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# FACTORS THAT PLAY A KEY ROLE IN INFORMATION SYSTEMS FAILING: AN EXPLORATORY ANALYSIS

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***Abstract:*** An information system (IS) project management is the critical issue for the companies due to its high failure rate .The objective of this paper is to explore the reasons for failures in the information system. The failures of IS is not confined to any particular industry rather theydo happen in every country; whether small or large companies; in commercial, non profitable, and governmental organizations; and without regard to their status or reputation. For developing an understanding of the failure factors of IS ,an in-depth review of the existing literature has been done .A variety of studies across several different countries, industries and areas have been taken into account for identifying the failures factors of IS. This has been confirmed from most of the studies that not all the failures belong to technical aspects but also to the social aspects of the system as IS is a Socio-technical System. This paper presents a critical failure factors for the Information system.

**Keywords:** Information System, Critical Success factor, Critical failure factor, IS, organization

## INTRODUCTION

To stay competitive in the global market it is theorganization's need to improve their business information systems (IS) in the dynamic environment of the market. It isthe requirement of all the organizations that they should havethe information system which provides the accurate andtimely information. The recognition of the significance of information system planning and implementation is increasing day by day. Since there is an exponential growth in the field of Information technology with huge investmentshave been already done. Despite this fact there are number offailures concerning IS projects.

This research paper explores the previous studies conductedby different researchers on Critical Failure Factors (CFFs) ofInformation System. The literature review is an analytical and in-depth evaluation of the researches done earlier. The information has been collected from various sources which are further documented. It also helps in recognizing the gap that exists in the area of research. For justification of the literature review, the literature has been classified into different sections.

## LITERATURE REVIEW

A survey done by the Standish group for the decade of 1994to 2004 shows the successful project, challenged projects andfailed projects in the Chaos report. The projects which are completed on time, within budget and according to the goal of the organization are declared as successful projects whereas the projects of IS which are abandoned before finishing
point are called failure projects. The IS projects who are
beyond budget or are not completed within the stipulated time period are called challenged projects as shown in the Figure 1.

Within a decade of 1994 to 2004 ,there is a diminishing effect in the failed projects .The failure rate came down from31% to 18%.There has been an increase in success rate from16% to 29%..Hence these figures inspire for the continuationof the research in the area of Information system failures.

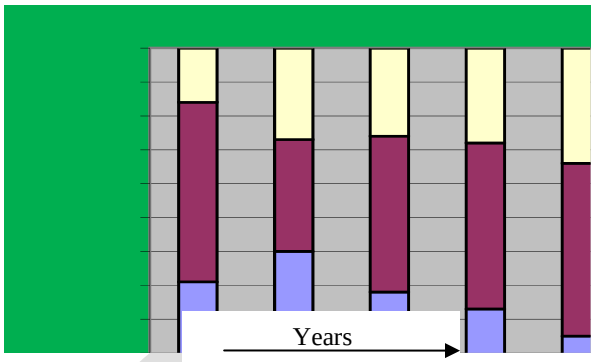


**Figure 1 S**uccess, Failures and Challenges (StandishReport from 1994 -2004)

**STUDIES UNDERTAKEN TO EXAINE THE CRITICALFAILURE FACTORS OF INFORMATION SYSTEM**

Wilson and Howcroft [1] elaborates a numberof types of failure that can be summarized as:

*Project failure***:** When the approved standards have not been met, it is called project failure, It includes meeting the deadlines, budgets and the functionality.

*System failure***:** When the system does not perform as expected and also does not operate at the particular time or not being used in the way intended it is called system failure. The projects may not produce productive gains even when they are used with right intentions.

*User failure***:** When the user is resistant in using the system, it is called user failure. The reason may be lack of training and ability of staff, complexity of the new system or aconfrontation against a new system.

The failure or success of IS is determined from the people since they use the system [2].

