostly senior, experienced and accountable people attribute heavily the failure to themselves while linking the success to the contextual factors affecting the project. In the middle layers, line and operation managers respond much more moderately and attribute a large responsibility of both success and failure to themselves. This is along with their underemphasizing view over environmental and contextual factors. The bottom line is the level of maturity in terms of accountability and experience of IT professionals when judging the causes of success or failure. Figure 6 illustrates a model of this maturity:

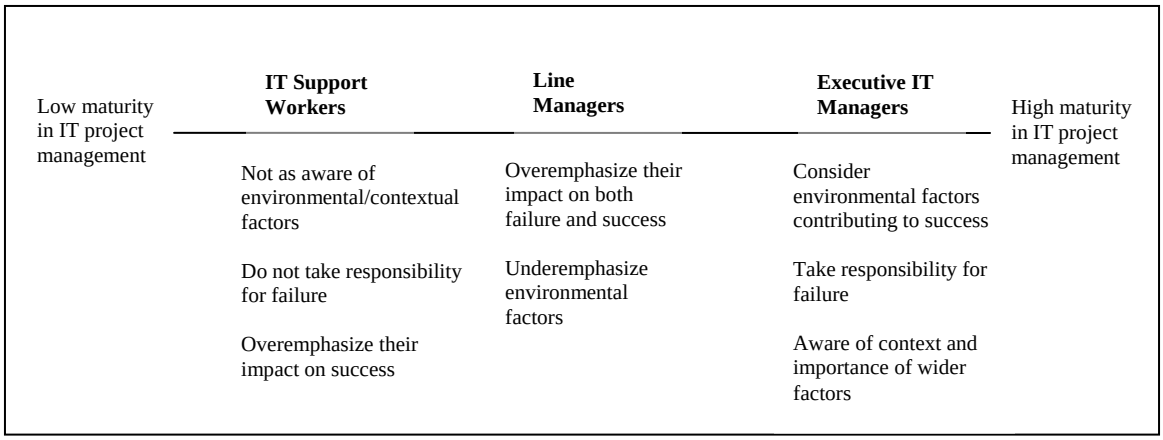

Figure 6 - *Attribution model for IS/IT professionals (Standing et al., 2006)*

What the findings from Standing and his colleagues' research have not covered is IS/IT projects success/failure factors from the software developers' perspective. Linberg (1999) conducted a relatively complete literature review and outlined the most prominent reasons in lack of six influential aspects; effective leadership, conductive organizational climate, technological realistic requirements, realistic schedule and effort estimates, sufficient software personnel and other necessary resources, and finally a diverse and synergic team, all from the software developer's standpoint. The noticeable emphasis of these results is advocating software developers' role in terms of their motivation, personal growth, and job performance, satisfaction and commitment in performing IS/IT projects.

2.4.2. Planning-related Failure Factors

The relationship between project planning aspect and the degree of success/failure in projects is quite a controversial matter. Where there is a vast amount of positive ideas in favor of a concrete planning for a project to ensure the success, the literature review has brought to the scene some opposing opinions. Dvir *et al.* (2003) argue that even though a decent level of planning for a successful project is vital, there is not an essential positive correlation between planning and success – if not negative all together. Burnably Lautier from the 15th IPMA World Congress (Kippenberger, 2000) believes that in reality being able to perform a project according to what has been planned is an exception rather than a norm. He actually believes that too much emphasis on planning and trying to stick to it would decrease the chances of success for a project. He reveals two important points related to excessive attachment to the plans; firstly, financial planning focuses more on the cost than the time, so spending excessive efforts to save money to avoid cost overruns, will create delays which result in time overruns that are more costly than what was planned for. Secondly, when it comes to time planning (scheduling), project managers either constantly look backwards or so fixed at the present moment to compare the progress according to the plan which consequently prevents them from looking forward and anticipating changes and doing corrections in time.

2.4.3. Top Management-related Failure Factors

Glaster (2005) once and again in his commentary on the IS/IT projects failure puts vast amount of emphasis on insufficient support from senior management and leadership

through setting unclear purpose from employing a certain project, incapability to manage complexity, under-nourishing initiatives, failure to anticipate short-term disruptions, inability to demonstrate the invisible progress and eventually disregard for the stability and maturity of the used technology. He elaborates these points by expressing that even if the leadership fully comprehends the nature of needed changes to the organization, they might fall into illusion how these changes could cause uncertainty and complexity by impacting the routine process of their organization. Furthermore he underlines the necessity to provide the most qualified staff and resources for supporting the initiatives in establishing a new IS/IT project. He also admits the fact that any new changes resulted from newly introduced IS/IT project would for sure disrupt in short-terms the everyday routine of the work in any system. This needs support and encouraging words of the top management to mitigate the frustration raised in the morale of subordinates. One important issue not to underestimate is the fact that the progression in the project might happen to be too slight to be visible to the organization which would add to the spice of complexity of the situation. Glaster suggests that top management must continuously strive to reveal the fulfillment of series of short-term deliverables to the organization. The last but not the least, he recognizes the fact that an adopted technology in a IS/IT project could require a lot to reach to a certain level of stability, supportability and maturity prior to be completely acceptable by the users and the host organization. The emerging technologies of this kind always bear with them a high risk of failure on one hand, but on the other hand they could provide a tremendous competitive advantage by letting the host organization achieve differential value by being an early adopter. Running pilot projects experiencing the immature technology with limited implementation scope and minimizing the potential harms are considered as a subtle solution in these cases. Garth Ward from the 15th IPMA World Congress (Kippenberger, 2000) by revealing some very subtle points contributes even more to the influence top management can have on the success/failure of a project. He remarks the precision of information concerning the nature of project communicated from top management as the project sponsors to project managers from the inception. It is also vital that project managers also convey their messages by means of business-oriented concepts (vs. IS/IT-oriented ones which might not be comprehensible to top management) to project sponsors (Kumar, 2002). In continue Ward underlines some more considerations from the side of top management among which are: the clarity of business case, recognition of time spent on project planning, responsibility in proper resource allocation (as portfolio managers) and not merely depending on project management methodologies instead of people's creativity and resourcefulness.

2.4.4. Risk Management-related Failure Factors

Remenyi (1999) discuss that in the field of IS/IT projects, there is surprisingly an excessive amount of lip service regarding risk management where organizations either totally disregard the assessment of likelihood and impact of imminent risks or do not at all sufficiently accredit it and consider it as a redundant add-on to the project life-cycle. They do believe that risk management should be seen as an integral and dispensable ingredient of fulfilling IS/IT project management. In their opinion, the risks in IS/IT projects can fall into any of three classes of: business, development or architecture. Additionally, the significance of risk management's role is entirely proportionate with the

size of the organization. The research confirms that the larger the organization, the greater the influence of risk management as a factor in IS/IT project failure (Whittaker, 1999). Cannon (1994) from a series of case studies extracts three new dimensions of: *size of the project*, *experience of the technology* and *degree of the specificity of the end result* as the major sources for an IS/IT project's risk. On this basis, as the size of the projects increases, specificity of the requirements/objectives of the project (task definition) plummets or the experience of the employed technology and the competence of its executive people (technical experience) are kept low, the probability of failure soars. This is the perspective that brings to the scene what Cannon (1994) calls 'risk assessment cube' and opens up the involvement of risk management as a major factor in project success/failure. Figure 7 illustrates how these dimensions would affect the degree of risk in a project success.

