IT Offshoring – A Cost-Oriented Analysis

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Abstract

Due to excellent skills and sufficient capacities in low-wage countries like India, an increased business trend to IT offshoring has become visible. Especially the reduction of companies' IT budgets, as a result of the worldwide economic downturn, has fortified the offshoring trend. However, in many cases, offshoring projects have produced disappointing results. While potential cost savings are close to 50 percent, in some projects, no cost saving at all is realized. In this case, an insufficient cost analysis often turns out to be crucial for the false estimation of expected savings.
One reason for an insufficient profitability analysis of IT offshoring projects is that the costs relevant for such a project are not systematically considered. In this paper, relevant cost factors are identified, analyzed, and structured in a classification framework, in an attempt to facilitate the profitability analysis of offshoring projects.
In the first part of the paper, a total cost approach, applied by Siemens Corporate Technology, is presented. In the second part, based on a comprehensive literature research and practical experiences from offshoring projects, relevant cost factors for the profitability analysis of IT offshoring projects are identified, analyzed and structured in a framework.

Keywords: *IT, Outsourcing, Offshoring, Nearshoring, Economics, Cost Analysis*

Introduction

In the 80's and up to the early 90's, a lot of companies emphasized a broad diversification of their business operations. An example for this type of orientation was the Daimler Benz affiliated technology group, led by Edzard Reuter. Since then, however, this trend seems to have taken on new directions. It has become clearly visible that companies worldwide tend to shift their focus more and more towards their core competencies (Söbbing, 2002). In conjunction with a continuous globalization of sales and procurement markets, and an increase in competition (Bayerischer Industrie- und Handelskammertag, 2002) [BIHK], companies are on the lookout for new, profitable ways to structure their business operations. As a consequence, implementation of offshore outsourcing projects is at the top of many organizations' to-do lists for 2004 and beyond (Jacobson and Lidman, 2004). META Group predicts that offshore outsourcing will grow by more than 20 percent annually, pushing it from a $7 billion market in 2003 to a $10 billion market in 2005.

The drivers of the offshoring trend can be viewed from a national economy perspective, and from a corporate perspective. According to Kalakota and Robinson (2004), from the perspective of a national economy, the offshoring trend is driven by the following structural changes of the global economy:

- **Globalization:** transition to a global economy through technical innovations
- **Competition:** reorganization of the IT service provider landscape
- **Evolution:** transfer of common business practices from other industries
- **Deflation:** rising customer demands (faster, cheaper, better)
- **Demographics:** aging population and declining birth rates in developed countries

From a company's point of view, the offshoring trend is mainly fortified by the opportunities it offers. According to (Moczadlo, 2002), for most of the companies, the major reasons for cooperating with an offshore service provider are:

- **Cost reduction:** exploitation of lower labor costs in low-wage countries like India, China, etc.
- **Flexibility in staff numbers:** improvement of a company's reactivity on current market conditions
- **Quality improvement:** utilization of specialization advantages
- **Reduced time-to-market:** reduction of development times through external support

Normally, cost reduction is the key compelling reason for sourcing out an activity or a process to an offshore provider. Nevertheless, companies' initial engagements in offshore outsourcing often form another picture. While potential cost savings are close to 50 percent (compare Figure 1), in some offshoring projects, no cost saving at all is realized. Consequently, 78 percent of offshoring customers end an offshoring relationship abnormally (Jacobson et al., 2004).