The various constraints [3] for perceiving IS as a failure includes

- Time constraints
- Budget constraints
- Expectations of stakeholders
- User requirements and expectations constraints;
- Quality constraints.

The success is a cube as explained by [4] in terms of time, cost and quality and cannot be considered as a single point. Therefore the ideal status of the success is considered as a cube not a point. But it does not mean that missing that point is a failure. Often times clients and even internal project sponsors target performance goals which are in essence totally unreasonable, although believe that only reaching 80 to 90 percent of them would be regarded as success.

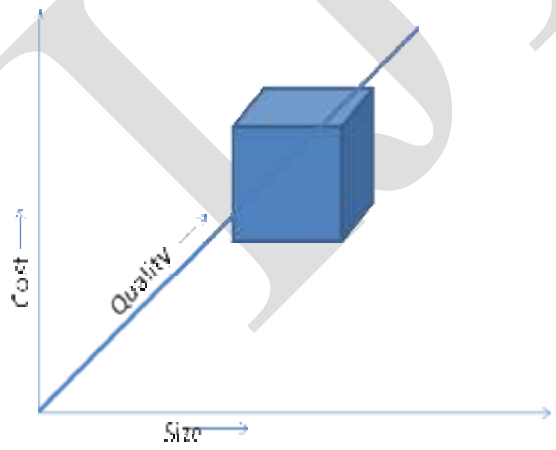


**Figure 2 -** *Failure 'Cube' vs. Failure 'Point' (Kerzner, 2003)*

Two concept of failures [4],one project failure and other is actual failure was further elaborated by introducing actual, planned,

achievable and perfection target goals. Planning failure is the difference between planned target and what wasactually achievable where as the actual failure is the difference between what was achievable and what in reality was accomplished. Actual and Planning failures together

forms 'perceived failure' as shown in Figures 3 and 4 below. Both the Figures show that in these cases the 'perceived failure' could vary considerably. Planning failureis the serious issue for most of the project managers. The reduction in the planning failure can be achieved by using good project management methodological practices. With this reduction in the failure, the 'actual failure' which is quiteclose to 'perceived failure' decrease dramatically.

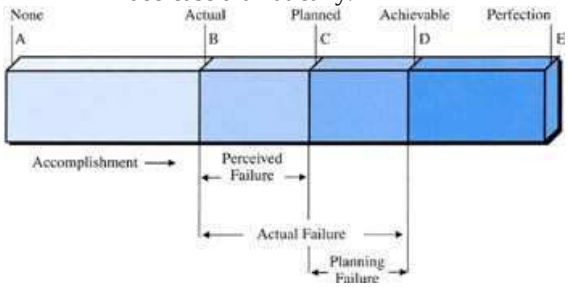


**Figure 3 -** *Components of failure 'pessimistic planning' (Kerzner, 2003)*

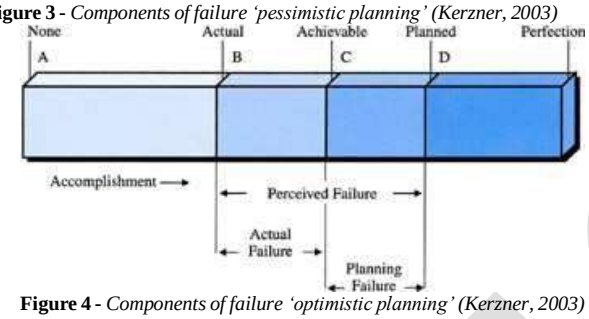


**Figure 4 -** *Components of failure 'optimistic planning' (Kerzner, 2003)*

According to [4], the modern project management, 'planningfailure' exists largely because of insufficient performance, measures and practices in effective risk management part ofproject management employed methodology .

The Royal Academy of Engineering and the BritishComputer Society[5] found that 84 percent of public sector projects resulted in failure of some sort.

