Delivering Successful IT Projects: A Literature-Based Framework

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Abstract

The general objective of this work was to contribute to the general body of knowledge and research work in the area of managing IT projects successfully. To achieve the general objective, the research was aimed at exploring the reasons why most IT projects fail from past literature, and come out with the most prevalent causes of failure, and then develop a framework to help manage IT projects successfully. The assumption this work was dependent on was that once the prevalent causes of failure are known, then conversely, we can propose what should be done to deliver IT projects successfully. This work only deals with secondary data, primarily from journal articles and newsletters of IT based institutions. About 32 categories/sets of research outputs were used as literature base for the analysis. No primary data was employed for this work. It was found out that for an IT project to be delivered successfully, there are four areas that are so critical: Skills of project manager/team members, Top Management Involvement, Proper Methodology/Processes, and Good Communication. This represents the success factors dimension. It was discovered that the success of IT projects depends so much primarily on the activities of the initiating stage followed by the planning stage, and then the executing, monitoring and controlling stage, and finally, closing stage. This represents the process dimension. A framework depicting all these was developed.

Keywords: Successful, Project, Information, Technology, Framework, Failure

Introduction

The general objective of this work is to contribute to the general body of knowledge and research work in the area of managing IT projects successfully. To achieve the general objective, the research is aimed at exploring the reasons why most IT projects fail from past literature, and come out with the most prevalent causes of failure, and then develop a framework to help manage IT projects successfully.

The Oxford English Dictionary defines "project" as "An individual or collaborative enterprise that is carefully planned and designed to achieve a particular aim: [e.g.] *a research project/a nationwide project to encourage business development*"

(http://pjp-eu.coe.int/documents/1017981/1667915/2_project.pdf/f317e5f0-dbc5-4fc7-bd94-79d22a21683d). This is what the project management institute (PMI) defines a project: a temporary group activity designed to produce a unique product, service or result. It continued to explain that a project is **temporary** in that it has a defined beginning and end in time, and therefore defined scope and resources, and a project is **unique** in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal. Explaining further, PMI mentioned a few items that constitute a project, and they are development of a software for an improved business process, the construction of a building or bridge, the relief effort after a natural disaster and the expansion of sales into a new geographic market. It further established that all projects must be expertly managed to deliver the on-time, on-budget results, learning and integration that organizations need" (http://www.pmi.org/About-Us/About-Us-What-is-Project-Management.aspx).

In PRINCE2, a project is defined as "a temporary organization that is created for the purpose of delivering one or more business products according to an agreed Business

Case."(http://www.cupe.co.uk/prince2-definition-of-a-project.html). These definitions are generic, and do not point to specifics.

IT Project Management differs slightly with traditional project management by the inclusion of systems analysis and design concepts/methodologies (System development life cycle-SDLC, etc) and management information systems principles(people concept in information systems) to reach higher levels of success of IT projects. One of the first findings about IT Project Success was the CHAOS study which was published in 1995 by the Standish Group. They reported that 31 % of IT projects were cancelled before completion, and 53 % of them were completed over budget / schedule which were also referred to as challenged projects; they did not meet all of the project requirements. Only 16 % of IT projects were successful (Standish Group, 1995).

In more specific terms, an IT project can be defined generally from different schools of thought. Three of them that feature prominently are as follows:

1. A project with at least one IS (information systems) or IT (Information technology) component amongst its outputs.
2. A project undertaken within the IS/IT functional unit.
3. Any project in which all outputs take the form of IS/IT artifacts.

(http://philica.com/display_observation.php?observation_id=36)

For the purposes of this research, we will go with definition item 3. Definition item three makes a lot of sense as the output or the deliverable must be substantially an IT or IS artifact. An artifact is one of many kinds of tangible by-product produced during the development of software. Some artifacts (e.g., use cases, class diagrams, and other UML models, requirements and design documents) help describe the function, architecture, and design of software

(http://programmers.stackexchange.com/questions/106473/what-does-artifact-mean). Smyrk (2007) defined an IS/IT output as an artifact taking the form either of software or of computing infrastructure.

IT project management in institutions/industries is inevitable. Regardless of the fact that it still remains a paradox (Whilst some researchers have come out with positive relationships (Bharadwaj et al, 1999), others have found negative effects (Alpar & Kim (1990) (cited in Peslak R., 2003, pg 79) as to the positive effects or otherwise of IT investments in industry, it is not enough grounds for curtailment of IT investments. As it has been established already, industry heavily rely on IT systems and infrastructure for its services to customers. So far the discussion has focussed on value creation by IT investments, but this work focusses on the process aspect of the IT investments, that is project management. Research has also shown that most IT projects fail, and can be due to a number of reasons (Schmidt, Lyytinen, Keil & Cule, 2001). This development makes it more worrying since it involves huge sums of capital. A lot of reasons have been put forward by researchers in this particular subject matter, and basically they all point to correspondence failure, process failure, interaction failure, and expectation failure (Lyytinen & Hirschheim, 1987; Yeo, 2002; Goulielmos, 2003). Other research findings also point to governance issues as one of the main causes of project failure, as was revealed by the office of Government commerce of the UK Government together with the National Audit, in which they issued a guideline in 2007 which list out eight causes of project failures, of which six were attributed to governance issues (Aon, 2011). This work in tends to look into literature and enumerate the most prevalent causes of project failure and then propose a framework to help in delivering IT projects successfully. The framework will focus on the placement of these failure causes in the system development life cycle (SDLC) side by side the Project Management Life Cycle (PMLC). The assumption this work is dependent on is that once the prevalent causes of failure are known, then conversely, we can propose what should be done to deliver IT projects successfully.

Attributes of a project

Generally, the attributes of a project are:
- A project must be driven by a specific goal (*objectives*, *deliverable/outputs*, *outcome)*
- A project must have a start and finish dates

- A project has resource requirements
- A project is a one-time occurrence
- A project is mounted to achieve change.

Other sources (http://www.cs.odu.edu/~cs410/whatisaproject.htm) present it this way:

- A project has a defined beginning, end, schedule, and approach
- A project use resources specifically allocated to the work
- A project end results have specific goals (time, cost, performance/quality)
- A project follows planned, organized approach
- A project usually involves a team of people

When is an IT project said to be successful?

A project is said to be successful when:

- deliverables are according to specification
- deliver on budget
- deliver on time

This is the traditional viewpoint, but apart from that, there are a number of thoughts concerning what is termed a successful project, and for that matter an IT project. The PMO (Project Management Office) executive council, 2009 did some work on "project managing to business outcomes", and they came out with some findings which are listed below:

1. On-time and on-budget project performance is necessary but not sufficient for attaining business outcomes.
2. Only a select number of project management activities drive business outcome attainment.
3. Project manager effectiveness is the number-one driver of business outcome attainment.
4. Re-center project planning around business outcomes to estimate and track benefits.
5. Over-manage stakeholder involvement at Concept Definition.

In conclusion, the council concluded that their project database reveals a disturbing reality: even among those projects that are delivered on time and on budget, the majority fails to deliver expected business outcomes (Gulla, 2011). This clearly shows that delivering IT projects on time and on budget does not guarantee successful projects. The key issue with IT projects is deliverables meeting specifications, and for that matter meeting expected business outcomes. This explains the key difference between IT projects and other projects. With IT projects, one of the keys things to watch out for is Requirement discovery, gathering, and analysis. This to a large extent help the project manager to deliver outputs that are in line with business outcomes.

