



Information Technology Governance Frameworks: Overview of Information Technology Infrastructure Library (ITIL) Implementation Approaches

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Abstract— *the transition from an Information Technology (IT) system used exclusively to streamline the flows and procedures to an information system support of the strategy will not be achieved without the establishment of a specific framework of analysis and an appropriate organizational structure ensuring an optimal decision-making. The IT governance aims to establish best practices for the management of IT operations, the structures to put in place, their functioning, organization and processes to be implemented so that the IT function can support and develop the strategy and objectives company's. These best practices are identified in COBIT but also CMMI, ITIL, ISO 27001, ISO 38500 ...*

The purpose of this paper is to make an overview of ITIL implementation approaches. Thus we'll start with a literature review of these approaches by highlighting the strong points and limitations of each approach. Then we analyze an ITIL implementation case study in a company by focusing on the benefits of implementation, limitations and recommendations. Finally we will do a literature review on critical success factors for implementation approaches by classifying them according to the percentage of citation of each factor.

Keywords— *ITIL; ITIL implementation approaches; Critical success factors of ITIL implementation; IT governance frameworks; ITSM.*

I. INTRODUCTION

Companies that expect their information systems (IS) a decisive contribution to leverage the global redistribution of resources meet the versatile and volatile customer needs and innovate to face aggressive competition, good IT governance is imperative.

The IT governance aims to establish best practices for the management of IT operations, the structures to put in place, their functioning, organization and processes to be implemented so that the IT function can support and develop the strategy and objectives company's [1].

The five pillars of IT governance as defined by IT Governance Institute (ITGI) are:

- IT strategic alignment;
- IT value delivery;
- IT risk management;
- Performance Measurement;
- IT resource management.

The success of the IT governance requires the use of best practices that are identified in frameworks as COBIT as well as CMMI ITIL, ISO 27001, ISO 38500...

As part of this work, we will make a presentation of the main frameworks of IT governance, by focusing on the ITIL framework and specifically on ITIL implementation approaches.

The objectives of this article are:

- Make a literature review of ITIL implementation approaches and a comparative study of them;
- An analysis of an ITIL implementation case study in a company ;
- Make a literature review of critical success factors of ITIL implementation.

II. IT GOVERNANCE FRAMEWORKS

Good governance is a guarantee for optimal contribution of information system to the overall performance of the company. For users of IT and their representatives, IT governance is what corporate governance for shareholders and the board of directors of a company; it is a management and control of IT that combines the best effectiveness of management on the one hand and the interests, needs and user safety, on the other.

The issue of IT governance is particularly complex, that why makers are rather have to resort to experts and frameworks which are composed of guides of best practices.

The main frameworks of IT governance are presented in the following table:

TABLE I PRESENTATION OF IT GOVERNANCE FRAMEWORKS

| Framework | Purpose | Objectives/principles |
|--|--|--|
| COBIT (Control Objectives for Information and related Technology) | Provides a comprehensive framework that assists enterprises in achieving their objectives for the governance and management of enterprise IT. | COBIT 5 is based on five key principles for governance and management of enterprise IT [2]: <ul style="list-style-type: none"> • Meeting stakeholder needs; • Covering the enterprise end-to-end; • Applying a single, integrated framework; • Enabling a holistic approach; • Separating governance from management. |
| ITIL | Set of best practices for IT service management (ITSM). | The objectives of ITIL are [3]: <ul style="list-style-type: none"> • Align IT services with the current and future needs of the business; • Improve the quality of IT services delivered; • Reduce the long-term costs of IT service provision; • Improve the effectiveness and efficiency of IT organization. |
| CMMI (Capability Maturity Model Integration) | Provide a set of practices to assess the maturity process, to develop improvement plans or to implement more mature practices. | The objectives of CMMI are : <ul style="list-style-type: none"> • Improve the quality of the delivered product and productivity of project; • Increase customer satisfaction; • Reduce costs and meet deadlines; • Give visibility to management and allow better risk management. |
| ISO 38500 | Provide a framework of principles for directors to use when evaluating, directing and monitoring the use of IT in their organizations [4]. | This standard promote effective, efficient, and acceptable use of IT in all organizations by [4]: <ul style="list-style-type: none"> • Assuring stakeholders (including consumer, shareholders, and employees) that if the standard is followed, they can have confidence in the organization's corporate governance of IT. • Informing and guiding directors in governing the use of IT in their organization; • Providing a basis for objective evaluation of the corporate governance of IT. |
| ISO 27001 | Specifies the requirements for establishing, implementing, maintaining and continually improving an information security management system (ISMS). | It's a standard of risk control related to information security. It lets: <ul style="list-style-type: none"> • Identify the risk; • Identify the information and assets to be protected; • Treat the risk after having evaluated (risk acceptance, risk transfer or establishment of appropriate protection); • Maintain in time control of security as well obtained and to improve it. |