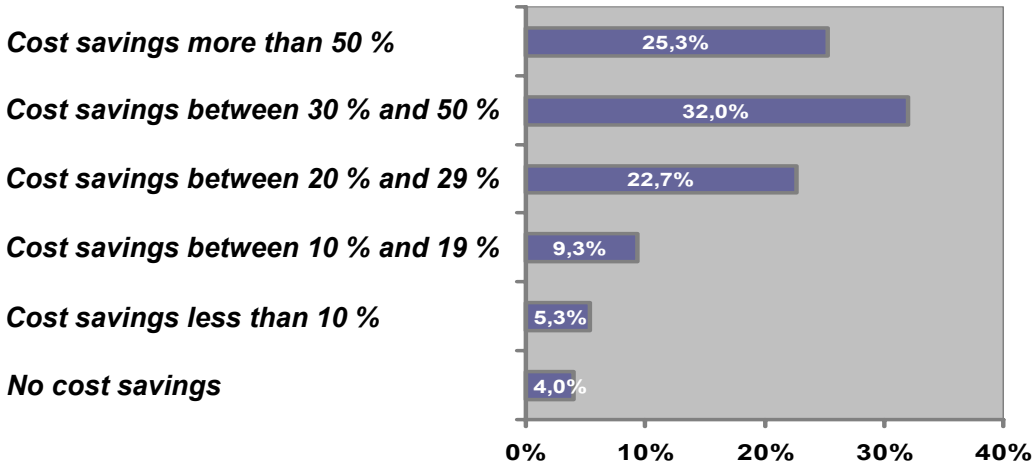

Figure 1. Cost Saving Expectations by German Firms (Moczadlo, 2002)

The disappointing cost savings of offshoring projects can often be traced back to a poor cost analysis, leading to unrealistic predictions. In order to prevent this kind of scenario, the implementation of a total cost approach is necessary. Only by considering all cost categories, a company can make realistic predictions for an offshoring project.
In the first part of the paper, a total cost approach for IT offshoring projects, developed by Siemens Corporate Technology, is presented. Based on this approach, in the second part of the paper, relevant cost factors are analyzed and structured in a classification framework. In an effort to identify relevant cost factors, a comprehensive literature research into IT offshoring was conducted over the last six months. Subsequently, the identified factors were valuated by practitioners, working in the field of IT offshoring.
It has to be emphasized that the cost approach and the cost factors presented in the following chapters focus on the relocation abroad of software development projects from an offshoring customer's point of view.

TCP Method

Siemens AG is one of the largest software development companies in the world. In contrast to other companies, most software is not sold directly as a product to the end users. More than 50 percent of Siemens' products, systems and services depend on software. Therefore, the development of software has a significant impact on the company's success.
As a global player, Siemens is using software development resources all over the world. In this connection, Siemens' focus has become more and more directed towards low-wage countries in Asia, especially India and China as well as Eastern Europe, and South America. By performing development tasks in these countries, different kinds of organization forms are used. The spectrum ranges from own subsidiaries of business units, established within low-wage-countries, over Siemens-internal suppliers, offering services for a number of business units, to external suppliers.
To support the successful implementation of offshoring initiatives, and to enable the exchange of experiences between various offshoring projects, Siemens Corporate Technology developed an evaluation method for offshoring intentions. The method,

called TCP method, analyzes an offshoring project from relevant perspectives (technical, commercial and process related perspectives). As a major advantage, the method is completely based on quantifiable data. Consequently, the evaluation results are transparent, reproducible and well documented. Based on the TCP method, a TCP assessment was developed to support business units with their offshoring decisions. As a precondition, a potential product to be outsourced and potential suppliers have to be selected in advance.

In general, the TCP method is used for answering the following three questions:

- Which parts of a software product are suitable for offshoring?
- Which supplier is qualified for the offshoring project?
- How should the customer start and proceed with the offshoring initiative?

It has to be mentioned that the questions listed above are not independent from one another. To identify a component or a product for an offshoring project, knowledge about potential suppliers is fundamental, and vice versa.

The TCP assessment is divided into three phases (see Figure 2). In the first phase, information about the business unit and the product to be outsourced are gathered in a workshop. From a technical perspective, the skills required to develop the product are collected. From a commercial perspective, the total costs for an in-house development, in contrast to an offshore development, are determined. Finally, from a process related perspective, the processes within the business unit are analyzed, using a subset of the CMM model, relevant for IT offshoring.