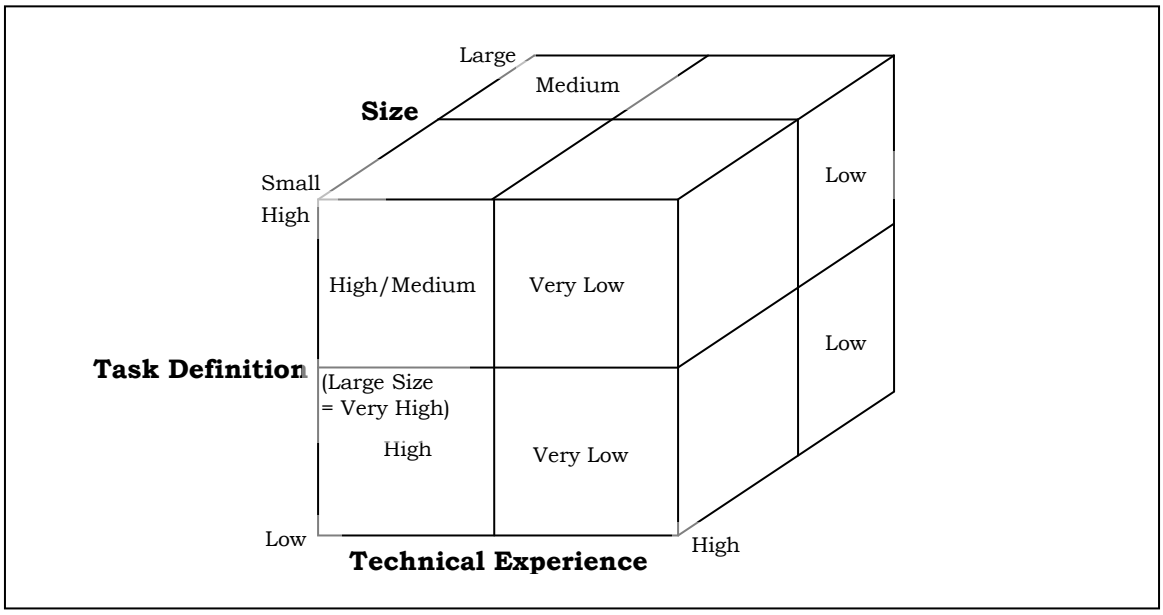

Figure 7 - *Risk Assessment Cube (Cannon, 1994)*

Comprehending the importance of IS/IT projects risk management; it is strongly felt the need to employ a solid framework to manage risks in this subject matter. Boehm (1991), Jiang & Klein (1999) and Rapponen (1999) in there researches have investigated the concept of uncertainty in managing IS/IT projects and have recognized risks such as specification uncertainty (because of vague business conditions or lack of knowledge), incorrect understanding of specifications, overlooked specifications, unrealistic schedules and budgets, shortcomings from externally supplied components and services, inadequate real-time performance, and technical uncertainty because of innovative nature of the project.

IS/IT project managers basically should handle risk management task initially by identifying the kind of related risks and later on by establishing a proper risk management strategy – called collectively 'risk mitigation strategies'. Risk treatment strategy could take either of the following two forms: the first is based on the idea of reducing the degree of risk (reduction strategies) or the second which is the strategy to manage the

impact of the risk (risk hedging strategies) (Kumar, 2002). The latter strategy which originates from the fact that risks can not be totally eliminated is in nature insurance-like and aims at minimizing the destructive impact of risk as the related uncertainty will get moderate over time. Kumar (2002) introduces a very intriguing framework relating well-known IS/IT projects risks to their proper resolutions under risk reduction and risk hedging strategies. In his proposal, Kumar suggests traditional methods such as checklists of risks and their probability analysis for risk reduction strategy and 'options' approach based on instead of 'decision tree' approach for risk hedging strategy. He believes that these two strategies complementing each other could contribute a lot to IS/IT projects risk management. Table 5 demonstrates some risks and their related remedy strategies:

Risk	**Risk reduction strategies**	**Options-based risk hedging strategies**
Change requests due to business changes	Interview multiple people to understand different types of uncertainties and impact on different stages of the project	Option to defer stages of the project affected by uncertainties. Option to contract scale of the project
Change request due users lack of knowledge of their own requirements or overlooked requirements	High degree of feedback and user interaction through diagrams, and prototypes training	Option to defer stages of the project affected by uncertainties. Option to contract scale of the project
Hardware or software price risk	Clauses in contracts (if possible)	Option to defer commitment to hardware purchases
Hardware or software technology change risk	Clauses in contracts (if possible)	Option to defer hardware decisions
Technical performance risk	Use of experienced consultants	Option to expand. Option to contract or abandon
Managerial support risk	Explain costs and benefits of the project including option values	Option to expand. Option to contract or abandon

Table 5 - *Risk reduction and hedging strategies (Kumar, 2002)*

Staying in the field of risk management, Kappelman *et al.* (2006) believe that although in modern times human beings understand and measure risks and their consequences very well in a general sense, strangely IS/IT project management is unacceptably immature and naive in mastering and applying risk management skills. They propose a new concept in this regard called 'early warning signs' (EWSs). They define a warning sign as "an event or indication that predicts, cautions, or alerts one of possible or impending problems". They are significant symptoms showing up long before occurrence of a failure – normally in the first 20 percent portion of the project's life-cycle. In their study of academic literature and practitioner journals along with feedbacks from experienced IS/IT project managers, they prepare a list of 53 EWSs among which they made an effort to underline and elaborate those dominant dozen ones. Aligned with classification of failure factors mindset, they take advantage of the model, Wallace *et al.* (2004) had introduced, in that they grouped IS/IT project risks in three overall category of *social subsystem, project management,* and *technical subsystem* risks or simply *people, process* and *product* risks. The results from Kappelman *et al.* (2006) research made it revealed that all highly ranked risks in IS/IT context are mainly raised from people and process origins and if there exists any product (technical) ailments of IS/IT projects, they are all definitely traced back to people and process shortcomings, incapable of resolving issues

such as large size, high complexity and technology novelty embedded in product risks. On this basis, Kappelman et al. (2006) have divided the dominant dozen EWSs into two main groups of *people-related* and *process-related* EWSs.

The six people-related EWSs of IS/IT project failure formed around five groups of people of *top management, project management, project team members, subject matter experts (SMEs)* – experts proving guidance to the project team, and *stakeholders (users)* are:

1. Lack of top management support
2. Weak project manager
3. No stakeholder involvement and/or participation
4. Weak communication of project team
5. Team members lack of requisite knowledge and/or skills
6. Overscheduled subject matter experts (SMEs)

The six process-related EWSs of IS/IT project failure centered on five project management process and their directly related deliverables of *requirements (including a business case), change control, schedule, communications,* and *resources* are:

7. Lack of documented requirement and/or success criteria
8. No business case for the project
9. No change control process
10. Ineffective schedule planning and/or management
11. Communication breakdown among stakeholders
12. Resources allocated to a higher priority project

Prioritizing sufficient care to understand these 'early warning signs' at early stages of the project's life-cycle would increase drastically the likelihood of success, terminate those projects doomed to failure and avoid situations beforehand they become project 'death marches'.

Major IS/IT projects, particularly those that are accompanied by major organizational change, will always have a nontrivial level of risk. There are also times when a review of the failure factors discussed indicates that the project is just too risky. The organization may not be ready, there may be too much baggage or too much inertia to overcome, the best team may not be available, the organization may not be good at handling conflict, and/or the project may require too much new information technology. Projects that have too much risk should not be undertaken until progress has been made in addressing the failure factors. Glaser (2005) as a conclusion for this factor strongly believes that effective management of IS/IT project risk if not the only but for sure is one of the most critical contributors to IS/IT projects success/failure.