Schmidt, Lyytinen, Keil and Cule (2001), a group of researchers, led one of the comprehensive studies that were deployed to study the root causes for IT project failure on experienced project managers in three different settings: Hong Kong, Finland, and the United States. The three panels of experts acknowledged initially a list of 53 IT project risk factors. The list was condensed to a set of 17 through ranking and paring down processes, and second on the list was "misunderstanding the user requirements". Again, in their research work on organizations in Ghana on the topic "why IT projects fail", Koi-Akrofi G, Koi-Akrofi J, and Quarshie (2013) established the same fact that most IT projects in Ghana do not meet user needs among other facts. For the purposes of this research, an IT project is successful primarily when deliverables are according to specifications, and meet user needs.

In addition to the normal problems that can cause a project to fail, factors that can negatively affect the success of an IT project include advances in technology during the project's execution, infrastructure changes that impact security and data management and unknown dependent relationships among hardware, software, network infrastructure and data. IT projects may also succumb to the first-time, first-use penalty which represents the total risk an organization assumes when implementing a new technology for the first time. Because the technology hasn't been implemented or used before in the organization,

there are likely to be complications that will affect the project's likelihood of success (http://searchcio.techtarget.com/definition/IT-project-management).

According to Wilson and Connel (n.d), the characteristics of a successful IT project are:

- Project managed as a team –no one individual responsible
- Good communication within the team and between all players in the project
- Establishment of a project management office (PMO)

Other characteristics are:

- Risk management and acceptance
- The ability of the project manager to make changes to ensure deliverables were met
- Manage to milestones not details
- Standardised project terminology
- Regular meetings of the Project Management Office and project steering committee
- Most effort occurs in the planning stage
- Executive buy in
- Delivered business expectations

Materials and methods

A comprehensive literature review is conducted on causes of IT project failures to list the most prevalent causes. The focus is on IT projects from all sectors of industry. Projects that are not IT based in accordance with the definition this work subscribes to are eliminated from the list. After listing the most prevalent causes of IT project failures, a framework is developed from it to help in delivering IT projects successfully. This work only deals with secondary data, primarily from articles and newsletters of IT based institutions. About 32 categories/sets of research outputs are used for this work. No primary data is employed for this work.

Results and discussions

Table 1 below shows a summary of 32 categories/sets of research outputs by individuals, group of individuals and institutions on causes of IT project failures.

Table 1. Summary of Research Outputs on Causes of IT Project Failures

Name of author/ institution	Year	Title of paper	Findings/reasons why it projects fail	Comments/key statements from authors
Joseph Gulla (IBM Corporation)	2011	Seven Reasons why IT projects fail	1. Poor project planning and direction 2. Insufficient Communication 3. Lack of change, risk, financial, and performance management 4. Failure to align with constituents and stakeholders 5. Ineffective involvement of executive management 6. Lack of skilled team members in the areas of soft skills, ability to adapt and experience 7. Poor or missing methodology and tools	
Isfahani	2010	Why projects fail: avoiding	1. Failure to align with constituents	Two other considerations:

		the classic pitfalls	2. Lack of proactive risk management 3. Poor performance measurement 4. Loose definition of project scope and management 5. Insufficient project communication 6. Missing methodology	1.Expectation of failure- Years of industry failures burden every IT project: counteract through leadership, confidence, & controls 2.Role of tools and automation- Utilize project portfolio management solutions to get help with these challenges
Taimour	2005	Why IT projects fail?	1. Poor planning 2. Unclear goals and objectives 3. Objectives changing during the project 4. Unrealistic time or resource estimates 5. Lack of executive support and user involvement 6. Failure to communicate and act as a team 7. Inappropriate skills	The most common cause for IT failures are related to project management.
Betts	2003	Why IT projects fail?	1. Unavailability of data 2. Unattainable objective 3. Technical problems 4. People 5. Business problems	Ever wondered why IT project status reports are so upbeat, managers continue to fund loosing efforts, and some projects are doomed from the start? Interview with Sue Young, CEO ANDA.
Rosenfeld	n.d	??	1. Poor user input 2. Stakeholder conflicts 3. Vague requirements 4. Poor cost and schedule estimation 5. Skills that do not match the job 6. Hidden cost of going LEAN and MEAN 7. Failure to plan 8. Communications breakdown 9. Poor architecture 10. Late failure warning signals	A failure is defined as any software project with severe cost or schedule overruns, quality problems, or that suffers outright cancellation.
Bryce	2006	Why does	People seem to have a natural	It must be

		project management fail?	aversion to the following attributes which project management presents: 1.Discipline 2.Organization 3.Accountability	remembered that project management is first and foremost a philosophy of management not an elaborate set of tools and techniques.
Tan	2011	How to increase your IT project success	1. 42.5% did not deliver all benefits; 44% were delivered over budget; 42% were not delivered on time 2. Multiple attributes contribute to IT project success 3. Key attributes: (a) planning, (b) project management, (c) consultant/SI experience, (d) user management, and (e) soft skills - Planning: Clearly defined realistic scope - Project management: Frequent and open communication - Consultant/SI experience: - Industry specific - User management: Realistic outcome expectations - Soft skills: Problem solving and flexibility	IT project success continues to be below expectations. This research report recommends how to improve IT success rate based on data from a 845 project sample.
Wiklund & Pucciarelli	2009	Improving IT Project Outcomes	Action to consider: 1. Strong coordination between technology and finance organizations 2. Common understanding of metrics—payback period, NPV, IRR, etc. 3. Integration of risk into project planning using risk management tools	Research explains a new and different approach to improving IT project performance called Project Hedging Optimization (PHO). Methodology focus is on these risks: 1.Financial 2.Operational 3.Market 4.Sovereign (local political instability or terrorist events)
PMO Executive Council	2010	Agile at Scale	The study is organized in six sections: 1. Establishing guardrails to ensure individual Agile projects are delivered on time, on budget, and within scope.	Study that presents practitioner solutions to help you broaden the scope of your Agile implementation in the project

			2. Managing the brand of Agile and cultural change management in the organization. 3. Building a standard vocabulary of Agile competencies in the organization while maintaining flexibility of the teams. 4. Integrating Agile into a global sourcing strategy by building high-performing Agile/iterative teams, even if team members are not collocated. 5. Managing demand from continuously testing teams. 6. Breaking rigid project boundaries to optimize benefits.	portfolio. Discusses the changed role of the project manager in Agile projects.
PMO Executive Council	2009	Project managing to business outcomes	The study in five findings: 1. On-time and on-budget project performance is necessary but not sufficient for attaining business outcomes. 2. Only a select number of project management activities drive business outcome attainment. 3. Project manager effectiveness is the number-one driver of business outcome attainment. 4. Re-center project planning around business outcomes to estimate and track benefits. 5. Over-manage stakeholder involvement at Concept Definition.	An analysis of the PMO Executive Council's project database reveals a disturbing reality: even among those projects that are delivered on time and on budget, the majority fails to deliver expected business outcomes.
Iman Attarzadeh and Siew Hock Ow(Department of Software Engineering Faculty of Computer Science & Information Technology University of Malaya,	2008	Project Management Practices: The Criteria for Success or Failure	*Poor planning and scheduling* are the main reasons of project failure. Other important issues that must not be neglected are the *quality of the team leaders and team spirits among the team members.* The top three factors that cause project success are: 1. User involvement 2. Good planning and estimations 3. Good leadership and team members' technical skills.	A case study was conducted on a group of undergraduate computer science students from the Faculty of Computer Science and Information Technology, University of Malaya, who took the course WKES2202: Project Management. Forty-nine students are from the Department of

