Offshore Outsourcing Costs: Known or Still Hidden?

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***Abstract*—Offshore outsourcing of software development has been both famous for the promises of great cost reductions, and infamous for the hidden costs associated with the challenges of organizing software work over distance. Experience shows that many of these costs do not receive the deserved attention and are often excluded when making offshoring decisions. As a result, there is often a significant deviation between the expected and the realized costs of offshoring. In this paper, we investigate the awareness of the extra costs when making an offshoring decision, and the significance of the actual cost deviations. We conducted a single case study of a company that carried out an offshore outsourcing pilot project. We collected qualitative data from interviews, observations and a retrospective, and quantitative data on the costs and effort associated with the project. We conclude that the company was aware of the hidden cost factors, but largely underestimated their significance. The costs that surfaced in the studied project accounted for a total deviation of 181% and several individual cost categories with more than 400% overrun. The two main cost drivers in our study were the distance and poor process fit, which escalated the investments needed to make the collaboration work. Our results suggest that pilots are useful to understand the key problem areas in an offshoring collaboration, but too limited to shed light on all potential problems (e.g. turnover) due to the short timeframe. We also conclude that results of pilot projects shall not be the only data source when calculating the true costs of offshoring, since the start-up phase of an offshoring relationship carries large investments. Finally, we provide recommendations for companies in a similar situation on how to run and learn from offshore outsourcing pilot projects.**

Keywords—offshoring, offshore outsourcing, global software engineering, hidden costs, extra costs, cost-savings

I. Introduction

Offshore outsourcing or the purchase of services from an external supplier from a different country [1] is not a new phenomenon. Over the last decade (at least), software companies have jumped on the famous bandwagon of outsourcing to locations where development hourly rates promise significant cost reductions. In fact, it seems that decision-makers are often dazzled by the salary differences, and the ease of hiring best talent in masses. Despite the claims that offshoring is motivated for less offensive reasons than simply reducing costs, the main driving force has traditionally been related to costs [2]. Yet, experience reports show mixed results and little convincing evidence of cost benefits of offshore outsourcing [3], while a number of recent detailed critical studies [4], [5], [6], [7], [8] complementing more general summaries (such as the ones included in [2]) warn about the significant hidden costs associated with offshoring.

Hidden or *extra* costs are the unanticipated costs at the beginning of a collaboration [7], [9], which significantly impact the amount or the very ability to achieve any cost-savings [2], [3], [6], [7]. While offshoring decisions are made primarily on the basis of the visible costs, hidden costs remain hidden during the decision-making, unconsciously or deliberately [6], [7], [9]. As related research on one hand, and the gained experience with offshoring on the other improve the understanding of the hidden cost factors associated with offshoring, we expect companies to be more aware of the necessary expenses and more accurate in their business case calculations.

In this paper, we share the findings from studying a software company that in the summer of 2017 in an attempt to gain experience with offshore outsourcing, initiated a pilot project with an experienced offshore vendor. Our analysis has focused on the company's awareness of the hidden costs associated with offshore outsourcing when making the decision, and whether they succeeded with the estimation of the true costs associated with this type of projects. Our research is thus driven by the following research questions:

RQ1: How accurate are the cost estimates in offshore outsourcing projects?

RQ2: What impacts the hidden cost accumulation?

The rest of the paper is organized as follows. In Section II, we present existing research related to cost estimation and cost-benefits in offshore outsourcing. In Section III, we provide the background of the studied empirical case, and details of the research methodology. Section IV contains the results of the empirical study, followed by a discussion in Section V, in which we answer our research question and offer recommendations and implications for practice. Finally, key conclusions and directions for further research can be found in Section VI.

II. Related Work

A. Offshore Outsourcing and Cost Benefits

The debate about the cost benefits of offshore outsourcing continues. The proponents suggest that offshore outsourcing brings economic benefits, although the range of these benefits varies. Ebert suggests that a 10-15% cost reduction can surface after a two to three years long learning curve [10], while Estler et al. found that 60% of the surveyed agile projects reported savings in the range of 25-50% [11]. Notably, the success rate of offshoring contracts in the proponent reports and studies is also quite high. Whitelane Research documented that 91% of all contracts in their study were categorized as satisfactory with 11% being very satisfied, 51% being satisfied, and 29% being at

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least partially satisfied [12]. Similarly, Estler et al. found that all surveyed projects reported at least some cost-savings [11].