2.4.5. Psychology-related Failure Factors

Chulkov and Desai (2005) have taken a rather philosophical stance. Firstly, they bring out the opinion of Mahancy and Lederer (2003) who introduced the presence of *agency problem* as one of the major explanations of the project write-offs. This is the issue

coming from the ‘agency theory’ i.e. the managers because of having better knowledge and understanding of the project’s progress than other stakeholders, are the first to know about the project failure and have the most reasonable incitement not to reveal the fact of failure to defend their reputation. Secondly, the *escalation problem* from the side of the managers (Keil *et al*., 1994) is emphasized. This escalation issue is generally described as the case in which the commitment of providing resources unchangeably continues despite of the fact that managers are receiving discouraging feedbacks from the progression of the project. In this case, the IT project is considered a ‘runaway’ case which is destined to slip out of planned schedule and budget creating more losses for the firm. The real reason behind the escalation of commitment is the ‘self-justification theory’ i.e. the managers seek to appear as much sensible in what they are deciding on to themselves as to the others in the firm in the face of the fact that the whole idea of escalation is inherently fallacious and damaging to the firm in the first place. And lastly, Chulkov and Desai with a different perspective focus on the very initial stage of project life-cycle that is the selection and decision-making criteria instead. They introduce the concept of the *bandit problem* in the context of IT project selection by an organization. The pivotal idea is that under a given circumstances it is always optimal to select a highly risky option with low probability of success but with high hope of striking it rich early prior to selection of a safer one that is more likely to come out successful but has definitely much lower maximum reward. In few words, the bandit perspective on IT industry project selection argues that an organization should look into the risky innovative IT projects which are worth their risk before going for safer ones. This would in consequence result in a high number of failures.

3. Research Method

The bottom line purpose of this research is to find out the most influential failure factors regarding IS/IT projects in Iran. To face this challenging research topic, a need of employing a combined qualitative and quantitative research strategies has been perceived appropriate. Thus, the general approaching strategy in this research is two-fold consisting of both of these fundamental research strategies – one generating the theory and the other testing the same theory.

Firstly, with a qualitative framework, a series of in-depth interviews have been conducted with five IS/IT project management gurus in Iran. These accredited individuals mostly are university tutors with solid academic backgrounds from American and European universities. Moreover, they are basically considered among those cornerstones in project management profession in Iran and are constantly active in the area of IS/IT consultations - either in their own private consulting companies or in the government public sector. This part of research methodology has three major characteristics; it is inductive (generating theory from evidence), interpretivism (how individuals interpreting the social world and rejecting norms of natural sciences) in its epistemological orientation, and constructionism (social reality being the fruit of individuals' creation) from an ontological perspective. The outcome of these interviews is the source to create a list of generally accepted failure factors conceived by IS/IT project management society. The norm literature ideas of failure factor classification presented in the literature review are used to categorize these failure causes. Aligned with an inductive mindset, these factors are used as primary ingredients to create a blueprint theory of IS/IT projects failure factors in the diverse context of organizations in Iran. The factors are divided into two main groups of project context- and content-related factors.

Secondly, with a qualitative approach, a host of 39 subject organizations have been surveyed according to the list of failure factors resulting from the first part of research. These organizations are an amalgamation of public and private sector organizations which have genuinely perceived the significance of integrating IS/IT systems both in their business processes and the way they deliver their services and products. The respondent agent in the target organization who is deliberately chosen the very same senior project manager in charge or one of his assistants e.g. a junior project manager, initially have been asked to rank those issues identified in context-related list in the order of their perceived importance. In continue, regarding the content-related factors, the degree of influence of the size of the hosting organizations and projects on the failure/success of projects are investigated. The quantitative essence of this part of research is featured by a deductive philosophy (testing validity of the theory through evidence), positivism (incorporating the norms of natural scientific models) from an epistemological standpoint and eventually objectivism (social reality is external and an objective matter) in an ontological orientation. The theory to be tested in this part of the research is actually the theory constructed from qualitative process in the first part which in turn is approved to a great extent on the ground of the classic school of thoughts in the discipline of project management presented in the literature review section.

When it comes to choosing a research design for this study, as it has been implicitly referred to previously, two cross-sectional - also known as social survey - designs for each of two parts of the strategy are chosen. The techniques (instruments) for performing these research designs are unstructured in-depth interviews for the former and self-completion questionnaire for the latter.

In the unstructured interviews, each of five subjects is exposed to the briefly stated question of: “What is your general opinion on the subject of factors engaged in IS/IT projects in Iran?” which has been followed up by a series of in-depth improvised questions suiting the course of interview. It has been asked from the interviewees to respond as freely and in detail as possible to these matters. The effort is made to transform these interviews into more informal conversations to turn around the issue of professional secrecy and organizational politics complications which are very common in Iran. The notion of making use of the results of the interviews in a dissertation work in a western university from where the writer has shown interest to investigate the project management field in Iran, has been an encouraging in order that the interviewees speak more freely.

As the questionnaire part of the social survey in the second stage of the research design; firstly, regarding the context-related factors, the research subjects are asked to answer to what degree on a scale of one to five, they agree on the influence of the factors identified from interviews on the IS/IT projects failure in their organizations. Secondly, when the matter comes to content-related issues, assuming each interviewee represents an organization and the organization size is a variable, they have been asked how many of them consider their organization to be successful and mature in IS/IT project management field. And finally, with postulation that the project size is a variable, the representatives of organizations have been asked to provide an estimated rate of IS/IT projects failure in their own organization on the basis of the project size.

In a nutshell, the plot of the research has two steps: firstly, establishing a new framework of commonly accepted failure factors in the field of IS/IT project management in Iran through interviews, and secondly, finding out what the main causes of IS/IT projects failure are in Iran through testing this customized framework of factors on a host of subject organizations.

4. Research Results

As it is outlined in the research method section, the research part of this study consists of two different but related social surveys with a cross-sectional attribute. The fist part focuses on five in-depth unstructured interviews and the second one deals with self-administrated questionnaires handed to a sample group of 50 project managers out of which 39 respondents from 39 different organizations have contributed to this research. The results from the interviews where the interviewees have provided the writer with very genuine and priceless knowledge include the commonly perceived factors and their implications in the failure of IS/IT projects in Iran. These are divided into two main context- and content-driven categories. The context-related issues sum up to 26 sub-factors under four main categories of (A) technical/human resources, (B) socio-cultural, (C) managerial/strategic and (D) economic/financial; and content-related one consists of the size of organization with number of employees as variable and the size of project with cost, time and size of the project team as variables. These factors are presented in the following tables:

Context-related Factors	
A - Technical/Human Resource	**C – Managerial/Strategic**
A1 – Insufficient Information & Communication Technology (ICT) network infrastructure	C1 – General weakness in IS/IT industry policy-making in Iran
A2 – Inadequate number of highly qualified Internet Service Providers (ISP)	C2 – Lack of commitment from organizational top management to support IS/IT projects
A3 – Lack of widespread software development knowledge and expertise	C3 – Inappropriate management approaches and mindsets in IS/IT projects field
A4 – Low accessibility to broadband connectivity	C4 – Conflicting decentralized decision-making systems in organizations for IS/IT projects
A5 – Low reliability on present ICT network infrastructure in terms of quality of service (QoS)	C5 – Overlaps of planning, design, implementation, controlling and operation phases in IS/IT projects
A6 – Lack of expertise in terms of project management and IS/IT *experience*	C6 – Dysfunctional implementation & operation phases in IS/IT projects
A7 – Lack of expertise in terms of project management and IS/IT *knowledge & techniques*	C7 – Conflicting goals and miscommunication between department managers and project managers
	C8 – Lack of collaboration among departments
	C9 – Lack of a national program for IS/IT systems
	C10 – High turnover ratio of executives
B - Socio-cultural	**D – Economic/Financial**
B1 – Cultural issues in acceptance and making proper use of IS/IT systems in organizations	D1 – Lack of financial power of organizations to start IS/IT projects
B2 – General senior management's lack of knowledge about structures and functions of IS/IT	D2 – Low economic efficiency of IS/IT systems
B3 – Intangible identity of IS/IT implications in business processes in organizational cultures	D3 – Long term investment to reach economic efficiency
B4 – Other key stakeholders' lack of knowledge of advantages of IS/IT systems	D4 – Insufficient financial recourses to gain connectivity to web networks (the Internet, intranets and extranets)
B5 – High resistance against change from traditional systems to electronic IS/IT systems	

Table 6 - *Context-related factors extracted from interviews*

Content-related Factors	
The Size of Organization	**The Size of Project**
Small (employees<50)	Budget
Medium (50<employees<250)	Time
Large (employees>250)	Size of project team

Table 7 - *Content-related factors extracted from interviews*

The second part of the survey draws on the results from the first part. The questionnaire handed in to respondents has two main sections. In the first section, subjects are asked to give their degree of agreement not only on four main groups of context-related factors (A, B, C and D) but also on the sub-factors in each group. Answer to each factor should only be chosen one out of five options: 'strongly disagree', 'disagree', 'undecided', 'agree' and 'strongly agree' which according to Likert scale they are coded by values from 1 to 5. For the sake of simplicity, the respondents to each factor are divided into two groups of those 'strongly disagree', 'disagree' or 'undecided' (<=3); and the group of those 'agree' or 'strongly agree' (>3). In those cases where disagreements (<=3) prevail agreements (>3) among 39 respondents, a non-parametric one-tailed binominal statistical test with 95% of confidence interval is conducted. All those factors with a resulted significance level lower than 0.05 are discarded. This would eliminate those factors which do not have at all any effect on failure of projects. The outcome proves that four main context-related factors (A, B, C, and D) collectively are all influential, whereas seven context-related sub-factors of (A2), (A3), (A5), (B3), (C1), (D1) and (D4) should be excluded because they do not have any effect on the failure of projects.

Factor	Group	Respondent	%	Significance Level
A	<= 3	25	0.64	0.109
	> 3	14	0.36	
		39	1.00	
B	<= 3	16	0.69	0.337
	> 3	23	0.31	
		39	1.00	
C	<= 3	10	0.74	0.004
	> 3	29	0.26	
		39	1.00	
D	<= 3	14	0.49	0.109
	> 3	25	0.51	
		39	1.00	

Table 8 - *Group factors statistical calculations*

Factor	Group	PMs	%	Significance Level	Factor	Group	PMs	%	Significance Level
A1	<= 3	18	0.46	0.749	C2	<= 3	0	0.00	0.000
	> 3	21	0.54			> 3	39	1.00	
		39	1.00				39	1.00	
A2	<= 3	27	0.69	0.025	C3	<= 3	16	0.41	0.337
	> 3	12	0.31			> 3	23	0.59	
		39	1.00				39	1.00	
A3	<= 3	29	0.74	0.004	C4	<= 3	10	0.26	0.004
	> 3	10	0.26			> 3	29	0.74	
		39	1.00				39	1.00	
A4	<= 3	19	0.49	1.000	C5	<= 3	14	0.36	0.109
	> 3	20	0.51			> 3	25	0.64	
		39	1.00				39	1.00	
A5	<= 3	37	0.95	0.000	C6	<= 3	17	0.44	0.522
	> 3	2	0.05			> 3	22	0.56	
		39	1.00				39	1.00	
A6	<= 3	13	0.33	0.055	C7	<= 3	10	0.26	0.004
	> 3	26	0.67			> 3	29	0.74	
		39	1.00				39	1.00	
A7	<= 3	6	0.15	0.000	C8	<= 3	15	0.38	0.200
	> 3	33	0.85			> 3	24	0.62	
		39	1.00				39	1.00	
B1	<= 3	10	0.26	0.004	C9	<= 3	16	0.41	0.337
	> 3	29	0.74			> 3	23	0.59	
		39	1.00				39	1.00	
B2	<= 3	11	0.28	0.010	C10	<= 3	12	0.31	0.025
	> 3	28	0.72			> 3	27	0.69	
		39	1.00				39	1.00	
B3	<= 3	33	0.85	0.000	D1	<= 3	29	0.74	0.004
	> 3	6	0.15			> 3	10	0.26	
		39	1.00				39	1.00	
B4	<= 3	15	0.38	0.200	D2	<= 3	16	0.41	0.337
	> 3	24	0.62			> 3	23	0.59	
		39	1.00				39	1.00	
B5	<= 3	12	0.31	0.025	D3	<= 3	10	0.26	0.004
	> 3	27	0.69			> 3	29	0.74	
		39	1.00				39	1.00	
C1	<= 3	31	0.79	0.000	D4	<= 3	27	0.69	0.025
	> 3	8	0.21			> 3	12	0.31	
		39	1.00				39	1.00	

Table 9 - *Subgroup factors statistical calculations*

After eliminating those unrelated factors, at this point, a non-parametric statistical test such as *Friedman* test is made use of to give ranking to each of these failure factors on the basis of how 39 respondents have given them importance. The following is the final results, both for four main context-related factors and their related sub-factors:

Factor	Coefficient	Unsorted Ranking	Factors	Sorted Ranking
A	0.245670	4	C	1
B	0.250874	2	B	2
C	0.255697	1	D	3
D	0.247949	3	A	4

Table 10 - *Group factors rankings*

Factor	Coefficient	Unsorted Ranking	Factors	Sorted Ranking
A1	0.050197	16	C2	1
A4	0.050556	14	B2	2
A6	0.052349	10	C4	3
A7	0.054500	5	B1	4
B1	0.054500	4	A7	5
B2	0.058085	2	C7	6
B4	0.050197	17	C5	7
B5	0.050014	12	C6	8
C2	0.064181	1	D3	9
C3	0.049480	19	A6	10
C4	0.054500	3	B5	11
C5	0.052349	7	C10	12
C6	0.052349	8	A4	13
C7	0.052349	6	C8	14
C8	0.050556	15	A1	15
C9	0.049480	20	B4	16
C10	0.050914	13	D2	17
D2	0.050197	18	C3	18
D3	0.052349	9	C9	19

Table 11 - *Subgroup factors rankings*

The second section of the questionnaire deals with the effect of the content-related factors – organization and project size – on the rate of failure/success of projects. The size of organizations has been divided into three groups of small (employees<50), medium (50<employees<250), and large (employees>250) on the basis of the number of employees. Each of 39 representatives of organizations have been asked on the ground of the size of their organization, if they are perceived successful and mature when it comes to IS/IT projects – from planning all through operation phases. The result of this part of survey is found below:

	Large	Medium	Small
Organizations	16	13	10
Failed Organizations	12	8	5
Failure Rate	0.75	0.62	0.50