50603 Kuala Lumpur, MALAYSIA)				Software Engineering and only one student is from the Department of Information Science. A questionnaire was designed to investigate the factors that contributed to project success and also factors that resulted in project failure. The questionnaire consists of two parts. Part A gathers information about the project title and team members. Part B contains assessment questions on project management issues.
Matilda Alexandrova Liliana Ivanova University of National and World Economy, Sofia, Bulgaria	2012	Critical success factors of project management: empirical evidence from projects supported by EU programmes	The evaluation approach was a version of the so called "project echo" procedure suggested at the early stage of project management development (Bavelas, 1968). The results obtained by the opinions of respondents served as the basis for the identification of critical success factors (CSF) in the framework of the conceptual model of the study. From the study, five CSFs out of the lot stood out: 1. Competence of the project manager 2. Compliance with the rules and procedures established by the operational program 3. Quality of subcontractor services 4. Competence of project team members 5. Top management support	9TH INTERNATIONAL ASECU CONFERENCE ON "SYSTEMIC ECONOMIC CRISIS: CURRENT ISSUES AND PERSPECTIVES" NB: Bavelas, A., (1968), "Project echo: Use of projective techniques to define reality in different cultures", Stanford University.
Simon Rawlinson	2006	Successful Projects	Research on projects identified a number of common causes of project failure, including:	www.building.co.uk

			1. Lack of a clear link between the project and the organization's key strategic priorities, including agreed measures of success 2. Lack of clear senior management ownership and leadership 3. Lack of effective engagement with stakeholders 4. Lack of skills and proven approach to project and risk management 5. Failure to break down projects into manageable steps 6. Consideration of projects on the basis of initial cost rather than whole-life value 7. Lack of client understanding and contact with the supply chain 8. Poor project team integration	
Mike Thibado	2006	Managing Successful Software Development Projects	The five top reasons identified for the failures were: • Project objectives not fully specified. • Bad planning and estimating. • Technology new to the organization. • Inadequate or no project management methodology. • Insufficient senior staff on the team.	Ambient Consulting: Remember, for managing successful software development projects; use a strong project management discipline approach: 1. Define the project in detail. 2. Get the right people involved. 3. Estimate the costs and time involved in the project for each phase of the development process. 4. Establish a formal change procedure. 5. Establish a formal acceptance procedure.
Mark A. Taylor, President & CEO, TAYLOR Systems Engineering Corporation	2002	The 5 Reasons Why Most Projects Fail: And what steps you can take to prevent it	1. The number one reason that most projects fail: Lack of Leadership. 2. The second reason that projects fail: Lack of Clarity. 3. The third reason that projects fail: Little or no Due Diligence is performed. 4. The fourth reason projects fail:	According to research by The Standish Group, 74% of all information technology projects fail REFERENCE: PC Week, December 5, 1999

			Lack of Accountability. 5. Finally, the fifth reason that projects fail: Lack of a Proven Process.	
An Oracle White Paper	2011	Why Projects Fail: Avoiding the Classic Pitfalls	Six areas in particular highlight the biggest and most common failure culprits. These are: • Constituent Alignment • Proactive Risk Management • Performance Measurement • Project Scope Definition and Management • Critical Project Communication and • Methodology Usage.	Oracle Corporation
www.pmtoday.co.uk	2014	Why projects fail?	1. Unclear objectives – Inadequate definition – Scope not fully defined 2. Wrong leader – Inappropriate team – Inadequate training 3. Poor or no planning - Unrealistic timescales - Ineffective controls 4. Poor communications – Lack of stakeholder consultation	www.pmtoday.co.uk
Al Neimat, Taimour	2005	Why IT Projects Fail?	The following list the primary causes for the failure of complex IT projects: • Poor planning • Unclear goals and objectives • Objectives changing during the project • Unrealistic time or resource estimates • Lack of executive support and user involvement • Failure to communicate and act as a team • Inappropriate skills	The Project Perfect White Paper Collection http://www.projectperfect.com.au Project managers can position themselves to reduce the possibility for project failure by considering the following recommendations: • Make sure to plan before starting the development or implementation • Pay attention to tasks in the critical path • Set up the necessary processes to calculate and

				inform the risk
				• Ensure that the IT project has clear objectives
				• Understand project trade-offs when making decisions regarding objectives change
				• Use the duration instead of the time on task to estimate schedule
				• Avoid using linear approximation when estimating time or resources
				• Get the support from the executive management and ask them to be open if they have any reservations about the project
				• Ensure and communicate regular about the progress, even if it seems invisible
				• Require that users participate in design and implementation of your project
				• Make sure you have the appropriate planning, communication, and technology

				skills.
Andy Quick	n.d	Why IT Projects Fail?	Process, Sponsorship, Technology, Expectation Management, and People.	
Dr. Paul Dorsey Dulcian, Inc.	2000	Top 10 Reasons Why Systems Projects Fail	A. There do seem to be three factors that all successful projects have in common. Each of these factors is key to any project's success. Each project can be viewed as a tripod. All three legs must be in place for the tripod to stand sturdily. In a systems project, these "legs" or critical success factors consist of the following: • Top management support • A sound methodology • Solid technical leadership by someone who has successfully completed a similar project Without each of these solidly in place, the tripod will topple and the project will fail. B. List of the Top 10 Ways to Guarantee the Failure of a Systems Project: The following list has been inspired by actual mistakes encountered in real-world systems projects. 1. Don't use a specific methodology because coding is all that is really important. 2. Create the project plan by working backwards from a drop-dead system completion date. 3. Don't bother with a data model. Just build whatever tables you need. 4. Use a Technical Lead that has never built a similar system. Hiring such talent is too expensive. 5. Hire forty developers to make the coding go faster. 6. Build the system in Java, even though most of the development team still thinks that Java is coffee and you have no intention of ever deploying to the Web. 7. Three months before the system	In order to ensure system success, there are several factors to keep in mind: 1. Don't cut corners, methodologically. In the long run, this results in system failure or an inadequate system that doesn't meet the users' needs. 2. Audit each major deliverable and step along the way for accuracy and correctness. 3. Carefully monitor top management support for the project. Make sure that managers are aware of the progress of the team. 4. Secure the correct technical lead for the project.