After having pre-selected potential suppliers in respect to general assessment criteria, e.g. their financial status, the second phase of the TCP assessment focuses on collecting project-related information about the selected suppliers. In this context, from a technical perspective, the suppliers' technical capabilities, competences and references are collected. For a commercial and process related assessment of the suppliers, information on hourly rates, the preferred business model, etc. are requested.

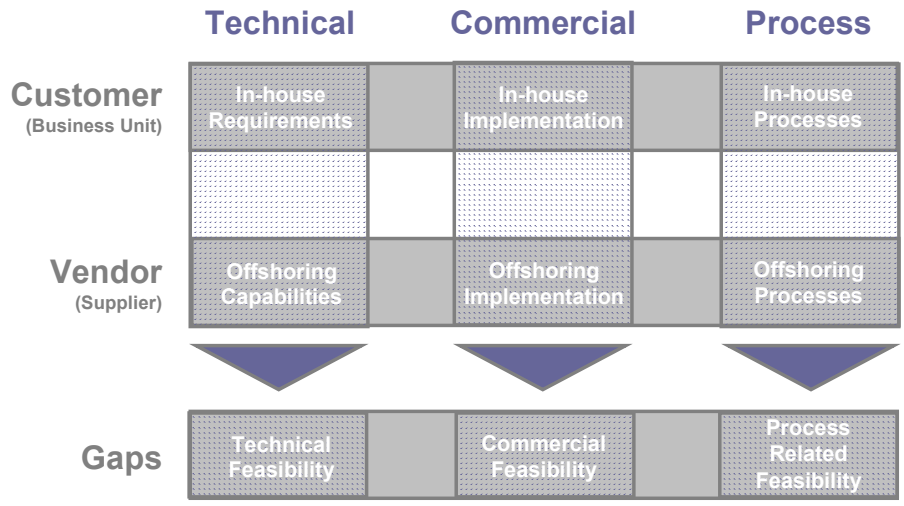

Figure 2. Phases and Areas of the TCP Assessment

Within the third phase of the TCP assessment, the information about the business unit, collected in phase 1, and the information about the supplier, collected in phase 2, is

compared to one another. By doing this, within the different perspectives, existing gaps between customer requirements and vendor skills can be identified, and adequate countermeasures (e. g., cultural training, and process synchronization) can be triggered.
The costs for these measures will drastically reduce the cost saving potential of an offshoring project. Therefore, the TCP report, which is the result of a TCP assessment, includes a detailed comparison of the costs for an in-house and an offshore development.
Considering all kinds of costs, the TCP method may help a company to estimate possible cost savings more realistically. For a long-term strategic partnership, the TCP method enables the derivation of a cost saving curve, realized through IT offshoring, by assigning cost savings to single phases of an offshoring project (e. g., introduction, transition, and implementation).

Cost Factors

The profitability assessment of IT offshoring projects gains in importance. In order to assess the profitability of a project, a company must have profound knowledge about cost factors related to offshoring. By comparing issues related to an in-house development with issues related to offshore development, the TCP method describes a first approach for analyzing costs of an offshoring project. However, cost factors, which have to be taken into account, are often not systematically considered. Therefore, within this paper, most relevant cost factors have been identified, analyzed, and structured in a classification framework.
As confirmed by Siemens, the dimensions of the TCP method are qualified for systematically structuring the cost factors of an IT offshoring project. Therefore, the identified cost factors are classified into the following three perspectives:

- **Technical perspective:** Costs for bridging of know-how gaps, and other technical-related expenses.
- **Commercial perspective:** Costs for project administration, and provider remuneration.
- **Process related perspective:** Costs for construction of new processes, and adjustment/improvement of existing processes.

In addition, within a specific perspective, according to Albert and Thondavadi (2004), the cost factors are differentiated by non-recurring and recurring costs:

- **Non-recurring costs:** Costs which incur only once during the course of a project.
- **Recurring costs:** Costs which incur repeatedly during the course of a project.

