The Value of ITIL

Pedro Carmo Belo de Oliveira

Abstract: As World economy lingers it is increasingly more important to justify any investment so that available corporate funds are spent wisely. However, estimating the value of ITIL investments is not an easy task, which means that most CIOs do not invest in large-scale ITIL projects as much as it would be desirable. Instead, CIOs prefer to embark on quick win implementations (e.g. solely implement the incident management process). For this reason, it is necessary to create an ITIL Value Estimator. This estimator is based on an estimation process that quantifies the project’s total cost, along with each process’ benefits. The outcome of the ITIL Value Estimator is a Monte Carlo simulation whose result provides CIOs with a justification of the value of large-scale ITIL implementations, which can be used to gain the upper hand during the decision-making process.

Keywords: ITIL, estimator, metrics, risk analyses, cost-benefit analysis, KPIs.

1. Introduction

Today’s competitive and turbulent economy forces organizations to struggle in order to remain competitive. Organizations can only grow by cutting costs as well as optimizing resources. Having this in mind, a growing number of organizations has become increasingly dependent on Information Technology (IT) to manage and grow their businesses.

In the past, this IT dependency meant a growing IT budget, despite the fact that there was no evidence if IT investments would bring benefits to the organization (Ross & Weill, 2002). However, disproportionate budgets are no longer allowed by the executive board, as Chief Information Officers (CIO) must justify their IT budget, and must prove that IT projects are indeed necessary for the organization to maintain its competitive level.

CIOs should have a broader understanding of the organizations’ structure as organizations are gradually becoming flat instead of having a vertical structure. This transition leads to the establishment of horizontal processes in detriment of vertical silos, which made it possible to align IT and business. And, CIOs should be able to effectively manage the link between the two of them (O’Leary, 2002).

However, without a coherent framework to manage business processes, organizations are not well prepared to avoid or solve problems related to this transition. Hence, organizations that manage their IT correctly generate returns at least 40% higher than their competitors and, for that reason, it is very important that organizations adopt an IT management framework (Ross & Weill, 2002).

In the present day, ITIL v3 consists of a set of guidelines that specify what an IT organization should do based on industry best practices. These guidelines offer advice on the definition, plan, implementation, execution, monitoring and continual improvement of the IT service management. Therefore, it is crucial not to regard ITIL as a technological project but as organizational change process (Silva & Martins, 2008).

To sum up, ITIL investment justification is a non-trivial subject and only by analysing the investment are CIOs able to justify the value of ITIL investments. In this way, the analysis of the investment ends up being the main justification support because it produces numbers that help justifying the ITIL investment, by calculating the benefits and costs. Thus, calculating the value of the investment is part of the investment analysis, and this analysis is absolutely necessary in order to justify the investment.
2. Problem

Nowadays there are multiple research case studies which support the statement that ITIL brings value (Gartner, 2006). However, CIOs are going through great difficulties so as to justify the value of ITIL implementations to their peers, as there is no pragmatic methodology in their grasp to prove the business value of ITIL implementations.

Indeed, estimating the value of ITIL implementations is not an easy task because many variables have to be considered (Seddon, Graeser & Willcocks, 2002). Maturity level, tangible and intangible benefits and costs, organizational complexity, and cultural context are just some of the variables that can be considered. The time factor is also another important aspect to be considered in the investment evaluation process (Repenning & Sterman, 2001).

Consequently, ITIL projects that immediately fix problematic areas (e.g. incident management systems), commonly known as quick wins, are usually chosen instead of large scale ITIL implementations (University of St. Gallen, 2005). This happens because large-scale projects are more complex which originates confusion and increases costs (Denker, 2005). Also, quick wins comprise an easier way of showing employees that ITIL works and, therefore, facilitates change that is naturally implicated in ITIL implementation projects (Silva & Martins, 2008; University of St. Gallen, 2005).