III. PRESENTATION OF ITIL

ITIL provides a guide for service providers on the delivery of quality IT services, processes, functions and other capabilities needed to support them. ITIL is not a standard to follow, it is a guide that should be read and understood, and used to create value for the service provider and its customers.

The objectives of ITIL are [3]:

- Align IT services with the current and future needs of the business;
- Improve the quality of IT services delivered;
- Reduce the long-term costs of IT service provision.

ITIL is the result of researches about issues provided by information technology. It is a framework of best practices for IT service delivery [5]. ITIL was developed in the end of 1980s by the central computer and telecommunications agency (CCTA), now called office of government commerce (OGC) at the request of the British government, which sought to enhance the quality of delivery of its IS and wanted to have a consistent framework for evaluation in order to outsource operations [6].

The initial version of ITIL is constituted of a library of thirty one associated books covering all aspects of IT service delivery. This initial version was then revised and replaced by seven, more closely connected and consistent books (ITIL V2) consolidated within an overall framework [7]. This second version became universally accepted and is now used in many countries by thousands of organizations as the basis for efficient IT service delivery [7]. In 2007, ITIL V2 was substituted by an enhanced and consolidated third version of ITIL, composed of five core books covering the service lifecycle, plus the Official Introduction [7].

In 2011, the third version has been updated in response to following points:

- Consideration of proposals by the training centers to facilitate teaching;
- Improvement of presentation of certain process lifecycle services;
- Review of the book « service strategy» to facilitate accessibility and understanding of the concepts.

The first book in the series of five ITIL publications is stage « service strategy» of the service lifecycle. The purpose of this stage is to define the perspective, position, plans and patterns that a service provider needs to be able to execute to meet an organization’s business outcomes [8].

The second book in the series of five ITIL publications is stage « service design » of the service lifecycle. The purpose of this stage is to design IT services, together with the governing IT practices, processes and policies, to realize the service provider’s strategy and to facilitate the introduction of these services into supported environments ensuring quality service delivery, customer satisfaction and cost-effective service provision [9].

The third book in the series of five ITIL publications is stage «service transition » of the service lifecycle. The purpose of this stage is to ensure that new, modified or retired services meet the expectations of the business as documented in the service strategy and service design stages of the lifecycle reference [10].

The fourth book in the series of five ITIL publications is stage «service operation» of the service lifecycle. The purpose of this stage is to coordinate and carry out the activities and processes required to deliver and manage services at agreed levels to business users and customers [11].

The fifth book in the series of five ITIL publications is stage « continual service improvement » of the service lifecycle. The purpose of this stage is to align IT services with changing business needs by identifying and implementing improvements to IT services that supports business processes reference [12].

IV. ITIL IMPLEMENTATION APPROACHES

A. Presentation of Implementation Approaches

Research work on the implementation of ITIL concern the following areas: antecedents to implementation, including reasons to implement and preconditions for implementation, strategies and methodologies for implementation, status of implementation, consequences of implementation, including outputs and benefits [13].

We are interested, in our article, to the researches work which proposed approaches of implementing ITIL in a company. The works on the implementation methodology are not many, that is why our work on literature review of ITIL implementation approach is divided in 2 parts: academic researches and the proposals of experts and consultants of ITIL (see table II).