On the other hand, a number of studies and reports point to the back or the "black" side of offshoring. An industry survey on information systems outsourcing found that 49% of the surveyed companies have terminated their contracts before the end of the contract period because the promised cost savings did not eventuate [13]. Related studies have put forward a number of hidden or extra costs of offshoring that were unanticipated at the beginning of collaborations [7], [8] and significantly impacted the amount of cost-savings [2], [3], [6], [7].

B. *Offshore Outsourcing and Associated Costs Factors*

The already well-known costs in offshore outsourcing collaborations include travel expenses, management and control costs, costs of IT infrastructure, and training costs. Experience shows that these costs are often ignored or underestimated and therefore either the costs or the significance of these costs is hidden from the decision-makers [6], [7], [8]. For example, outsourcing of complex projects requires a lot of management and control, and a high degree of expertise (domain knowledge, business understanding, technical complexity) and therefore also training [3]. Complexity as such is often associated with uncertainty and frequent cost overruns especially when the decision-maker lacks prior experience with offshoring [7]. Furthermore, related studies suggest that projects with domain specificity and business understanding require a lot of specification and interaction, which drives the costs up [6], [7]. The significance of the hidden costs can be demonstrated by propagating these to the hourly rates, i.e., by dividing the total costs (salary-based costs with these additional costs) by the recorded effort as demonstrated in [4], [5].

Evidently, the accumulation of cost savings is influenced by a number of context factors, such as the already mentioned project complexity and domain specificity. Perhaps even more significant cost driver is the turnover [4], [5], [6]. Moe et al. found that high turnover was one reason why four companies ended their sourcing relationship and backsourced or resourced their software development activities [14]. Stringfellow et al. refer to a typical turnover rate of 15-20% per year in India, where companies risk having to recruit people with insufficient levels of competence and end up in continuous training mode [6]. In our previous studies, we found that turnover not only drives the training costs, but also decreases the productivity of existing developers, and results in companies paying for people/hours without real output [4], [5]. Such productivity decrease is one key indirect cost factor.

In complex projects, ramp-up of competence takes longer and the productivity gaps associated with the start-up phase or replacement of employees result in huge indirect costs for companies [4], [5], [7]. Our own and related studies have shown that companies should not expect immediate cost benefits, as it can take from two to four years before one begins to ramp up their productivity [4]. Similarly, others have found that it can take more than five years to meet the levels of productivity of original in-house developers [15]. However, the inclusion of these indirect costs in the cost-benefit calculations is not a straightforward task.

One way to account the indirect costs, such as the costs of learning (non-productivity), or the costs of rework (non-quality) proposed in related studies is to propagate the impact of these costs on the hourly rate by dividing the total costs mentioned above (salary-based and additional costs) by productive work hours only – the hours spent on adding value [4]. However, the amount of indirect costs (or productive hours) is often hard to estimate and thus it is hidden when making an offshoring decision. This difficulty is primarily related to the fact that some of the key cost drivers (e.g., employee turnover) are quite uncertain and therefore ignored, and some (e.g., task complexity) might even be esoteric for the decision-makers, and therefore overlooked.

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III. Research Methodology

To explore the differences in the expected costs and the realized costs of offshore outsourcing, we have conducted an exploratory single case study [16] of a company that carried out a pilot project. We selected a case where the outsourcing service provider was highly experienced in order to reduce the effects of an inexperienced provider. The outsourcing partner had established their first nearshore development center more than ten years prior to our investigation and was in 2018 included in the list of the world's 100 best outsourcing service providers and advisors published by the International Association of Outsourcing Professionals (www.IAOP.org). The central phenomenon of investigation in our study are the costs associated with offshore outsourcing, which are calculated based on qualitative and quantitative data gathered from a company called EpimethIT (the real name is anonymized for confidentiality reasons).

A. *The Case Company: EpimethIT*

EpimethIT is a small size Norwegian company in relation to their competitors and the market in which they operate. They have more than 380 employees and 400 000 customers. For many years, EpimethIT has managed to build and maintain a solid reputation and create an image of an innovative company. They manage to keep their customers happy in a fierce competition, while heavily depending on the access to resources with the right expertise. Therefore, the company management has strategically decided to maintain internal competence where it provides competitive advantages and utilize standard methodologies and outsourcing operations in other service areas.