			goes live, assign one junior developer to handle the data migration. 8. Skip the testing phase because the project is way behind schedule. 9. Change the system to support critical new requirements discovered during final development. 10. Buy a commercial, off-the-shelf package and customize it … a lot.	
Brenda Whittaker Senior Consultant, KPMG Consulting, Toronto, Canada	1999	What went wrong? Unsuccessful information technology projects	Common reasons for project failure were: 1. Poor project planning (specifically, risks were not addressed or the project plan was weak) 2. Weak business case – that which misses several components 3. Lack of management involvement and support.	
Janet Laurie JISC infoNet	2003	Why Projects Fail: A University Accounting System	• Overspend • Lack of planning of project infrastructure • Senior staff changes and lack of accountability and involvement • Unrealistic deadlines • Lack of contingency plans	JISC Centre of Expertise in the Planning & Implementation of Information Systems
R. Schmidt, K. Lyytinen, M. Keil, and P. Cule.	2001	Identifying software project risks: An international Delphi study	• Lack of top management commitment to the project • Misunderstanding the user requirements • Not managing change properly • Failure to gain user commitment • Lack of adequate user involvement • Conflict between user departments • Changing scope and objectives • Number of organizational units involved • Failure to manage end-user expectations • Unclear / misunderstood	Schmidt, Lyytinen, Keil and Cule, a group of researchers, led one of the comprehensive studies that were deployed to study the root causes for IT project failure on experienced project managers in three different settings: Hong Kong, Finland, and the United States. The three panels of experts acknowledged initially a list of 53 IT project risk factors. The list was

			scope and objectives • Improper definitions of roles and responsibilities • Lack of frozen requirements • Introduction of new technology • Lack of effective project management skills • Lack of effective project management methodology • Lack of required team knowledge / skills • Insufficient / inappropriate staffing	condensed to a set of 17 through ranking and paring down processes
Godfred Yaw Koi-Akrofi, Henry Osborn Quarshie, Joyce Koi-Akrofi	2013	IT PROJECT FAILURES IN ORGANIZATIONS IN GHANA	i. No project management departments: Companies do not have project management departments/units where projects are run from, where professionalism is assured for project delivery, but projects being run by IT departments themselves, where the focus may not be on project management, but on IT operations to the detriment of IT projects that are delivered ii. No quality checks for IT projects iii. IT projects not completed according to schedule iv. No specific IT project management methodology followed v. Revision of scope very often for a particular project vi. IT projects not meeting users needs vii. Wrong estimates	
Standish Group, Chaos Report	1994	IT Project failures/Success	Project success profiles in descending order: 1. User Involvement 2. Executive management support 3. Clear statement of requirement 4. Proper planning 5. Realistic expectations 6. Smaller project milestones 7. Competent Staff 8. Ownership	For the purposes of the study, projects were classified into three resolution types: 1. Resolution Type 1 (project success): The project is completed on time and on budget, with all features and functions

			9. Clear vision and objectives
			10. Hard working, focused staff
			11. Other
			Factors that cause projects to be challenged in descending order:
			1. Lack of user input
			2. Incomplete requirements and specifications
			3. Changing requirements and specifications
			4. Lack of executive support
			5. Technology incompetence
			6. Lack of resources
			7. Unrealistic expectations
			8. Unclear objectives
			9. Unrealistic time frames
			  10. New Technology
			  11. Other
			Why projects are impaired and ultimately cancelled in descending order:
			1. Incomplete requirements
			2. Lack of user involvement
			3. Lack of resources
			4. Unrealistic expectations
			5. Lack of executive support
			6. Changing requirements and specifications
			7. Lack of planning
			8. Did not need it any longer
			9. Lack of IT management
			10. Technology illiteracy
			11. Other
				as initially specified.
				2. Resolution Type 2(project challenged): The project is completed and operational but over budget, over the time estimate, and offers fewer features and functions than originally specified.
				3. Resolution Type 3(project impaired): The project is cancelled at some point during the development cycle.

De Lone & McLean	1992	IT Project success factors	1. Post criteria like system and information quality 2. Information use 3. User satisfaction 4. Individual and organizational impact	
Standish Group	2001	IT Project success factors	1. Executive Support 2. User Involvement 3. Experienced Project Manager 4. Clear Business Objects 5. Minimized Scope Standard 6. Software Infrastructure 7. Firm Basic Requirements 8. Formal Methodology 9. Reliable Estimates Other	

Hartman & Ashrafi	2002	IT Project success factors	1. Owner is informed of the project status and his/her approval is obtained at each stage. 2. Owner is consulted at all stages of development and implementation. 3. Proper communication channels are established at appropriate levels in the project team. 4. The project has a clearly defined mission. 5. Top management is willing to provide the necessary resources (money, expertise, equipment) 6. The project achieves its stated business purpose 7. A detailed project plan (including time schedules and milestones) with a detailed budget in place. 8. The appropriate technology and expertise are available. 9. Project changes are managed through a formal process. 10. The project is completed with minimal and mutually agreed scope changes.	
Robert N. Charette	2005	IT Project success factors	1. Unrealistic or unarticulated project goals 2. Inaccurate estimates of needed resources 3. Badly defined system requirements 4. Poor reporting of the project's status 5. Unmanaged risks 6. Poor communication among customers, developers, and users 7. Use of immature technology 8. Inability to handle the project's complexity 9. Sloppy development practices 10. Poor project management 11. Stakeholder politics 12. Commercial pressures	
Joseph Gulla	2011	IT Project success factors	Five Factor Model: 1. Project Management	

			2. People	
			3. Business	
			4. Technical	
			5. Method	
Selcuk Kiran	2012	IT Project success factors	1. Timing 2. Individuals with knowledge and/or experience 3. Partners and software selection 4. Time Management 5. Lower level workers 6. Project Management 7. After installation phase	
Brousseau, P, and He´roux, D	2013	IT Project success factors	Risk management as a part of IT project management, is still overseen or pitied by project managers.	

From Table 1, the following are the top 11 causes of IT project failure in descending order:

1. Poor requirements, objectives, resource estimates, and frequent changing of scope
2. Lack of skills of project manager/team members
3. Lack of top management involvement
4. Poor project planning
5. People factor/user involvement
6. Lack of proper methodology/process
7. Poor Communication
8. Unrealistic timescales/deadlines
9. Incorrect cost estimates
10. Outcomes not meeting business needs/objectives and user satisfaction
11. Technology Changes/Technology new to organization

- **Poor requirements, objectives, resource estimates, and frequent changing of scope**

Requirement gathering is key for IT projects because it forms the basis for a good design and subsequently, a successful outcome of the project, to meet the satisfaction of users. Incomplete requirements will definitely result in something that users will not be happy about. Software developers as an example always stand the risk of not being told everything. This is so because users tend to think that anything left out could easily be included later. On the other hand the software developer may not understand fully the business situation and requirements. This is the more reason why for a successful IT project, there must be within the team a liaison between the technical lead and the business to ensure all requirements are gathered for a good design.

Objectives are the specific deliverables, items, results, or outcomes the project team would like to achieve at the end of the day. This must be stated clearly without any ambiguity. If the objectives are not clear, or if they are poorly stated, it confuses the team as to what to actually deliver. This allows for introduction of personal ideas into the delivery of the project to the detriment of users and the business at the end of the day.

Resource estimates when not done well will either cause for a demand in resources, which will ultimately cause an increase in cost, or will serve as a waste, that is if overestimated. Past information can be relied upon to do good estimates. Poor resource estimates again, can cause temporary halt in the project since the resources may not be adequate to complete the project at the scheduled time. Poor resources estimates can also affect quality of the outcome of the project, as the project team may be

forced to make do with what they have, especially when new provisions are not made. We realize that poor estimates can affect all the three criteria for IT project success: within time and budget, and deliverables according to specifications.

Frequent changing of scope is a very serious phenomenon in the project environment. It can cause an increase in cost, delay the project, and also affect the quality of the outcome of the project. Too much scope changing can also cause the team to lose focus of the objectives of the project. In as much as possible, this must be controlled to ensure a smooth running of the project. This also means that the team should know what they are about right from the beginning. They should not be confused about the scope of the project right from the conception of the project.