Table 12 - *Organizational size divisions*

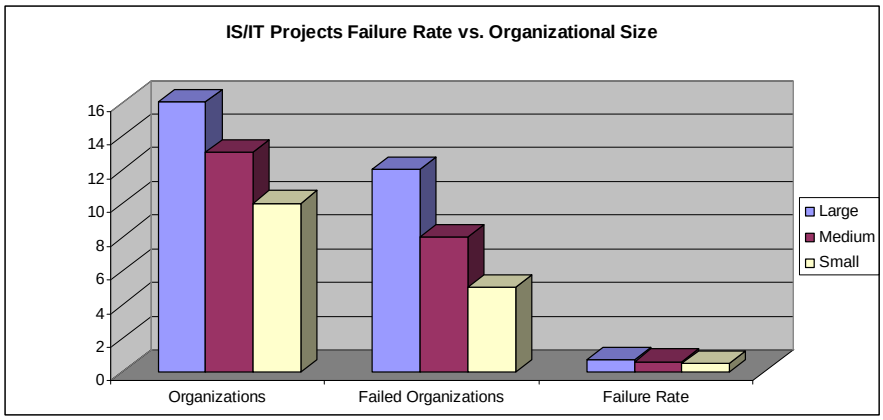

Figure 8 - *IS/IT projects failure rate vs. organizational size*

Regarding the size of projects, three indirect variables of budget, time and team size have be nominated appropriate parameters to determine the magnitude of an IS/IT project by interviewees. The projects could be categorized into five groups which are attributed by these three interrelated parameters. The history of success/failure of IS/IT projects in each of 39 organizations have been examined according to this criteria through their representatives. The table () illustrates the size-wise categories of projects collectively undertaken by these 39 organizations and afterwards the percentage of failure for each group has been calculated:

Group	Budget	Time	Team Size	Failure Rate
1	< 2 m	3 months	4	0.40
2	2 - 10 m	6 months	9	0.42
3	10 - 50 m	9 months	12	0.63
4	50 - 100 m	12 months	20	0.78
5	> 100 m	18 months	30	0.98

Table 13 - *Project size divisions*

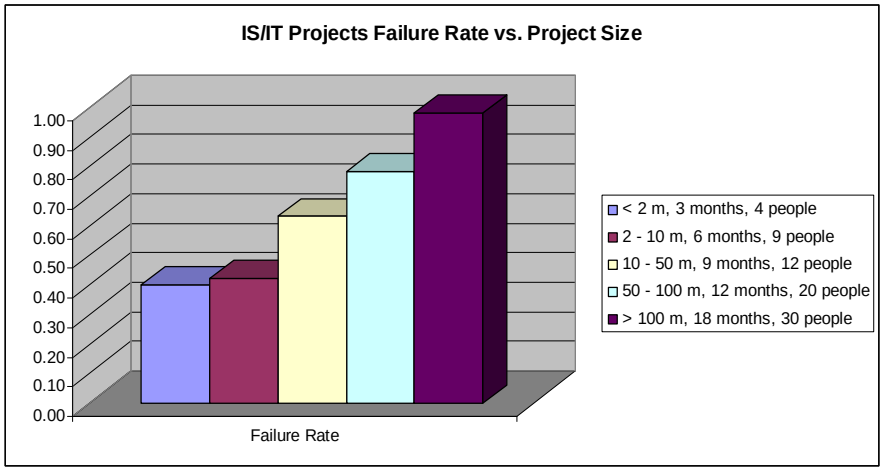

Figure 9 - *IS/IT projects failure rate vs. project size*

When looking into the results from context-related factors, as it is demonstrated in Table 10, it is seen that managerial/strategic and socio-cultural subgroups of factors have correspondingly the first and second highest impact on the failure of IS/IT projects. After them, there are economic/financial and technical/human resource subgroups of factors which in the order of their appearance are critical. Moreover, considering collectively all of 19 of failure factors, the top ten most highly ranked causes of failure – according to Table 11 - are:

1. Lack of commitment from organizational top management to support IS/IT projects
2. General senior management's lack of knowledge about structures and functions of IS/IT
3. Conflicting decentralized decision-making systems in organizations for IS/IT projects
4. Cultural issues in acceptance and making proper use of IS/IT systems in organizations
5. Lack of expertise in terms of project management and IS/IT *knowledge & techniques*
6. Conflicting goals and miscommunication between department managers and project managers
7. Overlaps of planning, design, implementation, controlling and operation phases in IS/IT projects
8. Dysfunctional implementation & operation phases in IS/IT projects
9. Long term investment to reach economic efficiency
10. Lack of expertise in terms of project management and IS/IT *experience*

The last obvious and concrete conclusion from the questionnaire section regarding content-related factors is that as the size of organizations hosting the IS/IT projects and also the size of project itself in terms of value, time density and project team members increases, the risk of failure respectively soars – visualized in Figures 8 and 9. This confirms the fact that the size of organizations and the IS/IT projects fostered in them have positive correlation with the ratio of failure of this kind of projects in organizations.

5. Data Analysis

The analysis of results of this research should address both the quality of outcome from the interviews forming the list of failure factors – context-related and content-related – as well as the statistically summarized and classified data resulted from questionnaires.

As far as it is concerned with the analytical study, validity and classification of identified failure factors from interviews, the attempt has been made to draw as much as possible on the theoretical models and ideas presented in the literature review chapters. The context- and content-related failure factors presented in Tables 6 and 7 cover most of the factors in Belassi's and Tukel's (1996) model in terms of *project manager and team members* (A6, A7, C3, C5, C6, size of team), *hosting organization* (B1-5, C2, C4, C7, C8, C10, D1-4, size of organization), *project* (time and budget), and finally *external factors* (A1-5, C1, C9). It can be easily noticed that in Iranian IS/IT project management context, project managers as the target interviewees in this research, find most of the causes of the failure rooting in the organization hosting the IS/IT project and external factors. This conclusion from the analysis of results both approves and contradicts the idea of Standing *et al.* (2006) who in his 'attribution model' argues that while project managers are fully aware of the influence of environmental (external) factors, they most of the time bear the responsibility of project failure on their own shoulders and relate it to their own lack of expertise in terms of knowledge, competence or experience and likely to those of project team members. This fact would lead the analysis to the point that in the factors identified from interviews, except for C3, C5, C6, A6 and A7 factors, there is not enough emphasis on the shortcomings originating from project management procedures and methodologies. Moreover, the outcome of the interviews surprisingly demonstrate that there is almost no trace of mentioning the basic elements of success/failure criteria which are remaining in the predefined limits of time, budget and quality for IS/IT projects. The lack of concern regarding project planning, scheduling, monitoring, time estimation, cost control and underestimating the volatility of project requirements and targets reflected in interviews, are evidences to two opposing conclusions. On one hand, this could be a proof that – according to Krezner (2003) – since 1990 there is a major transition of preoccupations in the discipline of project from quantitative issues to qualitative ones management in a global scale. This implies that there is a shift of focus regarding project failure factors towards degraded morale, motivation, human relations, productivity, and commitment plus countless problem-solving and policy-making complications and also confliction between executives, project managers, and line managers; not to mention among departments. On the other hand, the negligence of addressing fundamental elements such as time, cost and performance from the side of project management society in Iran could be an indication of the fact that this society has forgotten altogether the principles of the profession. If this turns out to be the case, a revolutionary movement is required to change the entire mindset of project management profession in Iran.