EpimethIT management believes that they did not exploit their full potential, since the development capacity is limited while they have to continuously develop new services. Resource availability for local employment is challenging and the fierce competition for the scarce pool of talents drives up the wages. While collaboration with local consultants is a common practice in Scandinavian software companies when in-house employment possibilities are limited, such collaborations are yet very expensive. As a result, in the summer of 2017 EpimethIT decided to start a pilot project to gain experience in offshore outsourcing. After considering two companies EpimethIT chose PandoraOffshoring (the supplier name is also anonymized) as a supplier. This choice was based on the fact that the organization knew about PandoraOffshoring from before and that PandoraOffshoring had over 10 years of experience as an outsourcing service provider. Further, PandoraOffshoring offered a nearshore location within the EU, which was important for EpimethIT. The other company had resources in India and the EpimethIT management considered both the time difference and the cultural differences to be too large. The pilot was also

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seen as a first step towards identifying a good collaboration model for future scaling.

B. Data Collection

During our investigation, the second, third and fourth authors had open access to the case company that made available both onsite people resources and material. This is why our data collection efforts focused primarily on the rich qualitative data gathered through continuous dialog, interviews and observations, aiming at obtaining the necessary depth of the understanding of the phenomenon being studied. We have also gathered quantitative data to increase the reliability of our findings related to the costs, quality and productivity. Fig. 1 illustrates the time at which the data was collected, compared with important events in the case.

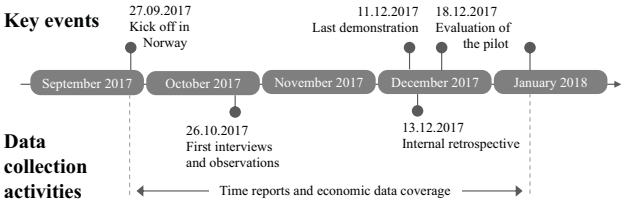

Fig. 1. Overview of the data collection activities.

We helped in planning the pilot up front, we visited the case company on three occasions before and during the pilot, in addition to regular participation in the daily skype meetings between the involved sites and meetings with the management. During the planning phase, we gave advice regarding the pilot project (e.g. presented findings from current research, discussed complexity of pilots, the need of domain knowledge, and how to collect data during a pilot). The pilot was important for EpimethIT for internal stakeholders to prioritize the project, but not business-critical. Further, it was not to be too complex when it came to technology or need for domain knowledge, it was to be well documented and to have both business and technical resources in EpimethIT available for PandoraOffshoring. A lot of effort was put into the estimation process as good estimates were essential for the evaluation of the pilot.

The following are the main data collection activities.

Informal dialogues and unstructured interviews were used on multiple occasions during three onsite visits to the case company, and held with the project owner, the Tech Lead, the process manager from PandoraOffshoring and the manager of the pilot. Follow-up conversations were conducted by phone throughout the study.

Daily meetings on Skype were observed by the second and fourth authors. We observed a total of 10 meetings, which lasted 9 minutes, on average.

Semi-structured interviews using an interview guide as a checklist were conducted with the product owner, the tech lead and the pilot project manager (3 interviews) to elicit their insights into the offshoring experience, as well as the feedback on the cost calculation results and the proposed conceptual model. The interviews lasted between 40 and 50 minutes and were audio recorded. The choice of a semi-structured agenda was made to facilitate a dialogue and to have an opportunity to dig deeper into important areas. As we had a constant dialogue with people in the case company, we had a good overview of who knew what and what areas each individual had experience about.

Group interview was organized to discuss the relationship with the offshoring vendor, and the actual business case of the pilot project. The group interview lasted one hour and involved the project owner and key participants from the business side.

Retrospective was led by the second author and involved nine project representatives: the pilot project manager, the business side representatives and important stakeholders. The retrospective started by using the metaphoric roller coaster to detect the individual participant perception of how they evaluated the offshoring pilot project. This created a good understanding that people were in different places and had different views. Next, the participants were asked to brainstorm on the positive and negative experiences, after which the individual insights were grouped under emerging areas. Participants then voted on the importance of each area and selected prioritized areas for further discussion. The top three problematic areas were then discussed to identify the possible improvement points. Finally, all participants were requested to draw perceived productivity changes of the offshore team over the duration of the pilot individually. The individual results were then integrated and discussed (see the final result in Figure 4).

The results of an internal **survey** conducted by the offshore supplier was also used as input into the analysis of what worked and what did not work well in the offshoring pilot project.