Almost 64% of Information system projects are spoilt whereas 26% are challenged and only 10% are successful projects in the country of Iran as determined by [6](Iran among Middle Eastern nation). Iran is the fastest growing country in the Middle Eastern nation and the IS face number of problems due to the political barriers of this country

According to Standish Group's report only 16% of the IS projects are completed within budget ,on time and according to the objective as explained by [7]

The top management failures are the main reasons for the failures of IS projects according to [8] as elaborates below:

- Inadequate support from senior management,
- Insufficient leadership by starting a vague project,
- Inability to manage complexity,
- Failure to anticipate short-term interferences,
- Incapability to display the unseen progress ,
- Ignorance for the stability and maturity of the usedtechnology.

Certain failure factors in the information system projects issues in Iranian organizational approaches as explained by [8]. They are:

- Non-establishment of clarified objectives for IS projectinitiative.
- Non-communication regarding achievement of theobjectives.
- Non-protection of the project from organizationalmultiple project sponsorship and management.
- Non-creation of reward system to provide incentive forparticipants toward project success.
- Non-acceptance of the debates about project andreception of constructive feedbacks.
- Non-breakage of complexity of the project intomanageable pieces.
- Taking account of organizational resistance to change.
- Developing a good change management especially whenfacing a broad scope of IT change.
- Providing adequate resources to project and assign bestpersonnel to it.
- Accepting and limiting the rigorousness of the short-term operational disruption.
- Ensuring and communicating regular visible progress.
- Being vigilant of new and unverified technologies.

The attributes of failures of IS [9] are not straight forward because of

- Deficiency in universal harmony to compromise project failure metrics.
- Lack of common collective approval standards among all key stakeholders engaged in a certain project.
- The inconsistency between what business companies call project failure and that of textbooks which investigate the matter from a theoretical andutopian viewpoint are amongst the most important reasons.

The philosophical attitude regarding information system wastaken by [10],regarding [11],[12] and they explains that firstly, according to the judgment of [11] who launched the presence of *agency problem* as one of the major explanationsof the project abandonment. The issues from the agency theories explains that the managers are the first one who knows about the IS failures because they have the better knowledge regarding the progress of the project but they alsohave the most reasonable inspiration not to reveal the fact offailure to preserve their reputation than the stakeholders.

Secondly, the *escalation problem* from the side of the managers [12] is highlighted. The assurance of providing resources in unbothered in spite of the fact that managers arereceiving discouraging feedbacks from the development of the project. Such IS project is considered a 'runaway' case which is fated to skid out of planned schedule as budget creates more losses for the firm. The real reason behind the escalation of assurance is the 'self-justification theory'.

The managers considers themselves much sensible than others in decision making in the firm. They don't discuss with others face to face in the firm whole idea of escalation which is inherently erroneous and damaging for the firm in the first place.

**T**he 'attribution theory' [13] as elaborates in the research has an observation that different IS professionals such as chief information officers (CIO), IS managers, senior IS managers, operational/line managers, and IS operations/support staff attribute success/failure in the context of IS/IT projects. Attribution theory's investigation could be based on a four –dimensional study:

Internal and external (the extent to which the causesof success/failure could be mapped externally to other people and circumstances or internally to the individual),

- Stable/unstable (the extent to which the same causeswill still affect success/failure of projects in future),
- Global/specific (the extent to which the same causesfor IT project success/failure would effect other areas of one's work), and finally
- Controllable/uncontrollable (the degree of influenceand control of an individual over causes of success/failure).

Even though in modern times human beings are able to recognize and quantify risks[14] and their results very well ina general sense, eccentrically IS project management is inappropriately immature and naive in mastering and applying risk management skills. They suggest a new concept of 'Early Warning Signs' (EWSs). EWSs is an eventor indication that predicts, cautions, or alerts one of possibleor future problems. They are noteworthy symptoms showingup long before occurrence of a failure – mostly in the first 20percent portion of the project's life-cycle.

The prevailing EWSs[14] are divided that into two maingroups.

