When Does Learning Pay Off? The Relationship of Organizational Learning and ITO Vendor Profitability

Research-in-Progress

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Abstract

We investigate the effect of exploitative and exploratory learning activities on ITO vendor profitability. We present a mixed-method strategy to iteratively inform our research with an unprecedented data set of both qualitative and quantitative data on projects of the ERP service vendor OMEGA. In this paper, we report on initial quantitative findings, which show that exploitative activities have a positive linear effect on vendor profitability, suggesting that OMEGA benefits from learning curve effects. In contrast, we show that exploratory activities have a negative non-linear effect on profitability, suggesting that OMEGA deliberately relaxes profitability objectives to invest into new capabilities. By combining these findings with qualitative data, we hope to describe and understand the relationship of organizational learning and vendor profitability in more detail. Advancing our understanding of this relationship is crucial to offer sound and relevant guidance to an increasingly competitive and mature ITO industry.

Keywords: organizational learning, exploitative learning, exploratory learning, information technology outsourcing, GAMLSS, vendor profitability
Introduction

Information technology outsourcing (ITO) vendors face an intensifying competition that threatens profitability (Manning et al. 2011). The ITO industry has become a well-established industry that combines increasingly commoditized services with high levels of market transparency, which enable ITO clients to make informed choices of ITO vendors (Dongus et al. 2014; Manning 2013; Reimann et al. 2010). At the same time, a fast-pacing technological progress and fragile market dynamics erode existing competitive advantages very quickly (Teece et al. 1997; Wirtz et al. 2007).

To thrive in such market conditions, ITO vendors must balance two forms of organizational learning activities (Levinthal and March 1981; March 1991; Winter 1971). Exploitative activities improve and refine existing capabilities to enhance productivity. In contrast, exploratory activities develop new capabilities that enable future competitive advantages. Exploitative and exploratory activities, however, compete for the same organizational resources, which requires ITO vendors to achieve and maintain a trade-off between exploitative and exploratory activities (March 1991).

Yet, little is known about how ITO vendors achieve and maintain the trade-off between exploitative and exploratory activities (Gupta et al. 2006). Theoretical advancement is currently limited by the dynamics and the complexity of organizational learning. Most aspects of organizational learning are of implicit nature and are only indirectly accessible to researchers (March 1991). Still, advancing our understanding of organizational learning in ITO vendors is crucial to offer sound and relevant guidance to the ITO industry, which is a key audience of IS research.

Thus, we investigated the effect of exploitative and exploratory activities on vendor profitability, which arguably is one of the most important criteria of success (Hoermann et al. 2012). We opted for a mixed-method strategy to iteratively inform our research with both quantitative and qualitative data, which is crucial to capture the implicit aspects of organizational learning (Venkatesh et al. 2013). Our first iteration, however, is a quantitative analysis to leverage the existing foundations of organizational learning theory. For our research, we have established an unprecedented data set of qualitative and quantitative data on projects of the ERP service vendor OMEGA. ERP projects are a prime example of ITO. ERP projects are complex engagements that typically go beyond the competencies of a client and are thus frequently outsourced to specialized vendors (Markus and Tanis 2000; Sarker et al. 2012). We have a long-running research collaboration with OMEGA that allowed us to iteratively discuss our findings with representatives of OMEGA to advance our understanding of the data set.

In this paper, we report on initial quantitative findings from our first iteration. We used ‘generalized additive models for location, scale, and shape’ (GAMLSS) to study the relationships of our variables without any assumptions about the underlying statistical model (Stasinopoulos and Rigby 2007). GAMLSS enabled us to account for non-linear relationships resulting from the dynamics and the complexity of organizational learning. We show that exploitative activities have a positive and linear effect on vendor profitability, which suggests that OMEGA benefits from experience curve effects that help to improve productivity and subsequently profitability. We show further that exploratory activities have a negative effect on profitability. This suggests that OMEGA is deliberately relaxing its profitability objectives to invest into new capabilities together with clients. However, exploration comes with higher risks and greater unpredictability of results, which results in a non-linear relationship of exploratory activities and vendor profitability (March 1991).

The remainder of the paper is organized as follows: we outline the theoretical background of our research, briefly describe our overall research design, and explain the methodology of our first quantitative iteration of research. Next, we report our initial findings. We close the paper by outlining our next steps. Furthermore, we discuss the expected contributions of this research to theory and practice.

Theoretical Development

The Challenge of Balancing Exploitation and Exploration

Organizational learning is a continuous process that adapts an organization’s capabilities to changes in the environment of that organization (Fiol and Lyles 1985). Effective organizational learning is considered a key factor contributing to success and survival in highly dynamic markets such as the ITO market.
Organizational Learning and ITO Vendor Profitability

In our research, we posit that the catalyst of organizational learning are repeated interactions (RI) with clients (Ethiraj et al. 2005). Each additional interaction presents opportunities to transform experiences into knowledge that helps to improve operational capabilities or to establish new capabilities (Grant 1996). The competitive advantage of an ITO vendor comes from competencies and capabilities that go beyond the competencies of clients and other vendors (Sarker et al. 2012). The ability to learn is hard to imitate and leads to such competitive advantages, which help to safeguard profitability (Ethiraj et al. 2005; Grant 1996).