The **quantitative data** included an account of direct costs, time reports, and tasks and quality. We received an overview of all expenses recorded towards the pilot project, access to the time reports from both internal company resources and offshore vendor resources about their effort spent on the project, and quality data extracted from JIRA in terms of issues registered in the project, and the account of tasks completed.

C. Data Analysis

To address our first question regarding the accuracy of the cost estimates, we collected the expected costs from the business case analysis performed by the company and compared it with the realized costs that we gathered from different sources, including time reports, supplier invoices, and costs recorded by the case company. We have collected both effort estimates (in hours) and cost estimates (in NOK), and discuss percental deviations in both of these variables.

To analyze the reasons for the accumulation of the hidden costs we have supplemented our quantitative cost data with the qualitative data from the various sources, including retrospective, interviews, and observations. In other words, our data analysis relied on data triangulation [16]. Our rationale for the choice of these data sources for the study is that by interviewing and observing the project members, we gain access to their own understanding of important events in the pilot project, on the agile development process, their relationship and the software quality. Analyzing the observations in the daily meetings and retrospectives shed light on the accounts given by the interviewees and provided context to their statements. As such, data triangulation is likely to contribute to strengthening our findings and conclusions by increased accuracy [16].

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IV. RESULTS

In this section, we present the results of our empirical study by starting with an overview of the costs estimated at the decision point, followed by a detailed description of the course of events during the pilot project (see also Fig. 2), the actual cost evaluation (see Table I), and the main reasons for the deviations.

A. Estimated Costs at the Decision Point

EpimethIT was aware of the risks associated with offshore outsourcing and approached their offshoring endeavor carefully. First of all, an external consulting company was contracted to carry out an independent risk assessment when selecting a supplier. In parallel, internal experts carried out an assessment concerning technical capabilities and security. Internal risks were also identified, including the need to produce more documentation and more detailed specifications, and time needed to adapt to the new working language, English, which could pose a barrier for many and decrease internal efficiency. It was decided to start small and initiate a three-months-long pilot project to be able to evaluate the new relationship and the capabilities of the selected vendor. Risk analysis results were used to build a detailed business case for the pilot project (see planned hours and costs in Table I).

Evidently, the company management realized during the preparation phase (see Fig. 2.) that the project would require internal support (47% of the total time estimates). Travel budget, infrastructure and computer costs were also included in the business case, as well as a 10% reserve budget for unforeseen costs. One goal of the preparation phase was to plan the data gathering during the pilot project and use this data to improve the collaboration relationship to be able to continue and scale the initiative (the last planned phase on Fig. 2).

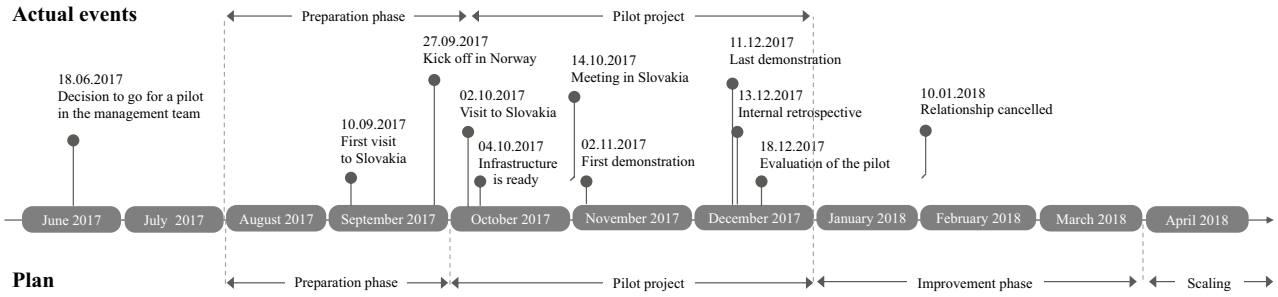

Fig. 2. Overview of the key events in the studied offshore outsourcing pilot project and the initial plan.

TABLE I. PLANNED AND REALIZED DIRECT COSTS.