*People-related Process-related*

*People related*: The people-related to EWSs of IS projectfailure formed around five groups of people

- *Top management,*
- *Project management,*
- *Project team members,*
- *Subject matter experts(SMEs)* – expertsproving guidance to the project team,
- *Stakeholders (users)*

Six People related EWSs 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/orskills
6. Overscheduled subject matter experts (SMEs)

*Process related*: The process-related EWSs of IS/IT project failure centered on five project managementprocesses namely:-

*Requirements (including a business case),Change Control,*

*Schedule, Communications,Resources*

Six process related EWSs are

1. Lack of documented requirement and/or successcriteria
2. No business case for the project
3. No change control process
4. Ineffective schedule planning and/or management
5. Communication breakdown among stakeholders
6. Resources allocated to a higher priority project.

The project team members are in habit of building their own versions [15] of their contributions to project success/failure in lessons

learned reports, if there are no prescribed evaluation procedures.

Dissimilar views explained by [16] regarding the Standish reports and disagree that the 1994 figures might not be trustworthy. They stated that the statistical figures of the failures and cost runs are much lower that those mentioned in the report which is also suggested by certainother studies.

There was confrontation made by[17] against that the Standish Group reports refer to a software crisis. His vision is that there are much more successful software systems in use where as the majority of literature sourceson IS failure are still supporting the style of the Standishreports and insists the need of IS failures studies for improving their practices to be put it into place.

The study [18] suggests that during the past two decades, investment in Information technology and Information system have increased significantly in the private and public sector organization. Whereas the rateof failure remains quite high.

The various factors responsible for IS failures [19] are:

- Lack of top management commitment to theproject;
- Poor user commitment;
- Inadequate user involvement;
- Requirements not well understood;
- Failure to manage the expectation of users;
- Changing scope;
- Lack in skills;
- New technology;
- Insufficient Staffing;
- Lack of organizations' commitment to a systemsdevelopment methodology;
- Poor estimation techniques;
- Inadequate people management skills;
- Failure to adapt to business change;
- Failure to manage the plan.

The S**tandish Group prepared a report of a survey in which 365[20] IS executives** participated. The reports suggests that IS/IT failures were covered up, ignored, and/or rationalized by IS/IT personnel. They advocate that the CEO's role in IS/IT planning and development should be:

(1) Quantify the business value of the IT by measuringits overall economic value to the business.
(2) Recentralize control of IT spending while maintainingflexibility.
(3) Communicate the results one expects in clearfinancial terms.
(4) Keep the IT architecture/infrastructure simple.
(5) Be firm on rigorous pilot testing.
(6) Make sure that the new system has the capacity to handle the required number of transactions that needto be processed.
(7) Closely monitor what IT suppliers are using to runtheir own businesses.
(8) Avoid succumbing to hasty decisions based on theurgency of the situation.

New requirements are influencing the business processes asthe business needs are changing very fast[21]. Therefore tokeep pace with the global market and to achieve the competitive advantage, the company has to reactimmediately and improve the quality of the adopted IS..

According to research conducted by Standish Group[22], Information system development and implementation projects often tend to end in failure. As many as 40% of information system development and implementation projects fail to complete. Standish Group classifies the success in the recognition of information system development and implementation projects into three types

- Successful projects;
- Failed projects;
- Projects exceeding the set deadlines and budgetframeworks.

As seen in Figure 5 [23], the majority of projects end in failure. In addition to successful and failed projects, a "successful" completion of project which, however, exceedsset deadlines and budget frameworks is a frequent occurrence. Many projects fail, or are considered as failed in particular aspect, but the issue is to what extent failure can be tolerated for the project to be still regarded as successful.