We focus on two crucial forms of RI: within the same industry and with the same client. ITO research confirms that industry experience affects the performance of ITO engagements (Gemino et al. 2008; Jiang and Klein 2000; Jun et al. 2011). Although information systems (e.g., ERP systems, CRM systems, HR systems) are implemented across industries, each industry exhibits distinct characteristics, such as regulatory requirements, that have pivotal impact on the performance of an ITO engagement. Thus, we argue that knowledge accumulated from ITO will be highly industry-specific (Davenport 1998; Markus and Tanis 2000).

We conceptualize that RI in the same industry represent exploitative learning activities. The underlying model of our conceptualization is the experience curve model, which posits that with increasing levels of experience organizations can improve and refine operational capabilities to achieve higher levels of efficiency (Ciborra and Andreu 2001; Hayes and Clark 1986; Saraswat and Gorgone 1990). ITO vendors accumulate experience through the design, implementation, and operation of similar ITO services for large set of clients within the same industry (Bharadwaj 2000; Ethiraj et al. 2005). Over time, this process of learning by doing refines and improves the organizational capabilities of an ITO vendor (Ethiraj et al. 2005). Thus, we posit a positive relationship between RI within the same industry and vendor profitability: (H1) More repeated interactions within the same industry are associated with higher vendor profitability. March (1991) argues that exploitative learning results in “positive, proximate, and predictable” (p. 85) returns. Thus, we posit a linear relationship of RI within the same industry and vendor profitability.

RI with the same client mitigate risks by reducing information asymmetries between client and vendor (Gefen et al. 2008). Client and vendor get to know each other’s capabilities, business environments, and cultures, which facilitates better allocation of resources (Kalnins and Mayer 2004). RI also increase trust,
which increases the chance that both parties will take constructive steps towards achieving common goals and reduces opportunistic behavior and the need for control (Gefen et al. 2008). This reduces the costs for governance mechanisms such as monitoring controls and extensively detailed contracts (Gefen et al. 2008; Williamson 1979). Thus, ITO vendors should benefit from trust and detailed client knowledge.

However, literature presents mixed results on the relationship of RI with the same client and vendor profitability (Gopal et al. 2003; Hoermann et al. 2014). Creating value for the client in RI may lead to higher technical complexity because more advanced services are being demanded (Gopal et al. 2003). Such advanced services are typically tightly integrated in the client’s core infrastructure or involve the replacement of legacy systems (Markus and Tanis 2000). Thus, the risks of engaging in advanced services may outweigh benefits from trust and detailed client knowledge. Also, it seems plausible that clients learn about the cost structure and market situation of the ITO vendor, which diminishes the ITO vendor’s opportunities to seek rents from information asymmetries (Gefen et al. 2008).

We conceptualize that RI with the same client represent exploratory learning activities. The underlying model of our conceptualization is the service-dominant logic, where the vendor not just delivers a service but rather engage in a co-creation process that innovatively combines capabilities of the vendor and the client to create a client-specific service offering (Lusch and Vargo 2006; Sarker et al. 2012; Vargo and Lusch 2004). Increased trust and detailed client knowledge that come from RI foster such settings (Kalnins and Mayer 2004). During this co-creation process the vendor acquires new capabilities that could be facilitated to other clients, too (Grönroos 2011). We argue that RI with the same client enable the vendor to invest into building capabilities that may result in new competitive advantages. Accounting for the co-creating activities of the client, the ITO vendor relaxes profitability objectives (Lusch and Vargo 2006; Sarker et al. 2012; Vargo and Lusch 2004). Thus, we posit a negative effect of RI with the same client on vendor profitability: (H2) More repeated interactions with the same client are associated with lower vendor profitability. However, such opportunities come with higher risks and greater unpredictability of results (March 1991). Some co-creation activities create value that positively affects the relationship between client and vendor while other co-creation activities result in delays, higher costs, and loss of trust, which negatively affect the relationship between client and vendor. Thus, we posit a non-linear relationship of RI with the same client and vendor profitability.

As March (1991) posits, successful organizations balancing exploitative and exploratory activities. Thus, we posit a general positive effect of RI on vendor profitability: (H3) More repeated interactions are associated with higher vendor profitability. However, given the competitive pressure and fragile market dynamics of the ITO industry, we argue that balancing is a continuous activity of ITO vendors. Thus, we posit a non-linear relationship between total RI independent of industry or client and ITO vendor profitability.