Cost categories		Time		Cost (incl. VAT)		Cost estimate deviation
		Plan	Actual	Plan	Actual	
Internal	Management	360 h	189 h	306 000 NOK	160 650 NOK	224%
	Specification		161 h		136 850 NOK	
	Development		153 h		130 050 NOK	
	Testing		117 h		99 450 NOK	
	UX		127 h		107 950 NOK	
	Infrastructure setup		59,2 h		50 320 NOK	
	Total internal costs	**360 h**	**806,2 h**	**306 000 NOK**	**685 270 NOK**	**224%**
External	Preparatory work	–	–	312 500 NOK	62 500 NOK	- 80%
	Onsite management	60 h	253 h	97 500 NOK	410 313 NOK	421%
	Local management	30 h	139 h	23 513 NOK	110 334 NOK	469%
	Development	300 h	856 h	192 750 NOK	628 787 NOK	454%
	Testing		318 h		247 211 NOK	
	Total external costs	**390 h**	**1566 h**	**626 263 NOK**	**1 459 144 NOK**	**233%**
Other costs	Infrastructure	–	–	125 000 NOK	83 531 NOK	- 33%
	Computers	–	–	125 000 NOK	100 000 NOK	- 20%
	Travel	–	–	125 000 NOK	182 012 NOK	145%
	Risk assessment	–	–	–	93 750 NOK	–
	Unforeseen costs (10%)	–	–	130 726 NOK	–	–
	Total other costs			**505 726 NOK**	**459 293 NOK**	**- 9%**
Total				**1 437 989 NOK**	**2 603 707 NOK**	**181%**

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B. Offshoring Experience

Preparation phase: PandoraOffshoring offered the use of several outsourcing sites, and Slovakia was chosen for this pilot. To get to know their new partner, EpimethIT sent three people on a visit. The practical preparations for the pilot initiation also included ensuring that the necessary infrastructure was in place. Work-wise, EpimethIT selected and defined a medium complexity task for the pilot project, with an estimate of 300 hours of development time, estimated by the internal Tech Lead. The overall structure of the project, the needed roles and responsibilities are illustrated in Fig. 3.

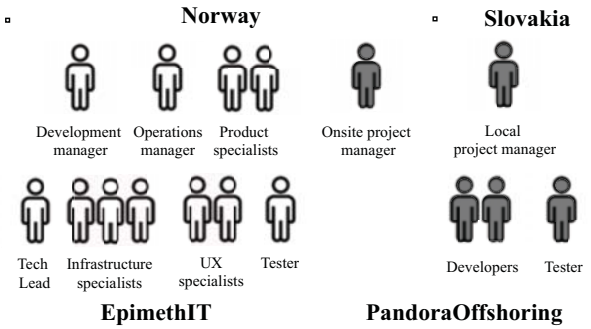

Fig. 3. Overview of the roles and responsibilities in the pilot project.

Upon the results of the first visit, EpimethIT instructed the supplier to enable more autonomy in the offshore teams and provide greater delivery responsibilities, clarify the roles, closely follow-up activities, and change the attitude from "finishing when it's perfect" to "good enough at the right time".

Pilot project start-up: The project started at the end of September 2017 with a three days long kick-off at EpimethIT. All developers and their manager from PandoraOffshoring went to Norway, to familiarize and socialize, to learn more about the customer expectations, ways of working and the task selected for the pilot project. The social part of the start-up was given high attention. Special attention was paid on the management tasks: how to manage the team, what to follow-up and what and when to report. The project manager from PandoraOffshoring agreed to be physically present in EpimethIT's office premises two days a week during the initial phase. All information and documentation were to be shared on a common web space. One week later, the management and the entire team from EpimethIT paid a visit to PandoraOffshoring in Slovakia to get to know their local ways of working and further socialize. EpimethIT also brought the work computers and ensured that the offshore teams had full access to the work environment.

Pilot project implementation: Overall the relationship between the Norwegian and the Slovakian staff was positive, which we observed in the daily meetings. The offshore team received the reputation of being knowledgeable and experienced, and the work started off well. Daily collaboration was established by conducting daily standup meetings on Skype and communicating continuously via HipChat, social software that enables group chat rooms, searchable chat history, and image and file sharing. Even though the team had invested a lot in the infrastructure and communication platform, a number of challenges emerged as the pilot continued. First, there was poor communication between the offshore team and the product owners, which was addressed by the management from both sides in recurring meetings. Second, the offshore team experienced occasional loss of access to the development environment, which hindered their progress. Third, while the offshore team was instructed to follow EpimethIT's development methodology (based on Kanban) instead of their own (Scrum), it became evident that the actual ways of working differed. Forth, one of the remote developers did not speak English well so the communication had to be mediated by the other developer.