- **Lack of skills of project manager/team members**

The project manager and the project team as a whole must in the first place be knowledgeable about managing a project from the beginning to the end. The Project management Institute talks about knowledge in the 10 knowledge areas: cost management, time management, integration management, stakeholder management, procurement management, risk management, human resource management, quality management, communications management, and scope management. These knowledge areas are key for a successful delivery of a project. Lack in these knowledge areas for especially the project manager may pose problems in the total delivery of the project. The project manager must also be very familiar with the project management life cycle: project initiation, project planning, project execution, project monitoring and evaluation, and project closure. Again, the project manager must be very familiar with the project life cycle. Other forms of skills are also needed in the project environment. Understanding the project environment is another skill that can be very advantageous to the project manager. The project environment in a large extent affects the project, and is also affected by the project. The project environment consists of the cultural and social environment, the international and political environment, and the physical environment. General management knowledge is also key since project management is an aspect of management. General management knowledge will help the project manager understand the project management process groups better. The project manager should also be familiar with application knowledge areas, standards, and regulations. Knowledge in a specific application knowledge area like engineering is not a requirement to become a project manager, but can be very helpful, especially in the execution and monitoring and controlling stages of the process. Finally, the interpersonal relationship of the project manager is key. Some of them are as follows:

- **Effective Communication**: The exchange of information
- **Influencing the organization**: The ability to "get things done"
- **Leadership:** Developing a vision and strategy, and motivating people to achieve that vision and strategy
- **Motivation:** Energizing people to achieve high levels of performance and to overcome barriers to change.
- **Negotiation and conflict management:** Conferring with others to come to terms with them or to reach an agreement
- **Problem solving:** The combination of problem definition, alternatives identification and analysis, and decision making.

- **Lack of top management involvement**

Lack of top management involvement in the project is similar to a vote of no confidence in the project. This may pose a major risk to the project. This kind of behavior may stem from equally important issues management may be dealing with at that moment in time. If management is involved in a number of issues that border on the survival of the organization, attention of management shifts to those things and all other issues become secondary. Another reason could be that the project does not match with the goals of the organization at that time in question. It could have been smuggled in by some powerful/influential people in the organization, but is sure to suffer rejection once it is clear that it does not match

organizational goals. The reason for lack of top management involvement could also be as a result of organizational politics. Regardless of the reason, it is not a good phenomenon, as it is a major cause of project failure.

- **Poor project planning**

Poor planning is a recipe for failure. Project managers execute plans and nothing else. With poor planning, project managers get it wrong at the end of the day. Detailed plans such as Task Plans, Resource Plans, Risk Management Plans, Quality Control Plans, Communications Plans, Issues Management Plan, Change Control Plan, Test Plan, Deployment Plan, etc. are essential for the effective delivery of projects. Poor planning is as a result of poor estimates, incomplete analysis of issues, and decisions not well thought through. Various scenarios must be considered before coming out with good plans. Even though plans can be altered in the course of the delivery of the projects, it is something that should not be encouraged. This means that it is imperative on the part of the project team to do a good job right from the beginning to ensure that they are focused with minimal deviations from the plan.

- **People factor/user involvement**

For IT/IS projects, user involvement is crucial especially at the requirement gathering and analysis stage of the project. Users must be involved from day one to appreciate what is being done for them. They must have a say in the output of the project since they are going to use it in the end. Failure to do that will result in the project in most cases being a "white elephant"; that is to say, they will not patronize it. The reason is simple: they see the outcome of the project as something being imposed on them rather than something they contributed to build. The users know their own problems, and for that matter what the new system should do for them. Rubbishing their input will spell disaster at the end of the day. The end project will not serve their purpose, and they will definitely not patronize it.

- **Lack of proper methodology/process**

Project management thrives on good methodology or process. Any serious organization will have a project management office to start with, and then a major methodology it follows for delivering its projects. The PMI's methodology of knowledge areas and process groups or the process based methodology of Prince2 as examples can be followed to deliver projects. Aside these major methodologies, there must be in place a governance team to ensure that the components or elements of these methodologies are followed judiciously. In the absence of these, the organization is just at the Initial or Repeatable levels of the capability maturity model. At these two levels, success is largely dependent on individual efforts and expertise as well as the scanty processes in place. The organization must be able to develop its own processes taking into consideration standardization.

- **Poor communication**

In this era of increased forms of communication; e-mail, telephone, real-time online like skype, what Sapp, etc., there should not be any barrier to communication. The issue here is not the technology, but the "how" it is done. To have all these forms of technology available and still not communicate effectively is a problem. Project team members must always be updated on the progress of the project to enable them keep track of time, etc. Key stakeholders must be updated on the progress of the project to know where they have to intervene and where they don't have to. Information on the progress of the project and any other information must be well managed to ensure that the project team keeps focus. People who should not be copied in mails should be left out to avoid unnecessary interference from them. Communication issues are very crucial, and if not managed well can throw the whole process of the project deliver into confusion. People who are not mandated to speak on the project should not speak to avoid confusions on completion time, cost of project, etc.

- **Unrealistic timescales/deadlines**

Unrealistic timescales/deadlines can result in the project team doing a shoddy job and presenting a low quality product or output at the end of the day. No matter the pressure from management about the project, the team must always come out with realistic timelines since they are the very people who will be blamed if something should go wrong.

- **Incorrect cost estimates**

Project costing is one of the criteria for project success or failure. Incorrect cost estimates can cause the project manager and the whole project team going back and forth in asking for increased quotations in the budget. This is not to be encouraged at all especially in a situation where budget is tight. The project in question can be halted for this reason, and that will be the end of that project.

- **Outcomes not meeting business needs/objectives and user satisfaction**

If the outcome of a project does not meet business needs/objectives and user satisfaction, the deployed project becomes as good as nothing. It may represent a wasted investment, and this simply means that the project failed big time.

- **Technology changes/Technology new to organization**

Technology changes can also cause projects to fail for the following reasons:
  - The outcome of the project may be obsolete at the time of deployment
  - There may be a lot of revisions in plans which can also affect cost considerably
  - Procured items may go waste as the team would have to procure a new set of items. Again it borders on cost
  - People or staff may have to be trained all over again because of the new technology. Again cost rears its head here.
  - Change management processes may have to be initiated to ensure the whole organization is in synchronism with the new technology

In summary, Technology Changes/Technology new to organization demand an increase in cost, and this can force a project to be halted if the organization is not in good standing in terms of finances.