Quick wins have early returns associated to them but, if the organization does not continue to incrementally implement the rest of the ITIL processes, then performance may become even worse than before (University of St. Gallen, 2005). On the other hand, if quick wins are completed successfully and the benefits are realized, it is much easier for the CIO to ask support for subsequent larger scale ITIL implementation projects.

Alternatively, CIOs who opt for long term ITIL implementations will experience higher returns because large scale ITIL implementations involve more abstract concepts (e.g. organization design) that systematically change the investments where the organization spends its time, which ends up making the ROI proportionally larger as it is a proactive process instead of reactive.

3. Related Work

Currently, there is still limited academic research on appraising the value from ITIL implementations (Tiong, Cater-Steel & Tan, 2008). For this reason, ITIL estimation metrics are adapted from different investment analysis approaches which use financial metrics and other non-financial approaches, which are discussed in the following sections.

3.1 Investment Analyses

The value of ITIL implementations can be estimated by using general investment analyses techniques because, likewise any investment, ITIL implementations are treated as business decisions subject to the same investment thresholds as every business investment (Harvard Business Review, 1999).

The metrics by which IS are evaluated are divided into cost and benefit analyses and risk analyses. The metrics for cost and benefit analyses include: pay back period, ROI, net present value, internal rate of return et cetera. And the risk analyses metrics include: sensitivity analysis, brainstorming, scenario planning, Monte Carlo simulation et cetera (Ballantine & Stray, 1999).
Cost and benefit analyses

It is important to analyse several financial metrics in terms of their main advantages and disadvantages, so as to identify which situations are more favourable to one financial metric in detriment of the others. Table 1 corresponds to the outcome of this comparison.

Table 1 – Comparison between financial metrics.

<table>
<thead>
<tr>
<th>Metrics</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Net Present Value (NPV)</strong> (McCready, 2005; Harvard Business School, 2002; Dos Santos, 1991; Silvius, 2006)</td>
<td>- Takes under consideration the discount rate.</td>
<td>- Does not give any indication about the project’s magnitude and risk.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Discount rate can be hard to calculate.</td>
</tr>
<tr>
<td><strong>Return On Investment (ROI)</strong> (McCready, 2005; Harvard Business School, 2002; Silvius, 2006)</td>
<td>- Perfect for one-to-one project comparison.</td>
<td>- Does not give any indication about the project’s magnitude.</td>
</tr>
<tr>
<td></td>
<td>- Commonly used.</td>
<td>- Requires vendors to share “sensible” information.</td>
</tr>
<tr>
<td></td>
<td>- Takes under consideration the cost of capital.</td>
<td>- Can only compare project with the same level of risk.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Does not recognize when the cash flows take place.</td>
</tr>
<tr>
<td><strong>Internal Rate of Return (IRR)</strong> (McCready, 2005; Harvard Business School, 2002)</td>
<td>- Identifies investments with irregular profits.</td>
<td>- Not easy to compute and understand.</td>
</tr>
<tr>
<td></td>
<td>- Takes under consideration the discount rate.</td>
<td>- Does not give any indication about the project’s magnitude.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Assumes that the cash inflow from an investment is reinvested at the same discount rate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Hurdle rate varies from company to company.</td>
</tr>
<tr>
<td><strong>PayBack Period (PBP)</strong> (McCready, 2005; Harvard Business School, 2002; Silvius, 2006)</td>
<td>- Expresses the time it takes for an investment to reach the ‘break even’ point.</td>
<td>- Does not take under consideration the discount rate.</td>
</tr>
<tr>
<td></td>
<td>- Separates, in terms of risk, long-term from short-term investments.</td>
<td>- Does not give any indication about the project’s magnitude.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- No information about the investment performance after the ‘break even’ point.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Does not identify when the cash flows take place.</td>
</tr>
<tr>
<td><strong>Economic Value Added (EVA)</strong> (McCready, 2005; Harvard Business School, 2002; Symons, 2005)</td>
<td>- CIOs analyze investment with shareholder’s lens.</td>
<td>- Cannot be used by organizations that are not publicly traded.</td>
</tr>
<tr>
<td></td>
<td>- Easy to understand.</td>
<td>- EVA is uncertain.</td>
</tr>
<tr>
<td></td>
<td>- Simple methodology.</td>
<td>- Cost of capital varies from organization to organization.</td>
</tr>
</tbody>
</table>
Risk analyses

In terms of sensitivity analysis, the gross sensitivity analysis reveals how sensitive the estimated ROI is to given changes in the considered variable.