It is easily recognizable that C2 from managerial/strategic factor group and A6 and A7 from technical/human resource group factor in Table 6 in one way or another correspondingly go into *strategic* (top management support) and *tactical* (personnel selection and training) factor groups presented by Schultz, Slevin and Pinto (1987) classification. Referring to the same researchers' ideas, one can come across exclusions

of shortcomings in project mission (objectives) and engagement of users' opinion through feedback and consultation in the customized model presented in Table 6. The incapability in establishing clarified objectives for an IS/IT project could appear as a cornerstone failure factor which could get even more severe once organizational structure is decentralized and lots of conflicts occur when it comes to decision-makings. This been said, C4 factor implicitly could also include the failure to set solid objectives for IS/IT projects as a major failure factor in Iranian organizations.

When comparing the results in Table 6 with Wateridge's (1995) research result which is recognizing deficiencies in project planning, project objectives and leadership as three major failure factors from a project manager point of view, it is noticed that there is not any explicit mentioning of these factors. This matter once again reveals a downside of the list of context-related factors extracted from interviews, when it is validated against Standing *et al.* (2006) 'attribution model'. The project managers who are target subjects in the interviews of this research study, despite the fact that they must be open to the idea of taking the responsibility of failure and accept the possible short comings in clarifying the project mission, thoughtful project planning and skills in project leadership which all are basically originating from project management competency, have overestimated the influences of hosting organizations' flaws and external environment on IS/IT projects failures. Slightly different from Wateridge (1995), Whittaker (1999) points out three factors of poor project planning, weak business case, and lack of top management involvement and support as the most important causes of failure in projects among which only the last one is totally in accordance with C2 failure factor – marked also as the top ranked factor in statistical analysis. In addition, Whittaker (1999) also refers to the fact that the size of hosting organization could be considered a complementary cause to IS/IT projects failure when budget overrun as a primary failure factor is in place rather than schedule overrun. In this research, the focus is exclusively on non-elementary failure factors where both budget and schedule overruns are discounted as being two elementary failure factors, thereby the size of hosting organization could be included on its own as the first content-related failure factor in Table 7.

Considering risk management measures to confront IS/IT projects failure is also one of the missing elements perceived by the writer when summarizing the results coming out of interviews. However, when looking into 'early warning signs' (EWS) concept introduced by Kappelman *et al.* (2006), it is worthwhile to notice that some context-related group factors in this study e.g. managerial/strategic and socio-cultural subgroups are relatively comparable to *people-related* issues addressed in EWS grouping. The inability to assimilate any of *process-related* factors in EWS grouping into the customized model created from interviews is to re-emphasize the negligence regarding processes and methodologies weakness that is apparently a common place in project management society in Iran; especially when it concerns IS/IT projects failure investigation. Staying in the paradigm of risk management, Cannon (1994) introduces his project Risk Assessment Cube with project size, task definition, and technical experience as three variables. Moreover, he argues that when task definition and technical experience are being kept low, then definitely with the increase of the size of the project the likelihood of project failure dramatically soars. For the sake of maintaining simplicity and avoiding

complexity due to increasing number of dependent variables in this research, only the size of project in terms of budget, time, and required personnel (as has been defined by the interviewees) for each organization has been taken into consideration. This has been represented as the second content-related factor in Table 7.

As a reminder from literature review, Flower (1996) has divided causes to project failure into two groups of *organizational/managerial context* and *conduct of project development* (project, project manager, and project team). In the eyes of the beholder, from Table 6, almost all B group factors by addressing the cultural norms, beliefs and behaviors controlling an organization and its employees as well as C1, C2, C4, C7-10 factors, by directly or indirectly referring to hidden agendas, political pressures and vested interests, fall into the former category proposed by Flower (1996). However, as it has been previously mentioned, it is not deniable that in this research's customized model there is a noticeable negligence towards failure factors related to *conduct of project development*. It is worthy to underline that the failure factors classification rationale used in Tables 6 and 7 to a great extent has got its inspiration from Yeo's (2002) model. In this model, a combination of *strategy project planning and delivery system*, *organizational system* (system to be served) and *formalized information system* (serving system) dealing with issues such as business and project planning, project management and control, corporate culture, corporate management, politics and IS/IT professional knowledge sources have been used to create the backbone of grouping in Table 6. Economic and financial factors had to be integrated into this customized model despite of the fact that there has not been enough emphasis on these aspects in the models presented in literature review.

After an analytical overview of the validity of failure factors constituting Tables 6 and 7, now it is required to critically investigate the results generated from statistical procedures. As Table 10 demonstrates, economical/financial and technical/human resource group factors have obtained lower ranking of the influence on IS/IT projects failure in Iranian organizations in comparison to managerial/strategic and socio-cultural factors. This surprisingly stays in the face of notorious reputation that most of Middle Eastern nations struggle with lack of financial funding and technological expertise when it comes to IT industry. This observation has the implication that even though economical and technical aspects have had their negative impacts on the development of IS/IT projects in Iranian organizations – since they quite strongly appear in the listing of failure factors; they are not comparable to the destructive effects that managerial and socio-cultural deficiencies have on the successful delivery of IS/IT projects in Iranian organizations. In other words, this is an indication that management concept in its broad sense along with cultural and people-related issues should be given special attention no matter in what country or what organization the project failure causes are examined.

According to the ranked list of context-related failure factors in Table 11, the lack of support and commitment from the side of top management in organizations as well as their misconceptions and lack of knowledge towards IS/IT projects structure and functionality are the most significant causes of failure for IS/IT projects initiated in Iranian organizations. This result is completely aligned with the results found in literature

review where numerous causes of failure are linked to the sources all the way up the hierarchy ladder of management. Furthermore, problems caused due to improper operation of decentralized decision-making system and lack of cooperative working between project managers and department managers are evidences that issues such as politics, hidden agendas or vested interests enforced by oftentimes ineligibly authorized individuals in Iranian organizations should be taken seriously as major failure factors when dealing with IS/IT projects.

Taking proper measures to orientate organizational culture towards accepting and making effective use of IS/IT projects is also a matter of high priority. This is proven by the rankings in Table 10 and 11 that show cultural issues could turn out to be great barriers. It is strongly perceivable that the cultural mindset of individuals - be it that of senior managers making decisions over IS/IT projects down to the IS/IT project users being in everyday contact with the implemented project – should be prepared, educated and mature enough to deal with essentiality and genuineness of radical changes accompanied with IS/IT projects.

One other interesting point that can be deducted from Table 11 is the presence of four failure factor related to lack of expertise (A6 and A7) and misconduct of project management processes (C5 and C6) among the top-ten ranked failure factors. This is in the face of the fact that overall emphasis on these issues among those 27 context-related factors is quite weak. It shows that even though the project management society in Iran is not extravagantly conscious of complexity of modern and numerous aspects of project management as a systematic technique and discipline to get projects done – as it is considered in Western industrial nations, it still insightfully feels the lack of knowledge and competency in this area in the country. The credibility of this matter is augmented with the present nationwide lack of academic and professional education/training in project management discipline. Furthermore from Table 11, one can also notice that the inconvenience of long term financial investment in IS/IT projects along with the wrong mentality of achieving hastily economic efficiency are two dominant financial barriers for successful IS/IT projects. The reason of these issues could definitely be traced back to either improper financial prioritization policies or conventionally cultural approaches towards IS/IT projects from the side of senior management and policy-makers in Iranian organizations.

6. Recommendations to Avoid Failure

The significance of 'lessons learned' in a project – be it a success or failure – is drastically increasing nowadays in the project management discipline. This has been emphasized even in some project management methodologies such as PRINCE2 where 'lessons learned log' is promoted (Office of Government Commerce, 2002). As a motivation for documenting a formal lessons learned, Central Computer and Telecommunication Agency (2001) states that such a report is to "ensure that all lessons learned during the project are annotated for the benefit of the future projects" and "know whether the project management activity itself has been a success or a failure". To shed more light on the need for learning from projects, Project Management Institute (2004) in its *A Guide to the Project Management Body of Knowledge* underlines the necessity to record not only the events happening in the context of the project, but also the decisions made and actions taken by the management regarding those occasions.