TABLE III PRESENTATION OF ITIL IMPLEMENTATION APPROACHES

| Research | Category | Purpose | Case studies |
|----------|---------------------|---|---|
| [14] | Academic researches | Propose a methodology to improve IT management using ITIL as a guide, in order to make the implementation of ITIL methodology more accessible to small companies in Quebec reference. | None |
| [15] | | Propose to the companies of all size and level, a methodology for implementing ITIL. | Implementation in 7 companies for 2 processes |
| [16] | | Propose to Egyptian companies a methodology to implement ITSM based on ITIL. | Implementation in 3 companies for 3 processes |
| [17] | | Identify the main frameworks used within IT departments | None |

| | | | |
|------|----------------------|--|-------------------------------------|
| | | of large companies. This study also looks at the life cycle and operational implementation of these frameworks, since initialization phase until the final measure of their use. | |
| [18] | | Propose a guide for implementing ITIL. | None |
| [19] | | Propose a guide to implement frameworks ITIL, COBIT and ISO27001 in a company. | None |
| [20] | | Propose a set of critical success factors and generic implementation model for ITIL with an implementation roadmap. | None |
| [21] | | Propose a roadmap to implement ITIL. | Implementation in one company |
| [22] | Proposals of Experts | Propose to the small and midsized companies a methodology for implementing ITIL. | Implementation in several companies |
| [23] | | Propose a methodology for implementing ITIL in organization. | Implementation in several companies |
| [24] | | Propose an ITIL implementation in companies. | Implementation in one company |
| [25] | | Propose an approach of five steps. | None |
| [26] | | Propose an implementation approach of ITIL based on best practices of the PMBOK. | Implementation in several companies |

B. Comparative study of Implementation Approaches

The comparative study of the implementation approaches consists in identifying strong points and limitations of each approach (see table III).

TABLE IIIII COMPARATIVE STUDY OF ITIL IMPLEMENTATION APPROACHES

| Approach | Strong points | Limitations |
|----------|---|--|
| [14] | <ul style="list-style-type: none"> Detailed approach Objectives, deliverables and challenges of each stage specified Approach established from managers and ITIL experts | <ul style="list-style-type: none"> Proposal for company with IT team of 10 people and a fleet of 400 computers and servers Not Implemented |
| [15] | <ul style="list-style-type: none"> Proposes a tool for assessing process maturity Offered for companies of all levels and sizes | <ul style="list-style-type: none"> Implemented in 7 companies but just for 2 processes |
| [16] | <ul style="list-style-type: none"> Proposes a step that defines critical success factors and key performance indicators for each process Proposes a tool for assessing process maturity | <ul style="list-style-type: none"> Implemented in 2 companies but just for 3 processes |
| [17] | <ul style="list-style-type: none"> Proposes a step for process mapping Proposes a step for change management Established from a survey of several companies | <ul style="list-style-type: none"> Applicable for all frameworks of IT department, but each has its particularity Constituted by 10 steps, 5 to choose a framework |
| [18] | <ul style="list-style-type: none"> Use of Total Quality Management (TQM) for survey Proposal of approach for a prioritization of ITIL processes Proposal a mapping for dependencies of process | <ul style="list-style-type: none"> Not implemented Not detailed |
| [19] | <ul style="list-style-type: none"> Use of IT Governance Implementation Guide Proposal for an alignment of the three frameworks (COBIT, ITIL and ISO 27002) Proposes a roadmap for the implementation model | <ul style="list-style-type: none"> Not implemented |
| [20] | <ul style="list-style-type: none"> Approach detailed Proposes a challenges and critical success factors (CSF) for implementing ITIL Proposes a roadmap for implementation | <ul style="list-style-type: none"> Not implemented |