In addition, stress testing consists of making an analysis of the extremes by calculating the worst/best case scenarios, and the baseline ROI is calculated by using expected values for all the variables used. Then, the ROI is recalculated by using, respectively, the smallest and the largest value for each of the variables (Stæhr, 2006).

The Monte Carlo simulation calculates the chances of success of the investment by using a normal distribution shape with a 95% confidence interval, which means that the probability that a value falls within 2σ (standard deviation) of the mean is 95%, so as to generate several scenarios through a random distribution of values, which belong to the area defined by the normal distribution curve (Hubbard, 2007).

To conclude, performing risk analyses by using a Monte Carlo simulation is less limitative than using stress testing or gross sensitivity analysis, because gross sensitivity analysis only changes the values of one variable at a time and stress testing places excessive weight on very unlikely outcomes (Rodger, Jason, 1999).

3.2 IT Investment Comprehensive Approaches

Since both IS and ITIL regard organizations/systems as people, processes and technology (a slight difference comparing to the Management Information System mantra: “organization, management and technology”), an ITIL implementation can be considered an IS project. Another reason why ITIL and IS are akin is the organizational change that is associated to them, as both of them transform the organizations where they are implemented (Laudon & Laudon, 2005).

As a result, the value of ITIL implementations can be estimated by using IT investment analysis comprehensive approaches because, similarly to any IS investment, ITIL investments can be controlled and measured (Ward & Daniel, 2005). And, for this reason, new methodologies that go beyond the traditional investment analysis focus on analysing the intangible benefits/costs (Violino, 1997).

3.3 Comparison

The IT investment comprehensive approaches bring more long-term added value to the organization when compared to cost-benefit and risk analyses (Silva & Martins, 2008; Harvard Business Review, 1999). On the other hand, IT investment analyses have a longer learning curve and might provoke organizational resistance as they require an organizational mind-set change.

In conclusion, the type of analyses do not constitute a satisfactory solution for the problem, because they are not prepared to make an accurate estimative of the value of ITIL implementations as multiple complex variables specific to ITIL have to be considered. Nonetheless, these approaches provide background for the conception of an estimation process.

4. Proposal

In order to perform a cost benefit analysis, three actions should be included in the estimation process: determine the tangible and intangible benefits in addition to the project’s costs, which embody the tangibility return of an investment, and determine the NPV (Silvius, 2008). Subsequently, an additional sensitivity analysis should be included as the previous variables are not deterministic and, therefore, are subjected to risks and uncertainty (Stæhr, 2006).
4.1 Estimation Process Description

The estimation process is represented by figure 2 and the following points explain each activity and sub-process in more detail.

- **Choose the processes**: the first activity of the process is performed by the consultant that determines which ITIL processes will be implemented. If a maturity survey occurs beforehand, the opportunities selection will be more accurate because there is more precise information about each ITIL process’s maturity. Nevertheless, the ITIL maturity survey artefact is an optional input.

- **Choose the project’s risk level**: the consultant chooses the project’s risk level based on a risk analysis, which impacts greatly the benefits quantification process and investment analysis further ahead. The higher the risk is, the lower the benefits will be, and the investment is influenced as well (Stæhr, 2006).

- **Input general client data**: the consultant inputs general client data, for example: the organisation’s revenue, number of employees and working hours per year.

- **Quantify benefits**: In this sub-process the benefits are quantified by analyzing the general client data gathered in the previous activity, as well as KPIs specific to each process which can be found in official literature (Brooks, 2006; Steinberg, 2006).

- **Compute total benefits**: the benefits are automatically quantified through the analysis of data that is inserted in the previous activity.