Quality: One important factor that impacted the satisfaction of EpimethIT with PandoraOffshoring services was the quality of the work delivered. From JIRA records of tasks and errors we extracted the number of cases opened during the pilot project, and the number of tasks, sub-tasks and stories completed (see Table II). In addition to the usual "bugs", a new issue category was added called "specification faults", which the tester from PandoraOffshoring used to mark the bugs that have been perceived to emerge from insufficiently specified requirements. Evidently, 21 out of 40 issues were returned to EpimethIT due to poor specification. Among the "bugs" we see that for 6 tasks in total, 40 bugs were reported.

TABLE II. QUALITY ERRORS AND TASKS REGISTERED IN THE PROJECT.

Issues		**Priority**	**Tasks**		
Bug	**Specification faults**		**Story**	**Sub-task**	**Task**
2	0	Highest	0	0	2
7	6	High	2	1	1
26	11	Medium	13	9	3
4	4	Low	0	0	0
1	0	Lowest	0	0	0
40	**21**	**Total**	**15**	**10**	**6**

Productivity: From Table I (columns Plan and Actual under Time) we see that offshore engineers have significantly overrun the planned effort for the selected task (more than four times overrun for development and testing), even though the task was not complicated. Gaps in productivity were attributed to a number of challenges. First, the scope of the project changed, which was though regarded as a common challenge in all EpimethIT projects. Second, due to the lack of domain and specific expertise needed for the project, the offshore developers did have to climb a learning curve, which affected their overall productivity. The perceived productivity of the offshore engineers as judged by the EpimethIT project members is illustrated in Fig. 4. The curve is said to have raised over time as the collaborators familiarized themselves with each other, and with the task. The productivity could have been also impacted by the poor relationship between the offshore developers and the product owners at the beginning of the pilot. Finally, the offshore manager pressured the developers to fulfill their commitments on the time front, which often resulted in delivering poor quality, and subsequently the need for rework.

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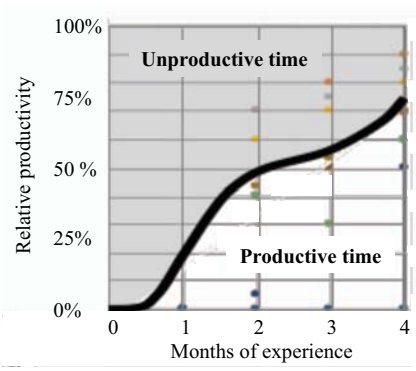

Fig. 4. Perceived productivity curve.

Project termination: December 15, 2017, was set as the deadline for the evaluation of the pilot project, i.e., the abilities of PandoraOffshoring to satisfy the needs of the EpimethIT as an external supplier. As a part of this evaluation, EpimethIT evaluated the quality of the work, cost, time commitments and overall relationship with the collaborator. The results of the evaluation demonstrated that although the quality of the deliveries from PandoraOffshoring increased over time, there were still some gaps. As the TechLead commented on the effort overrun: *"We would have spent half of [the estimated 300 hours] if we were to do it in-house. Now we are at 600 hours, or maybe 700"* (which at the end turned out to be 1174 hours). In particular, it was noted that the offshore teams were pressured to work towards the time commitments instead of the quality commitments, which could be attributed to the differences in Scrum and Kanban ways of working as well. Furthermore, the relationship with one of the PandoraOffshoring project managers caused a number of confusions and was recognized to be a major pain point. Finally, security-related access restrictions caused extra work for Norwegian teams to prepare test data and test the software before delivery. Additionally, EpimethIT engineers perceived the PandoraOffshoring ways of working based on direct supervision (two managers supervised two offshore developers and one tester) to conflict with the in-house philosophy, and they preferred to invest into collaborating with an ally with a better cultural fit when it comes to the ways of working.

C. Actual Cost Estimation

In this study, we focus on comparing the planned and the actual costs to determine the awareness of the hidden costs and their significance when initiating an offshore outsourcing collaboration. This is why, our investigation has focused primarily on the direct costs as opposed to our prior studies [4], [5], in which we have focused on quantifying the indirect costs.

We found that the direct costs accumulated in the pilot project over the course of three months followed the foreseen cost categories (see Actual time and costs in Table I). EpimethIT has followed up the effort spent by internal resources (internal effort) broken down to specific roles and received invoices for the time spent by the PandoraOffshoring (external effort) on management activities, support, development and testing. Although we can see that the cost factors were not overlooked, the deviations emerging from comparing the planed with the actual costs and effort (224% for internal costs and 233% for external costs) reveal that the complexity of working over distance and the knowledge and process gaps have been largely underestimated. Among the other costs, the actual costs of computers and infrastructure appeared to be quite close to the initial estimates and even slightly overestimated, while the actual travel budget exceeded the plan (145% overrun).