It must be noted that a selective differentiation between the above mentioned perspectives as well as between non-recurring and recurring costs is partially hard to accomplish.
Based on a comprehensive literature research and practical experiences by Siemens Corporate Technology, the following cost factors of IT offshoring projects have been identified. Table 1 summarizes the cost factors, classified by the dimensions listed above.

	Technical Perspective	***Commercial Perspective***	***Process related Perspective***
Non-Recurring	• Costs Related to Process/Task	• Costs Related to	• Costs Related to Process

Costs	Selection • Costs Related to Know-how Transfer	Supplier Selection • Costs Related to Contract Management	Adjustment/Optimization • Transition Costs
Recurring Costs	• Costs Related to Project Specification	• Labor costs • Costs Related to Risk Management	• Cooperation Costs • Costs Related to Performance Measurement

Table 1. Classification Framework for Cost Factors of IT Offshoring Projects

In the following chapters, the identified cost factors will be considered in more detail.

Technical Perspective

The technical perspective plays an important role in a total cost approach for offshoring projects, as many costs are rooted in this area. Within this paper, from a technical perspective, the following cost factors will be distinguished:

- Costs related to task/process selection
- Costs related to know-how transfer
- Costs related to project specification

While costs for task/process selection and know-how transfer can be classified as non-recurring costs, costs for specifying the project scope incur repeatedly during the course of the project.

Costs Related to Task/Process Selection

A considerable part of the costs for IT offshoring may arise from the task selection. In order to find the right tasks, gaps between required technical skills and available supplier know-how should be identified and evaluated. Subsequent to the identification and evaluation process, existing technical know-how gaps can be ranked.
One criterion to rank the identified gaps is the effort necessary to bridge a gap (e. g., through training measures). In general, only tasks with gaps that can be compensated with an adequate effort will be further considered for offshoring. If gaps cannot be bridged, or if costs for countermeasures would be disproportionately high, the company should not engage in outsourcing the corresponding tasks.

Costs Related to Know-how Transfer

Another substantial cost factor arises from the required know-how transfer between customer and supplier. As described in section 0, in order to bridge the identified know-how gaps, comprehensive training measures are necessary (Albert et al., 2004; TransCrit, 2004). The extent of the training measures depends on the complexity of the task, the

technical and domain know-how to be built up, the offshore experience of both client and supplier, and the quality of cooperation between the offshoring partners.
According to Siemens and TransCrit (2004), there are different possibilities to perform the know-how transfer:

- Training of supplier employees at the client site (onsite)
- Basic training at the supplier site (offshore)
- Long-term delegation of client experts to the supplier (offshore)

If the training activities take place onsite, additional costs for travel and accommodation arise alongside regular labor costs (META Group, 2003). In this context, training of general topics will be arranged and executed by the supplier. On the contrary, training of domain specific know-how will be organized and performed by the client.
To ensure a smooth know-how transfer, a comprehensive documentation of the affected software systems should be developed and transferred to the supplier. In addition to that, an experienced training team as well as a manager, responsible for coordinating the entire know-how transfer, should be appointed (TransCrit, 2004).

Costs Related to Project Specification

From a technical perspective, the costs for specifying the project scope form a significant cost factor, due to an increased demand in terms of integrity and level of detail (Overby, 2004; The Inquirer, 2004).
According to Siemens Corporate Technology, specifications should be developed in every stage of the V-Model. Depending on the entry level of the V-Model, the customer delivers the corresponding specification to the supplier and subsequent specifications will be created by the supplier. As a consequence, the higher the supplier entrance level, the more specification costs can be shifted to the supplier. However, a high entry level is only possible, if the supplier already has a profound level of domain experience. Therefore, in an effort to minimize project risks, additional expenses for supervising and reviewing supplier activities have to be taken into account in terms of cost calculation.
In case of changes, additional requirements or the like, a change request management process should be established. Additionally, a change control board, making decisions about priorities and the realization of changes, should be appointed.