- **More processes?**: If at least one process has not been processed yet, then the next phase is to analyze the next process on the waiting list. If not, the costs quantification starts.

- **Quantify costs**: the consultant defines the discount rate and the percentage of operating costs that come from the investment over the years and the value of the investment, so as to determine the project’s costs.

- **Perform investment analysis**: using the data gathered in the previous two activities, a financial analysis is made in order to assess the NPV, PBP and IRR of the investment.

- **Select number of trials to run**: in this activity the consultant selects how many scenarios will be used to perform a Monte Carlo simulation (see last activity).

- **Correlate variables**: because some variables are correlated to others, i.e. “the state of one variable gives us the information about the likely occurrence of another” (Rodger, Jason, 1999), it is important not to ignore the correlations that exist between variables. Therefore, the consultant has to define the correlation coefficients between all the variables that enter the sensitivity analysis.

- **Perform Monte Carlo simulation**: discovering the estimated ROI by using the expected values for the project’s benefits and costs is generally incorrect because of non-linearity between the variables. In order for the ITIL Value Estimator to be more precise and, therefore, more reliable, it is important to perform a Monte Carlo simulation. According to the “central limit theorem”, since the ROI results from the sum of several variables, there are strong arguments for choosing a normal distribution. The chance that the investment will compensate is calculated by counting the number of scenarios in which the user-defined breakeven line is reached.
Figure 2 – ITIL value estimation process
5. Implementation

In order to realize the estimation process described in the previous section, a prototype was built with Microsoft Excel 2003 technology.

5.1 Evaluation Methodology

The evaluation methodology of the prototype varies according to two distinct situations: when only one process is considered for the estimation process or when multiple processes are considered.

Several questions have to be answered in order to evaluate one process:

- Which metrics are the most relevant during the benefits quantification sub-process?
- Is the logic of the KPIs challenged by the practitioner or ITIL experts?
- Until what point is risk consequential?
- Do the correlations between variables affect the result? How?

On the other hand, the evaluation methodology for several processes is focused on the consequences that derive from the dependencies that exist between processes and, consequently, the benefits adjacent to the correlation coefficients attached to these dependencies.

5.2 Action

Incident management process simulation

A simulation using real KPIs’ data was performed in a Portuguese state/public organization which implemented one ITIL process, the incident management process, for a period of one year.

In order to determine the real value of the incident management process it is necessary to retrieve reliable data directly from historical data and introduce it into the prototype, in order to perform the investment analysis as well as the Monte Carlo simulation. The estimated value of one or more processes is then calculated by introducing input data regarding the forecast values of the KPIs and other data, which were determined by the practitioner.

So, in this way it is possible to compare the estimator’s effectiveness in a past project by comparing that project’s real value and estimated value.

Simulation with multiple processes

A theoretical simulation with several processes was performed so as to evaluate the value of the correlations that exist between processes. The following tests were performed:

- With correlations that exist between the processes and between processes and investment costs.
- Without any correlations.

Four processes were considered and each one creates € 100.000 of benefits and the project’s overall investment is € 500.000, which means that the ROI mean value is -20%. The purpose of this simulation is to realize if the correlations that exist between processes pay off the superior project’s investment costs or not.
5.3 Results

*Incident management process simulation*

The KPI “number of incidents” has a devastating influence over the benefits quantification outcome in the simulation with estimated data with 93.31% of the monetary benefits. In contrast, the simulation with real data confirmed the existence of two high-impact KPIs, “percentage of incidents resolved without breaching one SLA” and “percentage of calls 1st line support bypassed”, with 49.07% and 40.22%, respectively.

Therefore, some of the other KPIs proved to be irrelevant, but those KPIs whose percentages are linearly dependent on the “percentage of time that impacts employee productivity” could have more impact on the final result, if this percentage was set to a higher value.

So, the KPI “number of incidents” unleveraged the results of both simulations. In fact, the estimated value for this KPI is the outcome of a meeting with ITIL experts and the target organization’s practitioner which challenged the benefits quantification. Hence, this KPI is included only in the benefits quantification of the simulation with estimated data because no real data was available at the time.