Finally, to have a better visibility of the hidden costs for decision-makers, we estimated the hourly cost of offshore engineers including the extra costs on top of the hourly rate. The extra costs in this case include the costs of management, preparation, equipment and travel. We calculated the hourly costs by summing external costs with the other costs (see Table I) and dividing them with the development and testing effort (1174 h). We found that the true hourly cost during the pilot project appeared to reach 1634 NOK/h (168 €) opposed to the contract based hourly rate of 643 NOK/h (66 €) (incl. VAT). This was almost twice as high as the internal hourly rate of 850 NOK/h (88 €).

V. Discussion

In this study, we have explored the awareness of the case company of the hidden costs when starting their offshore outsourcing collaboration. In response to our research question regarding the accuracy of the cost estimates at the moment of decision-making, we found a significant negative deviation (budget overrun). In the following, we discuss why the case company failed to estimate the costs associated with offshoring, what impacted the accumulation of the hidden costs and what advise can we give for other companies to improve their decision-making when considering a sourcing decision.

A. Offshore Outsourcing Costs: Known or Hidden?

Experience shows that outsourcing decisions are mainly made on the basis of visible costs, while hidden costs remain hidden during the decision-making [6], sometimes resulting in unfavorable contracts. Our results suggest that the case company was not unaware of the potential cost factors. In contrast to similar cases of failed collaborations, in which companies have jumped into offshoring with high expectations and no prior experience [14], the case company has contracted an external expert to evaluate the potential risks and tried to carefully plan the first project. Based on recommendations from related research suggesting that large and complex tasks are more likely to fail [3], the case company decided to start small with a three-months-long pilot project and a task of medium complexity. However, the large budget overruns indicate that the significance of the cost drivers was largely underestimated.

Among the particular costs, we found the majority of the cost categories from related research [4], [5], [6] to be present in the studied case. These were the costs of management and control (both in-house and offshore), increased specification costs, travel expenses and costs of IT infrastructure.

B. What Impacts the Accumulation of Hidden Costs?

One may think that this paper is merely about poor task effort estimation, however this is not entirely true. Evidently, the time spent by the offshore team on development and testing was significantly longer than planned (three times), and this was the biggest cost driver. Although one possible reason for the large deviation in the expected and the realized costs could be poor effort and task complexity estimate, the more probable explanation is related to the very lack of experience with offshore outsourcing, as suggested in previous research [7]. In

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fact, it seems that failing with the first offshore outsourcing experience is a pattern [14]. When it comes to the main cost drivers in our study, we found that along with the costs of development and testing, other important cost drivers emerged, such as the managerial overhead, the internal costs of specification costs, the costs of quality control and relationship management costs. In other words, the investment into establishing a new relationship with an unfamiliar partner, and the effort for working on a distance work were largely underestimated. The challenges of distributed work are not only evidenced in the effort of offshore developers and testers that appeared to be almost four times higher but also in the internal support that was more than doubled comparing with the estimates. Our findings are not that surprising. Experimental research suggests that distributed work might take up to 2,5 times more than the same work performed in one location [17] and even more in the beginning of the collaboration [4]. What is, however, surprising is that EpimethIT only used 20% of their budget for preparatory work, which might mean that they have underestimated the need for proper kick off and onboarding. When it comes to the performance, we found that the perceived average productivity of the offshore engineers was about 50% of the desired raising from 0% in the beginning to 75% at the end of the three months long pilot. The identified learning curve (see Fig. 4) is much steeper than the ones we found in previous studies [4], [5]. Since both the productivity and quality of the offshore engineers were said to improve over time, it is fair to assume that the effort overruns could level out if the collaboration would continue. This is why, we believe that the cost deviation based on performance is not the major factor in our study.