Commercial Perspective

The business of a company is driven by commercial considerations. As described in this paper, technical and process related aspects do have commercial impacts and, therefore, have to be included within a cost-oriented approach.
This chapter focuses on general commercial aspects, relevant in the context of offshoring. In detail, the following cost factors will be considered:

- Costs related to supplier selection
- Costs related to contract management
- Labor costs
- Costs related to risk management

While the first two cost factors represent non-recurring costs, the other two cost factors state recurring costs.

Costs Related to Supplier Selection

For a successful offshoring initiative, a careful supplier selection is a precondition. Choosing the right supplier, however, calls for more than just scanning a series of price lists. To implement an appropriate selection process, considerable investments, including the assignment of personal resources, are necessary (Albert et al., 2004; Kalakota et al., 2004; Overby, 2004).
According to Aalders (2001) and Sparrow (2003), the supplier selection process comprises the following three steps:

1. Pre-selection of possible suppliers based on the analysis of market data.
2. Narrowing down the list of candidates by requesting and evaluating more detailed information.
3. In-depth examinations by auditing the remaining suppliers.

Due to the need for cross-functional teams during the last step of the selection process, a considerable number of experts are required (Kalakota et al., 2004). Since the final examinations have to be performed at the supplier site, additional costs for travel and accommodation arise (META Group, 2003).

Costs Related to Contract Management

Contract management has to accompany the entire process of creating and maintaining the offshoring agreement. In the preliminary stages of a project, the bid invitation, the evaluation and comparison of quotations, the contract negotiations, and the creation and conclusion of the contract should be supported. During the course of the project, the contract management has to deal with the monitoring of the contract adherence, the change request management, and the conflict management.
In general, well trained and experienced specialists should be assigned to the contract management function (The Inquirer, 2004). Many a time, the commercial project manager is responsible for the management of the contract. Depending on the project volume, the risk of the project, and the complexity of the contract, it may be necessary to appoint additional staff, e. g. a contract manager. In addition to that, the contract manager should be able to rely on the support by legal specialists or departments.
In any case, the management of the contract requires additional resources and, therefore, causes substantial expenditures that have to be taken into consideration in an overall cost calculation of an offshoring project (Kalakota et al., 2004).

Labor Costs

Predominantly, extensive differences between countries in terms of hourly wage rates drive offshoring considerations. In numerous articles and books, e. g., (Boehm, 2004), (Mayer & Söbbing, 2004) and (neoIT, 2004), tables are published, listing wage rates for software development tasks in different countries. Without exception, in comparison to Western Europe and the U.S., the provided data underlines immense cost advantages for low-wage countries like India, China, Russia, etc.
However, after examining the labor costs in these low-wage countries in more detail, wide ranges for hourly rates within a country or region become visible. In addition to that, it is often not mentioned, on which conditions the information is based and what is

included in these hourly rates. Therefore, it will be necessary to acquire reliable, comparable, and up-to-date wage rates directly from the suppliers, considering the following aspects:

- Are there different hourly rates for different skills/levels of experience?
- Is the use of equipment included in the hourly rate?
- Are costs for training included?
- Are the wage calculations and agreements based on annual rates?

Etc.

Furthermore, for a proper calculation of labor costs, the hourly wage rate must be further qualified (neoIT, 2004). Particularly at the beginning of cooperation, the supplier will perform the outsourced task(s) with lower efficiency than the internal business unit did before (Overby, 2004). According to Siemens, among other things, the lower efficiency results from the following aspects:

- Absence of offshoring experience
- Lack of domain know-how
- Linguistical problems
- Cultural differences
- Different time zones

Etc.