Placement of IT project failure causes in the project management institute's (PMI's) project management life cycle (PMLC) side by side the systems development life cycle (SDLC) frameworks

Placing these failure causes in the PMI's project management process group or project management life cycle (PMLC) alongside the Systems Development Life Cycle (SDLC), we have figure 1 below:

| WATERFALL | PMI's PMLC | MAIN ACTIVITIES | Main causes of failure at each stage |

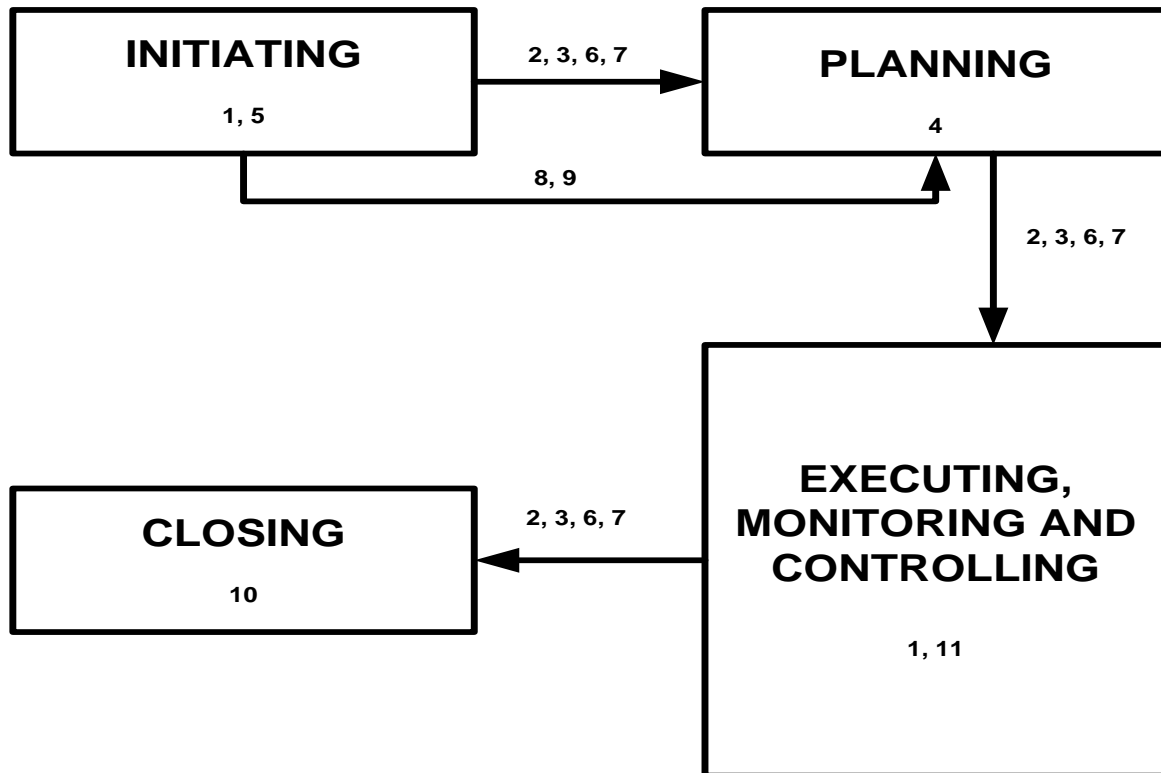| ANALYSIS | INITIATING | **WHAT** the system must do; **BUSINESS NEEDS AND REQUIREMENTS** | 1.   Poor requirements, objectives, resource estimates, and frequent changing of scope
2.   Lack of skills of project manager/team members
3.   Lack of top management involvement
5.   People factor/user involvement
6.   Lack of methodology/process
7.   Poor Communication
8.   Unrealistic timescales/deadlines
9.   Incorrect cost estimates |

| DESIGN | PLANNING | **HOW** the system must be built to meet the requirements for solving the problem or opportunity identified; various **PLANS** | 2.   Lack of skills of project manager/team members
3.   Lack of top management involvement
4.   Poor project planning
6.   Lack of proper methodology/process
7.   Poor Communication
8.   Unrealistic timescales/deadlines
9.   Incorrect cost estimates |

| CODING/ CONSTRUCTION/ IMPLEMENTATION — EXECUTING — MONITORING AND CONTROLLING | The system is built according to the requirements and design. | 1.   Poor requirements, objectives, resource estimates, and frequent changing of scope
2.   Lack of skills of project manager/team members
3.   Lack of top management involvement
6.   Lack of proper methodology/process
7.   Poor Communication
11.   Technology Changes/Technology new to organization |

| TESTING / DEPLOYMENT — CLOSING | The system is tested to ensure that it meets the defined requirements for solving the problem. It is then deployed(made available to the target users). Training, etc. are also done at this stage. | 2.   Lack of skills of project manager/team members
3.   Lack of top management involvement
6.   Lack of proper methodology/process
7.   Poor Communication
10.   Outcomes not meeting business needs/objectives and user satisfaction |

| MAINTENANCE |

This stage is normally not counted, as the project team has since been dissolved and project handed over to users

Figure 1: Placement of causes of IT project failures side by side SDLC (waterfall) and PMLC

Source: Author (Godfred Yaw Koi-Akrofi)

A summary of figure 1 is shown in figure 2 below.

Figure 2: Summary of figure 1

Source: Author (Godfred Yaw Koi-Akrofi)

From figure 2, we realize that the topmost cause of IT project failure according to this research work, designated "1" in this write-up, which is *"Poor requirements, objectives, resource estimates, and frequent changing of scope"*, is prevalent at the Initiating stage of the PMLC for the *Poor requirements, objectives, and resource estimates*, and at the Executing, Monitoring and Controlling stages for the *frequent changing of scope.* This means that an IT project's high probability of failing is heavily dependent on the Initiating stage of the project life cycle due to poor requirements, objectives, and resource estimates, and also at the executing, monitoring and controlling stages, if frequency in scope changing is not controlled.
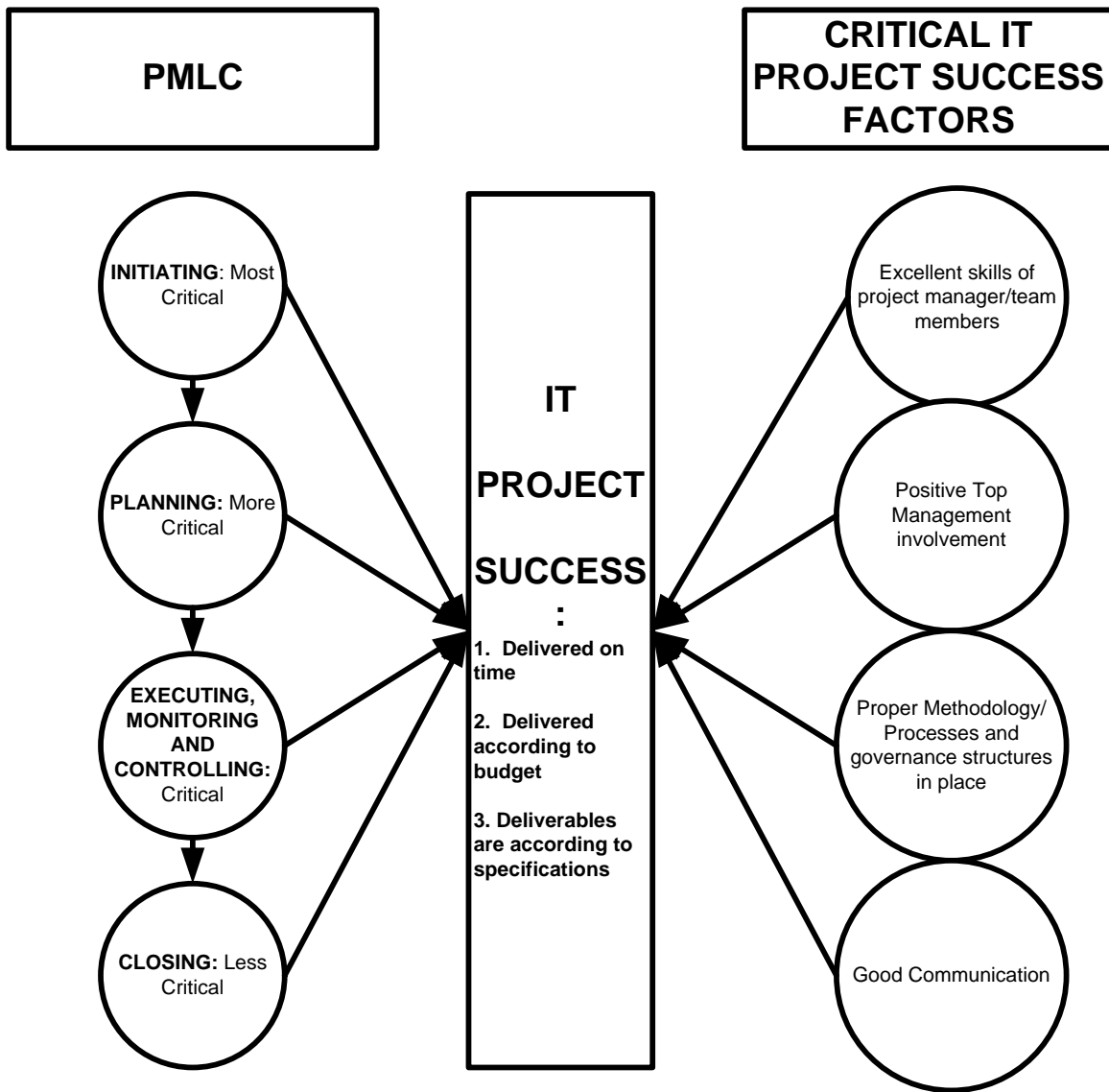
Again from figure 2, it is also clear that the Initiating stage has the greatest number of failure causes; eight out of eleven. This goes to strengthen the position that if the Initiating stage is not gotten right for IT projects, failure is inevitable. The planning stage too has seven out of the eleven causes of IT project failure identified in this research work. This means that the planning stage is second to the Initiating stage when it comes to IT project failure. Good project plans, etc. even though do not guarantee automatic success, are a recipe for success. The executing, monitoring and controlling has six causes, and the Closing stage has five causes. There is therefore a decreasing trend of number of causes of IT project failure from Initiating to Planning, to Executing, Monitoring and Controlling, and then to Closing.