One of the critical factors that also contributed to the hidden cost accumulation was the poor process fit, which was also the main reason for terminating the relationship. First, there was an obvious tension between the Norwegian engineers that followed flow-based Kanban method (you release when you are done) and the offshore engineers that followed Scrum method, which is based on timeboxes (you release every 2-4 weeks). The differences in the habitual approaches caused inefficiency on both sides. The transition to a common process was perceived to be too slow and according to the case company representatives required too much effort. Scaling up the project would therefore require significant training efforts and lead to a large period of process integration and low efficiency. Second, the management and leadership approaches across the companies differed dramatically. This is evidenced in the accumulated management costs at the offshore supplier side that accounted for 36% of the external costs and 20% of the total budget. The case company was unsure whether and how such organizational forms of onsite and local management and control would scale, and since processes and ways of working were already hard to integrate, the relationship was terminated.

Notably, the major cost driver found in related research, the turnover [4], [5], [6], did not surface in our study. This was most probably because of the short duration of the pilot project.

C. Implication for Practice

One of the key questions emerging from our study is related to the ways of initiating offshore outsourcing collaborations. Our findings suggest that piloting offshore outsourcing collaborations is a good idea. Pilots help evaluate the relationship potential, evaluate the process fit and compatibility of organizational and management styles, test the quality of delivered services and software, offshore team's productivity, and their ability to integrate with the in-house personnel (if needed). Close follow-up on the detailed cost breakdown can also help identify potential problems, such as the undesirable proportion of management over development or too high costs of internal support. At the same time, our findings suggest that looking only at the amount of the accumulated costs during a pilot might not be a good idea when taking a sourcing decision, because learning curves for different tasks vary in length, and such factors as turnover also surface only after a longer time [4], [5], [6]. Furthermore, related research suggests that overruns may distract the management attention and cause resource misallocation, and further decrease in performance [8].

For companies that plan to start an offshore outsourcing relationship, we recommend the following:

- When selecting a partner, pay attention to organizational culture and process fit. If processes vary, invest into establishing a common process across locations, and provide extensive process training before and during the work.
- When close integration and teamwork among the engineers from distant locations is planned, avoid having too many roles dedicated to coordination. Managers represent an additional separation layer hinders effective communication and coordination, and often drives the offshoring costs up.
- Consider the pilot as a learning experience and an investment, and do not expect any cost savings. The main purpose during the pilot should be to maximize the familiarization and integration across the sites. Therefore, the main expected outcome should be the assessment of the capabilities of the new partner, and the viability of the mutual relationship and the capability of improving the relationship. This will also motivate the offshoring partner to learn and make the relationship work rather than chase the budget goals.
- Do not constrain the learning experience by the pilot estimates. Effort and costs are difficult to estimate accurately, and engineers should not try to meet the expectations on the time and cost fronts. Pressure to meet the deadlines often leads to increased re-work, which again will reduce progress and satisfaction. What is truly important are the quality expectations, which should not be lessened.
- Set a reasonable duration of the pilot to be able to evaluate the partners learning experience by aligning the duration of the pilot with the task complexity and the time it takes to ramp up the competence needed to complete it.

VI. Conclusions

In this paper, we have shared our findings from studying the hidden costs of offshore outsourcing in a pilot project involving a Norwegian customer and a Slovakian supplier. We found that careful planning and external expertise has helped the case company identify the main cost factors, but the significance of these costs was largely underestimated. In particular, the main hidden costs were the internal support costs, including

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specification costs, the costs of management and control, especially the external ones were also underestimated, as well as the costs of learning and rework that were evidenced in significant effort overrun (almost four times overrun for development and testing). The main cost drivers in our study were the distance and the poor cultural fit both in terms of development processes and management approaches. Our results complement related work [4] that suggests that the start-up phase of an offshoring collaboration suffers from significant investments. We have found the hourly costs based on the salary rate and the additional direct costs to be 2,5 times higher than the contract-based hourly rate. Although the duration of the pilot project was too short to judge the true feasibility of the offshore outsourcing to bring the desirable cost savings, we illustrate that the hidden costs do significantly impact the hourly costs confirming the findings from related studies [2], [3], [4], [5], [6], [7]. The analysis performed in this case study drives a number of important implications for practice regarding how to pilot offshoring collaborations, that have not been well covered in the current research on global software development. And finally, we extend our current research that primarily focused on outsourcing to India [4], [5], and provide evidence that similar challenges and investments are faced in nearshore projects.

For the future work, we recommend replicating our study in different contexts to complement the evidence on the realized costs in offshore sourcing collaborations. Both studies on outsourcing and insourcing are of great value. Specifically, we urge researchers to report studies on nearshoring, and preferably on longer collaborations spanning several years rather than just pilot projects. More research is needed also to better understand the turnover impact as the cost driver, especially in nearshore collaborations.

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