Kerzner (2003) claims that today companies sustain their project learned lessons through maintaining project diaries and notebooks, conducting post-implementation meetings and most importantly documenting case studies of their project success or failure. Through this, IS/IT professionals from any level are required to be conscious about how they attribute success/failure in IS/IT projects and constantly review their contribution. Post-implementation reports should contain briefings of the impacts members' roles have had on the final results of the project in terms of success or failure (Standing *et al.*, 2006). This reporting would enable senior management to share more knowledge and let junior professionals to collect more unbiased overview of the impact the actions have had on the project (Wong, 2005). In spite of considerable body of evidence in literature showing the benefits of learning from success and failure, many organizations avoid facing this learning challenge. Robertson and Williams (2006) believe in five main reasons for this negligence. Firstly, there is a perceived lack of validity of learning from a project, since each project is unique and lessons of success and failure from one project might not be valid for other projects; secondly, past fruitless experiences of mere paper work discourage project teams to 'waste' their time 'again'; thirdly, the time pressure when the situation is distressing pushes the project team to rule out the option of learning experience; fourthly, team members are reluctant to go through learning lessons due to the unspoken fear that it might elicit their personal professional flaws and mistakes jeopardizing their career; and lastly, the complexity in identifying success or failure causes in a project lead the project management group to the misunderstanding that the learning process is just "banal recital of the obvious".

As Robertson and Williams (2006) have indirectly mentioned, project team members are prone to build their own versions of their contributions to project success/failure in lessons learned reports, if there is no formal evaluation procedures. Knights (1995) discusses that these self-made perspectives by attributing success internally and failure externally are based mostly on securing the positions of individuals and teams rather than being realistic and revealing the true reasons of success or failure. Udo (1993) has pointed out a very artful issue by indicating that dread of being punished for project failure is a significant reason why project evaluations turn out to be biased and for that

matter for an efficient evaluation of members' attributions to success and failure, it is necessary to distance rewarding/punishing systems from evaluation procedures.

On the grounds of these academic sources, as the first and most fundamental recommendation, it is strongly advised that an IS/IT project manager in Iranian organizations should seek to establish 'lessons learned' processes right at the beginning of development of the project and make use of it throughout the project life-cycle – which was totally ignored by interviewees in this research even when they were exposed to the concept. Naturally, it would be more practical if project managers – coherent with the nature of the project and the hosting organization - primarily take into consideration the aforementioned five reasons of avoiding 'lessons learned'. This would make a solid, trustworthy and unbiased point of reference for the mistakes, flaws and shortcomings in the course of their project development and is a primary approach to proactively confront future project failures.

As it has been repeatedly recognized by many researches, the ability to identify and assess relating risks to projects is critical to guarantee successful project results. Quayle (1999) argues that besides mature executive project managers who are experienced to pinpoint those volatile and stable external factors endangering the project, senior management accounts to a great deal for establishing a solid risk management plan due to their experiences about dynamic business environment factors. Considering the significant role of senior management in IS/IT project failure according to the results of this research and the notorious negligence of risk management concept from the side of project managers in interviews, it is undoubtedly necessary to integrate a consistent and robust risk management mechanism in Iranian organizations prior to making definite decisions on initiating any IS/IT projects. As the literature approves, this could be conducted by close collaboration of project manager and top management of the organization engaged in the IS/IT project.

Cultural barriers in recognizing the credibility of IS/IT projects in Iranian organizations appears to be crucial among failure reasons. Backed by psychological reasoning, as mentioned in previously, Kirby (1996) argues that different individuals ascribe different meanings to an event while missing the understanding of others' interpretations to the very same event. This principle can be grounded in order to figure out how people react to issue of major changes in an organization – specifically new IS/IT. Lots of literature in the field of organizational change and development (OCD) strive to make use of techniques to increase an organization's efficacy when facing change challenges. The logic standing behind these techniques is mainly that the subordinates fail to fully comprehend the reason for the change or misunderstand the goals of senior management for the ongoing change. However, re-educating users and employees through these techniques to get aligned with senior management perspective would not definitely reduce their resistance toward change. An IS/IT project is condemned to failure unless the senior management spend time and effort to communicate with subordinates to see the things from their perspective and investigate the real source of discontent. This implies that establishing appropriate change management systems in Iranian

organizations could turn out to be a reassured solution to overcome the obstacle of resistance against the whole concept of IS/IT projects.

After introducing three overlooked ideas of *lessons leaned*, *risk management* and *change management* as general recommendations for neutralizing IS/IT projects failure factors, it is required to address some more specific recommendations. Horine (2005) has presented a very comprehensive list of guidelines addressing all the major causes of projects failure among which some seem totally relevant to the issues raised in this research's results. When it comes to lack of top management support and commitment, issues such as insufficient provision of resources and inconsistency between senior management performance criteria and project success criteria might have risen. In this regard, understanding project impact on organizational structure, ensuring proper top management engagement in project organization and supporting Project Management Office and Steering Committee structures are vigorously suggested. Insufficient project sponsorship is another organizational reason for project failure which could be realized in forms of passive/uninvolved sponsor, weak leadership, ethical problems, and failure in solving organizational issues or supporting project management process. To mitigate these issues, actions such as educating sponsors about their roles and responsibilities, delegating formal project manager authorization and understanding sponsors' incentives seem to be responsive. Recourse conflicts such as lack of team members' dedication and commitment and their availability as is scheduled can be moderated through detailed project resource planning, obtaining commitments from resource managers, and centralization of organizational structure regarding resource planning, employment and deployment. As briefly referred to previously, the impact of the change brought by the project is also a notable issue which not appropriately planning for it or not comprehending its influence on processes and people could be seriously trouble-making. Measures such as championing new processes by means of project owners, planning for necessary communications and trainings in terms of change management, getting ready for 'disruptive deployment period' and making use of pilot project techniques would definitely contribute tremendously to diminish the negative impacts of the change.

Moreover, Horine (2005) by focusing more on project development issues believes that poor communication is a failure reason which could be rectified through developing a solid project Communication Plan that is acceptable to all key stakeholders, establishing tracking and monitoring mechanisms during planning, continuous looking for questions and feedbacks, understanding key stakeholders' perspectives and eventually elaborating the context of each message. Insufficient stakeholder 'buy-in' is an issue which could originate from undermined trust-relationship and improper communication with stakeholders, unclear project objectives, disaccorded expectations or even exclusion of some stakeholders. To avoid it an upfront acceptance of project purpose, success criteria and constant validation of what is communicated along with identification and consultation with all stakeholders is strongly recommended. Lack of clarity on roles and responsibilities could lead to inefficient work efforts, missed deadlines, and lower team morale which can be solved by using Responsibility Matrix in order to clarify and review roles and responsibilities with each individual and also validate expectations in advance. Lack of competency of project manager in terms of leadership, experience, training and

effectiveness could be remedied by organizational commitment to PM education and use of PM counseling programs.