Differences in efficiencies can be quantified by calculating an efficiency factor. According to Siemens Corporate Technology, a possible approach for assessing the efficiency of an outsourced task is illustrated in the following figure:

$$\textbf{Efficiency Factor} = \frac{\textbf{Expenditure for a certain task at supplier's site [in man-hours]}}{\textbf{Expenditure for same task at own site [in man-hours]}}$$

Figure 3. Definition of the Efficiency Factor

For instance, an efficiency factor of 2.0 means that a supplier's employee needs twice as much time to complete a particular task than an internal employee does.

Costs Related to Risk Management

According to Siemens, from a commercial perspective, a risk can be defined as an unintentional event which occurs with a certain probability and causes financial penalties. In comparison to classical outsourcing projects, the relocation abroad bears additional risks. Therefore, a comprehensive risk management is necessary. The additional resources, necessary for implementing an adequate risk management, should be considered within the total cost calculation of an offshoring project (Boehm, 2004).

According to Siemens Corporate Technology, the following activities should be covered by the risk management program:

- Development and maintenance of a risk inventory
- Analysis of risks (including evaluation of occurrence probability and risk impacts)
- Ongoing observation and re-evaluation of critical risks

- Development and appliance of measures to minimize or avoid risks

Effect on cost **before** measures $E_b = C_{rb} * P_b$	Effect on cost **after** measures $E_a = (C_{ra} * P_a) + C_m$
C_{rb} = cost of risk **before** measures (at occurrence probability = 100 %)	
C_{ra} = cost of risk **after** measures (at occurrence probability = 100 %)	
P_b = occurrence probability of risk **before** measures	
P_a = occurrence probability of risk **after** measures	
C_m = cost of measures	

Table 2. Calculation of Risk Costs

Besides the costs for risk management, the cost effects of the various risks themselves should also be considered in the cost calculation. According to Siemens Corporate Technology, the approach, shown in Table 2, can be used to analyze the costs of a specific risk, the costs for measures to minimize or avoid this risk, and the probability of risk occurrence.

Process-related Perspective

From a process-related perspective, costs which arise from the cooperation with the service provider are of interest. In this context, especially, the following cost factors should be taken into account:

- Costs related to process synchronization/optimization
- Transition costs
- Cooperation costs
- Costs related to performance measurement

While the first two cost categories are non-recurring costs, the third and fourth category have to be classified as recurring costs.

Costs Related to Process Synchronization/Optimization

In order to ensure a smooth cooperation, the processes of the project partners should be synchronized (Overby, 2004). In connection with the synchronization of internal processes, the aspects presented within Table 3 should be taken into consideration. In this context, it is advisable to differentiate between the relocation of an entire software system and the relocation of single components of a software system.

Project Scope	*Synchronization Tasks*
Offshoring of an entire software system	• Verification of the sustainability of the supplier's CMM level through regular audits • Determination of reporting mechanisms • Introduction of iterative/incremental processes for early feedback • Implementation of technical audits at the supplier site
Offshoring of single software components	• Coordination of the different development processes • Introduction of common development guidelines

Table 3. Tasks for Process Synchronization

Offshoring projects require a minimum level of process maturity, both at the customer and the vendor site. In an effort to provide the required process quality, costs evolve in conjunction with the assessment and the improvement of the existing processes (Albert et al., 2004). Within long-term projects, it is recommendable to implement regular supplier audits in order to ensure the process quality indicated by the service provider.
In addition to that, for some software projects, the offshoring customer has to verify the fulfillment of certain process requirements (e. g., EN ISO 9001, EN 50128, FDA) across from end customers or regulation authorities. In this case, the company should ensure that the supplier is conforming to the corresponding standards.

Transition Costs

Primarily, the transition costs can be linked to the composition of an adequate IT infrastructure at the supplier site. According to Siemens Corporate Technology, neoIT (2004) and Bräutigam (2004), primarily, the transition costs cover the following activities:

- Integration of multi-site capable systems
- Introduction of a common project management system
- Introduction of an integrative development and test environment
- Installation of an efficient telecommunications infrastructure
- Installation of data lines with sufficient bandwidth

Etc.