Figure 5. Illustrates [23] that the majority of projects belongto the category of failures. Looking at 2009 data, one can seethat as many as 44% information system development and implementation projects ended in failure. This amounts to almost half of all the projects included in the research. On the other hand, the proportion of successful projects amounts to 24%, equivalent approximately one-quarter. The remaining "challenged" projects account for 32%. From the view of thechart from the positive side, we can say that 56% of projects are successful. It is appositive fact that the percentage of successful projects is increasing, which may be the result ofthe increasingly serious management of information system development and implementation projects, taking intoconsideration change and risk management.

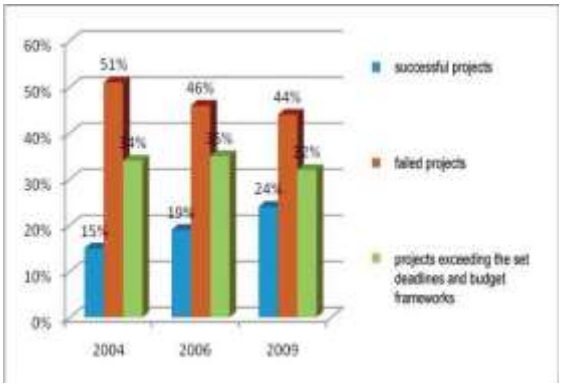


**Figure 5** Success rates of information system developmentprojects Martineau & Shumway,[23]

Critical Failure Factors of an information system aredescribed by [24] as

1. Lack of consultant effectiveness
2. Low quality BPR (Business ProcessReengineering)
3. Ineffective project management
4. Misfit of IS Software
5. High turnover rate of project team members
6. Over-dependence on intense customization
7. Insufficient IT Infrastructure
8. Lack in knowledge transfer
9. Ambiguous Concept of the Nature of IS
10. Unclear concept of IS from the Users perspective
11. Impractical expectations from top managementfrom IS projects
12. Too firm project schedule
13. Users' resistance to change
14. Lack of top management support
15. Low quality of testing
16. Lack in formal communication between systemdevelopers and users
17. Software modification
18. Informal strategy
19. Unprofessional dedication
20. Functionality problems with the system
21. Cost over runs

The above list is not complete, but it highlights the mix ofreasons why some IS are perceived as failures.

The literature review regarding failures of IS conducted by [25], [26] , [27], [28] .Sample of major failure in the recent years has shown in table1.

**Table :**Major Failures of IS in various organizations

| *YEAR* | *ORGNIZATION* | *OUTCOME (COST US $)* |
|---|---|---|
| 2010 | New York City | $700 million-plus to modernize its payroll system |
| 2008 | Waste Management Co. | $100 million-plus of legal case against SAP ERP |
| 2005 | Hudson Bay Co.(CANADA) | Inventory System Problem contribute $33.4 in Losses |
| 2004. | Hewlett Packard Co | Problems with ERP contribute $160 in losses |
| 2000 | Nike Co. | A $400 Million upgrade to Nike's ERP resulted in $100million lost sales |

**EXPLAINING DESIGN OF THE CURRENT AND FUTURE OF AN INFORMATION IS FAILURE**

There is a need to concurrently evaluate the current system and the future system. But they cannot simultaneously exist.It is very easy to do the assessment of the current "actuality"of a system in a particular location. But in order to assess thefuture, it must be evaluate instead the representation of a proposed future—an proposed future that is represented in adesign for the system. The assessment of the match or mismatch between actuality and system design ("where the design wants to get us")leads to the a model called as the *design–actuality gap* [29].Practically, because of subjective prospects about the future and subjective observations of reality, it could be confronted that every user of IS stakeholder has their own design and their own description of actuality. Among these design–actuality gaps, it is discovered that, the two key division of stakeholders presented here are the designers who create the dominant IS design, and the users who colonize the local actuality. Thesegroups are especially valuable for an understanding offailure given their dislocation, in both psychological and

even physical terms, as part of the IS implementation process. But, this simplification does enforce limits for example, limiting subjective partial failures to a consideration of the objectives of these two stakeholdergroups alone. The Figure 6 shows seven dimensions for the gap between actuality and design :