| | | |
|------|---|---|
| [21] | <ul style="list-style-type: none"> Proposes an adoption model for ITIL based on UTAUT (unified theory of acceptance and use of technology) Use a literature review detailing critical success factors of ITIL implementation. | <ul style="list-style-type: none"> Implemented only in one company |
| [22] | <ul style="list-style-type: none"> Approach implemented | <ul style="list-style-type: none"> Proposed for small and medium companies Not detailed approach Approach that stops at the implementation phase |
| [23] | <ul style="list-style-type: none"> Proposes a workshops on process in order to reflect on the changes to opt Proposes a step « governance process » consisting on setting up a structure that controls the performance of the whole processes | <ul style="list-style-type: none"> Approach does not specify the size of company concerned |
| [24] | <ul style="list-style-type: none"> Proposes a tool for assessing process maturity based on ITIL V3 and ISO /IEC15504 standard of processes assessment ; Implemented approach as part of the governance of the company Proposes a step for gaining top management's commitment Use basic operations in the work of the manager proposed by Drucker's management theory Proposes a step for motivating and communicating employees | <ul style="list-style-type: none"> Implemented only in one company Not detailed approach |
| [25] | <ul style="list-style-type: none"> Use of best practice of project management (PMBOK) Implementation of the project in small, iterative phases | <ul style="list-style-type: none"> Not implemented Not detailed |
| [26] | <ul style="list-style-type: none"> Use a step for process mapping Use CMMI for assessing process maturity Proposes the use of the measure with key performance indicator (KPI) based on the balanced scorecard. | <ul style="list-style-type: none"> Not detailed Limited only for 4 processes Approach does not specify the size of company concerned |

V. ANALYSIS OF AN ITIL IMPLEMENTATION CASE STUDY

The purpose of this section is to analyze a case study of ITIL implementation in a company. We had participated in this project as member of team (consulting firm) which had implemented ITIL in the company. The analysis consists of:

- Identify the main benefits of the implementation;
- Highlight the limits of the approach;
- Propose recommendations for successful implementation.

A. Presentation of Implementation Approach

The company (our case study) is a large company with a workforce of 500 employees organized in the form of a head office and 8 sites in 8 cities. The aim of this project is the implementation of incident management process based on ITIL framework. The approach consists of the following phases:

1) Initialize the Project:

The objective of this phase is to define the project scope. This phase is composed of the following steps:

- Presentation of the different phases of the project to the IT department;
- Presentation of the project for top management company's and the implementation benefits for the company ;
- Awareness and training the IT department on the ITIL processes.

2) Assess the current situation :

The objective of this phase is to assess the current practices of IT department compared to ITIL. This phase is composed of the following steps:

- Conclude interviews with employees of IT department and 3 staff from other departments, review the applicable documentation, Take into account the special constraints of the business, the trades and interfaces with other departments;

- Elaborate findings and analyzes of the current situation and recommendations;
- Position the current practices in IT department in relation to ITIL best practices.

3) *Define the process:*

The objective of this phase is to design the process. This phase is composed of the following steps:

- Design and document the process;
- Document the new roles and responsibilities;
- Define the plan for implementation of the process;
- Define the communication plan.

4) *Implement tools:*

The objective of this phase is to implement tools to manage the process. This phase is composed of the following steps:

- Implement tools to manage the process;
- Set up and prepare documentation process management tools;
- User training on process management tools.

5) *Implement process:*

The objective of this phase is the effective implementation of incident management process. This phase is composed of the following steps:

- Execution of the communication plan for implementation of the process ;
- Launch the new process into practice;
- Start reports and reviews;
- Measure progress.

6) *Assess and Evolve:*

The objective of this phase is to make an assessment of the process implemented and research of its improvement. This phase is composed of the following steps:

- Conduct an audit six months after starting ;
- Define improvement actions;
- Prepare the next step, to enter a cycle of improvement.

B. Principals profits of implementation

The implementation of incident management process in the company has enabled the company to make profits and quality improvement of IT services. The main results are described in the table IV.