Taking a look at the risk, it influenced greatly the financial metrics included in the financial analysis. Thus, when the risk increases, the NPV and IRR decrease and the PBP increases.

Lastly, a higher level of a negative correlation between variables is associated to higher values of variance, standard deviation and skewness, which means that the Monte Carlo simulation trials tend to be more dispersed if there are negative correlations between the variables considered.

*Simulation with multiple processes*

Even though the correlations might not pay off the superior project’s investment costs, there were more positive ROI scenarios in the Monte Carlo simulation with correlations than in the one without correlations, which is caused by the fact that the standard deviation, variance and skewness are higher in the simulation with correlations than in the one without, and this causes the trials to be more dispersed in the simulation with correlations.

6. Evaluation

6.1 Incident management process simulation

The simple fact that different KPIs were utilized in the two simulations influenced greatly the effectiveness of the estimator itself.

As a consequence, different quantification logics were applied in both simulations, for instance: some KPIs are based on the employee productivity whilst others are based on the cost per incident, which is calculated by dividing the IT total costs by the total number of incidents in a period of one year. On the other hand, the employee productivity is the result of the division of the revenue by the total number of employees.

Using different forms of quantification isn’t necessarily incorrect. On the contrary, it makes the estimator more correct as both forms are valid and should be taken under consideration, since the cost per incident is focused on cost reduction and the employee productivity is driven towards productivity gains.
Also, in view of the fact that the risk’s influence over the investment analyses is enormous, it is important that the risk analysis is performed carefully and with the help of risk experts.

6.2 Simulation with multiple processes

When the correlations amongst processes are considered in order to perform a Monte Carlo simulation, there are higher chances of more positive ROI outputs being generated as a consequence.

It is important to consider the correlations that exist between processes as some potential generated outputs and, therefore, the client can be elucidated about the potential of large scale ITIL investments. Therefore, the benefits generated by a single process are considerably less due to the fact that the positive correlations between processes are not included in the Monte Carlo simulation.

To conclude, the estimation process can be re-factorized by making the following changes:

- Due to the fact that multiple interactions with the client must occur so as to improve the benefits quantification logic, the “benefits quantification” sub-process becomes cyclical.
- In case of a project with multiple processes, the dependencies between these should be checked in order to correlate the processes and, therefore, a gateway should be placed after the “select number of trials” activity.

7. Conclusion

The value of ITIL is a much discussed subject these days as reducing IT costs, increasing IT performance and, at the same time, improving business performance through IT-business alignment are vital for any organization.

The related work provided enough insight to create an estimation process for assessing the value of ITIL implementations. An important acumen to be added is that ITIL investments impact dramatically the business processes’ efficiency as well as the business goals’ effectiveness. For this reason, the estimation process incorporates into its logic the investments’ impact, plus the tangible and intangible benefits quantification as well as project’s investment costs and, lastly, the risk assessment of the investment which is the ultimate outcome of the estimation process.

The estimation process was tested with data retrieved from a project that consisted of implementing the incidents management process in a state organization. The main results were that only a few KPIs have a great impact on the final benefits quantification and the project’s risk has a great influence over the investment analysis and the ROI Monte Carlo simulation.

Furthermore, a theoretical exercise was performed so as to evaluate how the interconnections between processes affect the overall project’s ROI. The results were revealing as the project’s mean ROI can be negative but, given the fact that those processes are interconnected and interdependent, the benefits are heightened, which ends up making the investment more attractive.

7.1. Future Work

The correlations coefficients can be defined by comparing two experimental data sets, which are derived from the level of dependency that exist between processes, by using several mathematical methodologies such as the Pearson’s correlation coefficient, or by associating the Pearson’s correlation coefficient with the rank order coefficient (Rodger, Jason, 1999).
References


The Information Technology Infrastructure Library Improves Infrastructure Investment. (2006). *Gartner*.