It is also identified in the figure that four causes of IT project failure designated by numbers as "2, 3, 6, 7", and corresponding to the causes; *Lack of skills of project manager/team members, Lack of top management involvement, Lack of proper methodology/processes, and Poor Communication*, respectively, are found in all the stages of the PMLC. This makes them critical causes that must be watched. In other words for an IT project to succeed, the following are critical:

- Skills of project manager/team members
- Top Management Involvement

- Proper Methodology/Processes
- Good Communication

The success criteria framework based on the analysis so far is shown in figure 3 below:

```
┌─────────────────────┐                    ┌──────────────────────┐
│       PMLC          │                    │    CRITICAL IT       │
│                     │                    │ PROJECT SUCCESS      │
│                     │                    │    FACTORS           │
└─────────────────────┘                    └──────────────────────┘
```

INITIATING: Most Critical

PLANNING: More Critical

EXECUTING, MONITORING AND CONTROLLING: Critical

CLOSING: Less Critical

IT PROJECT SUCCESS :

1. Delivered on time

2. Delivered according to budget

3. Deliverables are according to specifications

Excellent skills of project manager/team members

Positive Top Management involvement

Proper Methodology/ Processes and governance structures in place

Good Communication

Figure 3. IT projects success criteria framework (ITP-SCF)

Source: Author (Godfred Yaw Koi-Akrofi)

Figure 3 simply tells us that for an IT project to be very successful, the Initiating stage of the project should be taken as most critical to the whole process. Once that stage is gotten wrong, the whole project is bound to fail. Again, once that stage is gotten right, there is a high probability that things will be done right for the other stages, since the planning stage is dependent on the initiating stage as well as the executing, monitoring and controlling stages are also dependent on the planning stage. The closing stage is less critical in the sense that whether the project is successful or not, the project must be closed; a project has a definite start time and end time.

For the critical IT project success factors, this research work argues that the project manager/team members must have excellent skills which largely include knowledge in project management as a

discipline, and not just that, but also specific methodologies(for example PMP, Prince2, etc.) that are used to deliver projects. Previous experience with delivering projects is also an added advantage. They must have broad knowledge in management, finance, supply chain, procurement, contract law, etc. to effectively manage the project. They must also have good interpersonal skills.

Positive Top management involvement will ensure support in all aspects of the project for it to be successfully delivered. This is very critical since the project can suffer a setback anytime which top management may be needed to step in to bring it on track. There are some decisions on a project that top managers can only take regardless of the powers of the project manager. Every serious organization must have standard methodology/processes in place for delivering projects. Without them, things are done anyhow, and in most cases the projects do suffer. A well-structured governance team must be in place to ensure these processes/methodology are followed to ensure unison and standardization. The governance team is also responsible for developing various templates for the agreed processes, etc. This ensure sanity in the project management environment, and also for easy identification of flaws in the existing processes for improvement in the future.

Good Communication will keep all stakeholders updated in sync with whatever is happening as far as the projects are concerned. Bad communication leaves gaps in projects and this can cause a project to fail so easily. Effective communication can be achieved using e-mail, phone, social media, etc.

Conclusion

IT project management is quite different from the general project management because of the behavior of IT systems and the users of IT systems. It is not straightforward as to even the usage of a software or an IT system when it is constructed. It would have to take a lot of training and sensitization for people to want to use it. Again if the new system does not do what was intended for it to do, which necessitated its construction, users simply would abandon it. This makes IT projects very critical. The success of IT projects can be based on a number of issues, but from the analysis done so far in this research work, success of IT projects has two dimensions:

1. **The process dimension:** Where causes of IT projects were placed in the PMLC to see which process group is most critical and for that matter must be looked at very closely for IT project success, and in that order.
2. **The success factors dimension:** Where causes of IT projects which run through all the process groups of the PMLC were identified and the converse used for the analysis.

At the end of the day, the author developed the IT projects success criteria framework (ITP- SCF) to aid in the analysis. This framework can be used by practitioners as a guide when delivering IT projects to ensure success at the end of the day.

References

[1]. Alexandrova, M., & Ivanova. L. (2012). Critical success factors of project management: empirical evidence from projects supported by EU programmes. 9th international asecu conference on "systemic economic crisis: current issues and perspectives".

[2]. Alpar, P. & Kim, M. (1990). A microeconomic approach to the measurement of information technology value. Journal of Management Information Systems, 7 (2): 55-69.

[3]. An Oracle White Paper. (2011). Why Projects Fail: Avoiding the Classic Pitfalls. Oracle. Primavera.

[4]. Andy Quick (n.d). Why IT Projects Fail. http://www.pmtraining.com.tw/article/professional/Why%20IT%20Projects%20Fail.pdf

[5]. Aon Risk Solutions. (2011). Governance of project risk- A guide to NGOs

[6]. Attarzadeh, I., & Hock Ow, S. (2008). Project management practices: Success versus failure. International Symposium on Information Technology (Volume: 1), pgs 1 – 8, Kuala Lumpur.

[7]. Betts, M. (2003). Why IT projects fail. Accessed March 31, 2011 from http://www.computerworld.com/s/article/84266/Why_IT_projects_fail

[8]. Bharadwaj, A. S., Bharadwaj, S. G., and Konsynski, B. R. "Information Technology Effects on Firm Performance as Measured by Tobin's q," *Management Science* (45:7), 1999, pp. 1008-1024.