Furthermore, the transition process comprises the physical transfer of assets between the project locations. With this process, specific hard- and software is made available or updated at the supplier site. Here, the offshoring customer should clarify questions concerning custom regulations, restrictions on exports, etc. in advance.
The transition phase is one of the most complex phases of an offshoring project. Frequently, it takes several months to build up the required IT infrastructure and to

transfer the needed assets to the supplier site. Consequently, considerable costs incur in this phase of the project (neoIT, 2004; Overby, 2004; Kalakota et al., 2004).

Cooperation Costs

Dependent on the cooperation model, the level of the incurring costs varies. According to Mayer and Söbbing (2004), the following models can be distinguished:

- *Onsite/Offshore*: supplier manager at client site and team manager at supplier site.
- *Onsite*: representative of the supplier at client site.
- *Offshore*: delegate of the client at supplier site.

Scheduled Travel Costs	***Unscheduled Travel Costs***
• Regular project meetings • Management meetings • Audits by quality commissioners Etc.	• Trouble shooting • Escalation management • Change request management Etc.

Table 4. Scheduled vs. Unscheduled Travel Costs

Besides costs for employees, additional expenses incur from traveling between the different locations (neoIT, 2004; TransCrit, 2004). According to Siemens Corporate Technology, these should be differentiated between scheduled and unscheduled travel costs (compare Table 4).
In addition to travel costs, the customer has to face considerable communication costs, due to cross-border cooperation (Mayer et al., 2004).

Costs Related to Performance Measurement

The measurement of the provider performance causes additional costs. In this context, primarily the definition of adequate performance metrics and the monitoring of the provider performance during the course of the project are responsible for significant costs (Albert et al., 2004). Here, especially, the long distance between the project partners complicates the execution of the above mentioned activities, and therefore, raises the appendant costs.
At the end of the project, based on documented performance figures, a quantitative and qualitative analysis of the entire offshoring cooperation is feasible. Only by doing this, appropriate measures for future offshoring projects can be derived.
For measuring provider performance during the implementation phase of an offshoring project, a considerable number of personal resources are engaged in monitoring supplier activities. For these employees, the major task is to assure that the supplier performs the contractual agreed services (Overby, 2004).

Conclusion

Based on a comprehensive literature research and practical experiences in the field of IT offshoring, this paper identified, analyzed, and structured cost factors, incurring during the course of an offshoring project. As confirmed by practitioners, the applied classification framework qualifies for systematically structuring the cost factors of an IT offshoring project. Therefore, the perspectives of the framework are also used within the total cost approach presented in the paper.
The cost framework, presented within this paper, provides a basis for a total cost approach. Based on the framework, a top level calculation sheet for analyzing the profitability of an offshoring project can be derived (see Figure 4). Depending on the nature of the project, the calculation sheet must be adapted to project-specific characteristics. Furthermore, general cost factors of IT projects, not directly related to offshoring, must be added. In a next step, effective methods and tools should be developed in order to facilitate the profitability analysis of offshoring projects.

		In-house Costs	Offshoring Costs	Difference +/-
Costs Related to Technical Issues	Process/Task Selection*			
	Know-how Transfer*			
	Project Specification			
Costs Related to Commercial Issues	Supplier Selection*			
	Contract Management			
	Labor			
	Risk Management			
Costs Related to Process Issues	Process Adjustment/Optimization			
	Transition*			
	Cooperation*			
	Performance Measurement			
			Total	

* Typically relevant as an in-house cost factor for multi-site development projects

Figure 4. Example of a Top Level Calculation Sheet for Profitability Analysis of Offshoring Projects

In summary, the classification of the cost factors may help companies on constructing more profitable offshoring projects, thereby increasing their chances of efficiently making use of the vast potentials international outsourcing has to offer. Especially companies, which haven't engaged in offshoring projects up to now, can in this manner benefit from other companies' experiences in this field.

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