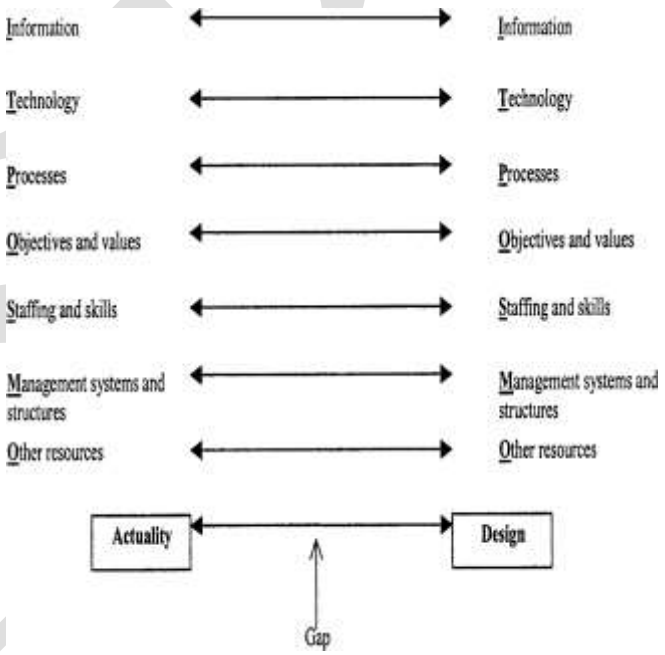


**Figure 6** Design and Actual Gap Model of IS

Gaps may increase during implementation and operation. For example, maintainability failures frequently occur whendesign and actuality jump apart. Examples from IS casesinclude actuality changes:
Besides the *other resources* dimension when donor fundsare also withdrawn.
Besides the *staffing and skills* dimension when key IS staffalso quit.
Besides the *objectives and values* dimension when senior-level defenders also move on.
It may simply prove impossible to bring design andactuality together.
If, on the other hand, the success rate of informationsystems projects is to increase, design–actuality gaps need to be reduced or even closed. This means:

- *Actuality improvisation*: changing local actualityto make it closer to IS design.
- *Design improvisation*: changing the (often "Imported") IS design to make it closer to user actuality.

Information technologies are produced by the very social structures that they assure to change[30]. This is not so because the context of design/production is not the same as the context of use. In studying industrialized country IS cases, however, it can be hard to separate these two because of the immediacy (in all senses) and similarity of designer and user context. Designers in industrialized countries may still find themselves "automating a fiction"[30], but design–actuality differences can be subtle, implicit, and hard to identify. It can therefore be hard to think beyond the black box.

The researchers working with IS cases from developing countries shows that the contexts of designer and user are often distant in physical, cultural, economic, and many otherways. The isolation of designers means that their contextualinscriptions are accountable to be significantly different fromuser actuality. So, too, are the inscribed assumptions that remote designers make about that actuality.

Design–actuality gaps are therefore more extreme and
more explicit and, as a result, are easier to identify and to understand.

The remoteness of designs and of dominant design stakeholders can happen in a number of ways, but the domain of developing country information systems is particularly dominated by the transfer of industrialized country designs to developing countries actualities [31].

## CONCLUSION

The necessity of integration of IS 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. In this global endeavor, most of the organizations have proof of high rates of failure in IS projects. Moreover, there has been sensed a big lack of academic research study to pin down the real causes of IS 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 paper for the sake of fully explaining the topic presents a thorough review of the literature and classic models related to all aspects of IS projects failure . Managerial/strategic factors /human are the most influential ones whereas technical factors, in the face of the largest misconception, are the least important ones. This implies that in order to reduce the rate of failures in IS projects, instead of excessive concentration on technical issues, the focus should be shifted towards mandating managerial, cultural, human resource management 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 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. The importance of improving the expertise in IS/IT project management in terms of technical knowledge and experience should not be underestimated.

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. 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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