Glaser (2005) who primarily believes in solid project management practices to succeed in projects has contributed with some more tweaking recommendations which could directly or indirectly be linked to major failure factors in Iranian organizational approaches to IS/IT projects – especially those project management methodology-related issues:

- Establishing clarified objectives for IS/IT project initiative
- Assessing and communicating the extent of 'buy-in' achievement of the objectives
- Protecting the project from organizational multiple project sponsorship and management
- Creating reward system to provide incentive for participants toward project success
- Accepting the debates about project and welcoming constructive feedbacks
- Tackling complexity by breaking the project into manageable pieces
- Taking account of organizational resistance to change
- Devising a good change management especially when facing a broad scope of IT change
- Providing adequate resource to project and assign best personnel to it
- Accepting and limiting the severity of the short-term operational disruption
- Ensuring and communicating regular visible progress
- Being vigilant of new and unproven technologies

Gardner (2000) looks into the matter from a more organizational perspective especially in the way that an organization perceive the concept of embracing IS/IT projects. His recommendations might seem quite common sense compared to preceding points. However, in the mind of the writer, their applicability in Iranian organizations is undeniable; and by keeping them in mind, many of issues risen in IS/IT projects in Iranian organizations are avoided in the first place. Thereby, he advises organizations to:

- Accept the fact that an IS/IT project is nothing more than a tool – Implementing a system in an organization does not guarantee that the operations will improve on their own, they do not come equipped with the business processes needed to teach a company how to use it, so each end-user and department should learn how to take the most out of the system. Even though IS/IT consultant can contribute a lot to the system selection and implementation, this is the users and not Management Information Systems (MIS) who should in the end drive the system from procurement to deployment.

- Understand the fact that the well-known best IS/IT project is not also the best for every single organization and business – selecting a sophisticated IS/IT project merely because another firm in a certain industry has done so, could probably end up the worst fit for a particular company.

- Reflect fully on the exact business needs that an IS/IT project should support before choosing it while understanding the underlying assumptions and philosophies in that project.

- Consider the company culture and likelihood that the company can embrace the technology employed in the project. It is vital to remember that the project is sold to the troops – using the system day in and day out - and not to the senior management. Too many projects have been deployed in which the people using that can not stand it because it does little or nothing to help them with their actual business needs. This would basically lead to resistance to change problem. It is crucial to go and talk to people in the trenches and find out what they actually need.

- Feel eventually self-sufficient and have the capability to manage the system when the project and consulting team take there hands off the ball - In other words, any IS/IT project should include an exit plan and take preemptive measures to hand over the ownership of the project to the client organization.

- Set aside a sufficient budget for training and conversion from old system to the new one - The end user's initial impression towards the change in the system is crucial and hard to handle. If the budget for training and support is not adequate, users will never embrace the new technology. During the training it is imperative to properly set users' expectations regarding the performance problems, know bugs, application enhancement. If the defects are concealed the users will lose their faith in the project's staff appreciation for their needs. So, due to these procedures, a project might slips out of anticipated time and cost. Training for the hand-off is critical, and cutting corners to avoid time and cost overruns from the side of the host organization should be strongly avoided.

7. Conclusion

The necessity of integration of IS/IT projects in business processes and structures of today's organizations of any size has become an indispensable reality. This is mainly due to phenomena such as diversification of commerce, globalization and rapid rate of technological development. Agile responsiveness to these new conditions are not possible unless under the shadow of taking advantage of IS/IT systems realized in the form of projects and all the innovative assistance emerging with them. This in return also makes organizations to deal with a whole new challenge - managing change. However, notwithstanding the requisiteness of IS/IT projects in the modern organizational context – both public and private sectors, the consequences of failures in IS/IT projects could be financially costly and could happen to be extremely crucial to the overall success or even survival of an organization. In this global endeavor, Iranian organizations from a developing nation are no exceptions. The statistical figures in this country have been proof to high rates of failure in IS/IT projects like other parts of the world. Moreover, there has been sensed a big lack of academic research study to pin down the real causes of IS/IT projects failure.

Basically, to systematically investigate the area of project failure, one should initially establish criteria and a clear definition of success and failure for a project in order to be able to make distinction between them. Then, it is required to identify as many involved factors possible and make the effort to categorize them into groups according to their characteristics, interrelations and nature of effects on the failure. This would help to understand better the real reasons behind failure factors and by which solutions either to take proactive measures to avoid failures altogether or to provide safeguards in case of their occurrence could be proposed. This writing for the sake of fully explaining the topic presents a thorough review of the literature and classic models related to all aspects of projects failure/success and in particular those mostly addressing IS/IT projects. Even though this elaboration might seem overly emphasized, but the writer has perceived its necessity due to the ambiguity of the topic. To limit the wide scope of aspects involved in this matter, it is attempted to focus on two main objectives: firstly, finding out the most crucial failure factors for IS/IT projects failure and secondly, to come up with a series of detailed recommendations according to related literature. For that matter, this research has taken a rather unconventional strategy to approach its objectives. It is mainly because of special conditions governing Iranian organizations particularly when it comes to dealing with IS/IT projects.

In a qualitative manner, through interviews a customized classification of factors is created whose validity and strength are examined against classical ideas and models presented in literature review. Afterwards, with a quantitative approach, project managers in a series of Iranian organizations adopting IS/IT projects are exposed to the identified factors, and through statistical analysis main failure factors are ranked. These key failure factors and the way they are affecting projects are scrutinized by means of cultural, managerial and technical facts practiced in Iranian organizations from the writer's perspective. The combination of these methods appears to be the most fitting and effective strategy to tackle a challenging case as such. In a nutshell, it extracts a

structured model from Iranian IS/IT project management society and draws on it to determine the causes of failure upon the same source of reference.

In summary, main issues of lessons learned, risk management and change management along with the necessity of their integration into Iranian IS/IT projects are of pivotal significance that should absolutely be commented on when evaluating the quality of the outcomes from interviews. On the grounds of similar models presented in literature review, the failure factors can be divided into two main groups of context- and content-related factors from which the former addresses issues surrounding the project and its hosting organization, and the latter addresses the size of the project and the related organization.

According to the quantitative research results, managerial/strategic factors among context-related causes are the most influential ones whereas technical/human resource factors, in the face of the predominant misconception, are the least important ones. This implies that in order to reduce the rate of failures in IS/IT projects, instead of excessive concentration on technical issues, the focus should be shifted towards mandating managerial and cultural approaches. Aligned with this conclusion, taking measures to increase the commitment and support from the senior management, and also elevating the level of general awareness regarding IS/IT projects' structure and functionality in Iranian organizations' top management and employees seem to be indispensable. Moreover, an especial care should be dedicated to an overall improvement in effectiveness and efficacy of IS/IT project management throughout the nation and a systematic amendment must be applied to promote the cultural impact of these systems. As the last comment on context-related factors, the importance of improving the expertise in IS/IT project management in terms of technical knowledge and experience should not be underestimated.

Concerning content-related factors, it sounds sensible that instead of starting big IS/IT projects in terms of cost and time in large Iranian organizations, they should be broken down into smaller projects and also in smaller organizations. As a result, this approach would mitigate context-related issues e.g. conflictions among decentralized decision-making bodies or long-term investments with short-term profitability expectancy entailing respectively from managerial and financial shortcomings; not to mention that managing the change in terms of culture turns out to be much easier in organizations of inferior sizes.

In the end, back to the initial assumptions structuring the scope of this research study, this work has taken a general stance by making no distinctions concerning the nature of businesses the organizations are into or their being from public or private sectors. Furthermore it solely investigates the failure factors from project management profession point of view as only one of key project stakeholders. On this basis, the major failure factors identified and their corresponding recommendations seem to be valid merely from project manager's stand and regardless the type of organizations which consequently creates future research proposal for further investigation of the matter considering these distinctions.

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