Table IV Principals Results of Implementation

| Before implementation | After implementation |
|---|---|
| •Lack of a single point contact for incident resolution. | •Defining a single point contact for the management and treatment of incidents. |
| •Solutions relating to assistance requests and incidents are not recorded. | •The solutions are recorded in order to capitalize (knowledge base and capitalization of know-how help desk). •Traceability and visibility into incidents. |
| •For unresolved incidents, two scenarios are possible: they are being processed or the request is lost and the user doesn't receive a feedback. | •The user is informed of his application processing status from creation to closing. |
| •No current indicator can reflect the reality of the number of incidents treated by the IT department. | •The average number of incidents per week is 1000 requests. •Definition of indicators for monitoring of incidents. |
| •No visibility on the responsibilities of the help desk. | •Better visibility of help desk responsibilities. |
| •No procedure for describing the incident management. | •A formalized procedure that describes the steps to manage incidents (who does what and how). |

C. Limitations of implementation

Although the implementation of the Incident Management process has enabled great benefits for the company, a number of limitations should be mentioned:

- Tools set up is suitable for incident management process;

- Awareness is not too large compared to the size of the project;
- The management commitment must be enormous in such projects to ensure their success in all of the company;
- Need to engage other important processes to have more profits for the company: change management, problem management and configuration management.

D. Recommendations

The implementation of ITIL is a best opportunity for improving the quality of IT services in a company. However in order to success the project in the short and medium-term, a number of recommendations to be taken into account:

- Obtain management commitment;
- Make a strong awareness;
- Ensure a better training for IT department team;
- Make good communication and especially on the project, profits, results and users' satisfaction surveys;
- Choose the good tools capable of supporting all ITIL processes.

VI. CRITICAL SUCCESS FACTORS

The objective of this paragraph is to make a literature review of critical success factors for ITIL implementation. This review is composed of two types of works: academic researches and the proposals of experts and consultants of ITIL (see table V).

TABLE V CRITICAL SUCCESS FACTORS OF ITIL IMPLEMENTATION

| Researches | Category | Critical Success Factors | | | | | | | | | |
|------------|----------------------|--------------------------|------------------------------|-----------|---|--------------------|----------------|---------------------|-------------------|--------------------------------------|-----------------|
| | | Training | Senior management commitment | Awareness | Right tools and techniques for process implementation and maintenance | Project management | Culture change | Performance Reviews | Change management | Having a clear vision of the project | Staged Approach |
| [27] | Academic researches | | ✓ | | ✓ | ✓ | ✓ | | | | |
| [28] | | ✓ | ✓ | ✓ | ✓ | | ✓ | | | | |
| [29] | | ✓ | ✓ | ✓ | | | | | | | |
| [30] | | ✓ | ✓ | ✓ | ✓ | | | | | | |
| [31] | | ✓ | ✓ | | | | ✓ | | | | |
| [32] | | ✓ | | | | | | | | | |
| [33] | | ✓ | ✓ | | | ✓ | | | ✓ | | |
| [34] | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | | |
| [17] | | ✓ | | | | | | | ✓ | ✓ | |
| [35] | Proposals of Experts | ✓ | ✓ | ✓ | | | | | | | |
| [36] | | ✓ | | | | ✓ | | ✓ | | ✓ | |
| [3] | | ✓ | ✓ | ✓ | | | | | ✓ | ✓ | ✓ |
| [37] | | ✓ | ✓ | ✓ | | | | | ✓ | ✓ | ✓ |

Our choice approach of important critical success factors is to classify them according to their citation percentage in the researches referenced in the table V. The result of the percentage shows that the most cited factors are:

- Training (92%);
- Senior management commitment (77%);
- Awareness (54%);
- Change management (38%).

VII. CONCLUSION

This paper presents the main frameworks of IT governance by focusing on ITIL implementation approaches. At first we did a literature review of implementation approaches and a comparative study of them by highlighting the strong

points and limitations of each. Secondly we did an analysis of an ITIL implementation case study in a company by identifying the benefits of the implementation, the limitations and recommendations. In a last time we did a literature review on critical success factors for ITIL implementation that we classified according to the citation percentage of each factor by researches. In a future work, we plan to propose an ITIL implementation approach based on the benefits for these approaches as well as the case study.

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