[9]. Brousseau, P., & Héroux, D. (2013). Factoring in success [structured risk management for IT innovation projects]. CA Magazine, vol.146, no.6, pp. 34-6.

[10]. Bryce, T. (2006). Why Does Project Management Fail? Accessed March 31, 2011 from http://www.projectsmart.co.uk/why-does-projectmanagement-fail.html.

[11]. Chaplin, D. (2004).Making Projects Succeed: Part 1 -Measurable Business Goals. Accessed on March 31, 2011 from http://www.bytevision.com/BusinessGoalsArticle.aspx.

[12]. Charette, R. N. (2005). Why Software Fails. http://spectrum.ieee.org/computing/software/why-software-fails.

[13]. Coley Consulting. (2010). Why Projects Fail. Accessed March 31, 2011 from http://www.coleyconsulting.co.uk/failure.htm

[14]. Corporate Executive Board – PMO Executive Council. (2009). Project Managing to Business Outcomes - Targeting Critical Project Management Activities That Drive Business Impact.

[15]. Corporate Executive Board – PMO Executive Council. (2010). Agile at scale.

[16]. Cranfield School of Management. (2014). Why projects fail? www.pmtoday.co.uk

[17]. DeLone, W. H., & McLean, E. R. (1992). "Information systems success: the quest for the dependent variable." Information systems research 3.1: 60-95.

[18]. Dorsey, Dr. P. (2000). Top 10 Reasons Why Systems Projects Fail. Dulcian, Inc. http://www.rrsg.ee.uct.ac.za/courses/EEE4084F/Archive/2014/Assignments/Reading%20Assignments/Lect21-Dorsey_Top10ReasonsSystemsProjectsFail.pdf

[19]. Fink, A. (2010). Essential Elements for Project Success. Accessed June 8, 2011 from http://www.infotech.com/research/essential-elementsfor-project-success6/

[20]. Goulielmos, M. (2003). Outlining organizational failure in information systems development. Disaster Development and Management Journal, Vol. 12, No. 4, pp. 319-27.

[21]. Greene, J. & Stellman, A. (2010). Why projects fail. Accessed March 31, 2011 from www.stellman-greene.com/Why_Projects_Fail.pdf

[22]. Gulla, J. (2011). Ph.D. IBM Corporation. Seven Reasons Why Information Technology Projects Fail. Session 9341.

[23]. Gulla, J. (2011). Seven reasons why IT projects fail. Share, session 9341.

[24]. Gulla, J. (2012). Seven Reasons Why Information Technology Projects Fail.

[25]. http://www.ibmsystemsmag.com/power/Systems-Management/Workload-Management/project_pitfalls/.

[26]. Hartman, F., & Ashrafi, R. A. (2002). Project management in the information systems and information technologies industries. Project Management Journal; Sep 2002; 33, 3; ABI/INFORM Global pg. 5.

[27]. Haughey, D. (2010). The Four Levels of Project Success. Accessed on March 24, 2011 from http://www.projectsmart.co.uk/four-levels-ofproject-success.html.

[28]. Isfahani, K. (2010). Why Projects Fail: Avoiding the Classic Pitfalls. Oracle Corporation. CA:

[29]. Redwood Shores.

[30]. Judy, K. (2010). Why do some Agile projects succeed while others fail? Is it the company? Is it Agile methods? Accessed on March 31, 2011 at http://judykat.com/ken-judy/agile-projects-succeed-fail-company-agile-methods/

[31]. Kıran, S. (2013). IT project management and success criteria. http://conf.uni-ruse.bg/bg/docs/cp13/5.1/5.1-8.pdf.

[32]. Koi-Akrofi, G.Y., Quarshie, H.O., & Koi-Akrofi, J. (2013). IT project failures in organizations in Ghana. Journal of Emerging Trends in Computing and Information Sciences, VOL. 4, NO. 1.

[33]. Laurie, J. (2003). Why Projects Fail: A University Accounting System. JISC infoNet. https://jiscinfonetcasestudies.pbworks.com/w/file/fetch/61637036/project-failure-university-accounting-system.pdf.

[34]. Lyytinen, K., & Hirschheim, R. (1987). Information failures—a survey and Classification of the empirical literature. Oxford Surveys in Information Technology, 4:257–309.

[35]. Oltmann, J. (2007). What Makes Projects Succeed? Accessed on March 24, 2011 from www.spspro.com/.../9What%20Makes%20Projects%20Succeed%20070213%20long.pdf

[36]. Peslak, A. R. (2003). History, Business Community, Information Technology. The journal of Computer Information Systems.

[37]. Rawlinson, S. (2006). Successful Projects. Issue 06. Building.co.uk.

[38]. Rosenfeld, E. (n.d.). After all this.... Why do projects fail? Accessed March 31, 2011 from http://www.adaptivepartners.com/projfailb.htm

[39]. Schmidt, R., Lyytinen, K., Keil, M., & Cule, P. (2001). Identifying software project risks: An international Delphi study. Journal of Management Information Systems, 17(4), 5–36.

[40]. Smyrk, J. (2007). What does the term "IT project" actually mean?: a challenge to the IT profession.. PHILICA.COM Observation number 36.

[41]. Taimour, A. (2005). Why IT Projects Fail. Accessed May 22, 2011 from www.projectperfect.com.au

[42]. The Standish Group. (2011). CHAOS Manifesto 2011. Accessed June 9, 2011 from http://standishgroup.com/newsroom/chaos_manifesto_2011.php

[43]. Tan, S. (2011). How to increase your IT project success rate. Gartner Research: ID Number G00209668

[44]. Taylor, M. A., President. & CEO. (2002). TAYLOR Systems Engineering Corporation. The 5 Reasons Why Most Projects Fail: And what steps you can take to prevent it.

[45]. The Corporate Executive Board Company. (2010). "PMO Executive Council, PMO Rebooted: Reinventing the PMO for Agile Value Delivery." Arlington, VA:

[46]. The Standish Group. (1994). CHAOS report. IT Project failures and successes. https://www.standishgroup.com/sample_research_files/chaos_report_1994.pdf

[47]. The Standish Group. (2001). Extreme CHAOS. IT Project failures and successes. http://www.cin.ufpe.br/gmp/docs/papers/extreme_chaos2001.pdf

[48]. The Standish Group. (1995). CHAOS report. IT Project failures and successes. Accessed July 27, 2016 from https://net.educause.edu/ir/library/pdf/NCP08083B.pdf

[49]. Thibado, M. (2006). Managing Successful Software Development Projects. Ambient Consulting.

[50]. Thompson, D. (2001). Ten Reasons Software Projects Succeed. Accessed on March 31, 2011 from http://www.dave2001.com/tensuccessreasons.htm

[51]. Yeo, K. T. (2002). Critical failure factors in information system projects. International Journal for Project Management, Vol. 20, No. 3, pp. 1241-246.

[52]. Welcome to the Official PRINCE2®Website. 2011. Accessed on July 18, 2011 from http://www.prince-officialsite.com/

[53]. Whittaker, B. (1999) "What went wrong? Unsuccessful information technology projects", Information Management & Computer Security, Vol. 7 Iss: 1, pp.23 – 30.

[54]. Wiklund, D. & Pucciarelli, J. (2009). Improving IT Project Outcomes by Systematically Managing and Hedging Risk. A IDC Insights Research Document.

[55]. Wilson, D., & Connel D. (n.d). Project Governance. Master RESEARCH Australasia Pty Ltd.