**Research Design and Methodology**

**Research Site and Data Collection**

For our research, we collected qualitative and quantitative data on projects from the German-based ERP service provider OMEGA from 2004 to 2012. OMEGA helps clients in Germany, Austria, and Switzerland to implement, operate, and maintain ERP systems. OMEGA is one of the leading service providers in the ERP market and owns a significant market share. Our research collaboration with OMEGA follows the idea of engaged scholarship (Mathiassen and Nielsen 2008; Van de Ven 2007). Our research informs OMEGA about improving its practices and strategies while discussions with experts from OMEGA inform our tentative hypotheses.

Qualitative data was obtained from archival records and semi-structured interviews. OMEGA monitors the risks of projects very closely over time. Understanding the risks in OMEGA’s projects helps us to identify events and situations that foster or inhibit activities of organizational learning. We collected risk management data on 1,188 projects with consists of 2,225 structured risk reports, which were input for decisions of OMEGA’s executives. While we are able to infer these reports in a quantitative manner, we still consider the results as qualitative, as they require a lot of context and interpretative help from OMEGA representative. Furthermore, we conducted 15 standardized semi-structured interviews to develop an in-depth understanding of the nature and the strategic objectives of OMEGA. Additionally, we
had numerous meetings, which were not recorded, though. This way, we were able to discuss OMEGA's practices and our results without potential biases due to the presence of recording devices (Miles and Huberman 1994).

Quantitative data about 33,444 projects was obtained from the project management systems, contract management systems, and financial systems of OMEGA. We used external databases to complement our data sets with data such as client industry and client's size. We calculated proxies for variables such as project uncertainty. The descriptive statistics of the metric variables are presented in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Unit</th>
<th>Min</th>
<th>Avg.</th>
<th>Med</th>
<th>Max</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>total RI</td>
<td># of projects</td>
<td>1,113</td>
<td>21,339</td>
<td>21,369</td>
<td>41,895</td>
<td>11,780</td>
</tr>
<tr>
<td>RI within the same industry</td>
<td># of projects</td>
<td>0</td>
<td>1,206</td>
<td>752</td>
<td>6,287</td>
<td>1,334</td>
</tr>
<tr>
<td>RI with the same client</td>
<td># of projects</td>
<td>0</td>
<td>92</td>
<td>29</td>
<td>1,154</td>
<td>157</td>
</tr>
<tr>
<td>client loyalty</td>
<td># of years</td>
<td>0</td>
<td>4.06</td>
<td>4</td>
<td>15</td>
<td>2.66</td>
</tr>
<tr>
<td>client size</td>
<td># of employees</td>
<td>1</td>
<td>56,026</td>
<td>7,185</td>
<td>482,867</td>
<td>104,661</td>
</tr>
<tr>
<td>project budget</td>
<td>000 Euro</td>
<td>1.0</td>
<td>60.5</td>
<td>12.9</td>
<td>27,183</td>
<td>291.8</td>
</tr>
<tr>
<td>project budget (log)</td>
<td></td>
<td>6.92</td>
<td>9.58</td>
<td>9.47</td>
<td>17.12</td>
<td>1.51</td>
</tr>
<tr>
<td>project delay</td>
<td># of years</td>
<td>0</td>
<td>0.1</td>
<td>0</td>
<td>4</td>
<td>0.34</td>
</tr>
<tr>
<td>project duration</td>
<td># of days</td>
<td>1</td>
<td>171</td>
<td>119</td>
<td>2,191</td>
<td>177</td>
</tr>
<tr>
<td>project duration (log)</td>
<td></td>
<td>4.58</td>
<td>4.78</td>
<td>7.69</td>
<td>12.6</td>
<td>1.26</td>
</tr>
<tr>
<td>project uncertainty</td>
<td>000 Euro</td>
<td>0</td>
<td>11.0</td>
<td>1.5</td>
<td>10,049</td>
<td>77.2</td>
</tr>
<tr>
<td>project uncertainty (log)</td>
<td></td>
<td>6.42</td>
<td>7.31</td>
<td>16.12</td>
<td>3.46</td>
<td></td>
</tr>
<tr>
<td>profitability</td>
<td>%</td>
<td>-13.22</td>
<td>33.87</td>
<td>33.53</td>
<td>87.80</td>
<td>12.35</td>
</tr>
</tbody>
</table>

For reason of confidentiality we multiplied the estimate values by a constant factor

Mixed-method Research Strategy

Our unique dataset provided unprecedented conditions to draw meta-inferences (i.e., a holistic explanation of relationship between organizational learning and IT vendor profitability) from integrating findings obtained via quantitative and qualitative methods (Venkatesh et al. 2013). We follow a mixed-method strategy to iteratively develop and refine meta-inferences from both quantitative and qualitative data. We believe that advancing theory on the trade-off between exploitative and exploratory organizational learning in ITO vendors requires a holistic analysis to capture both the explicit choices of vendors (e.g., profitability objectives, investment decisions, strategies) and the implicit choices, which are embedded in the organizational structures and practices (March 1991).

We have adopted a meta-inference analysis path that consists of iterations of either quantitative or qualitative research (Venkatesh et al. 2013). Between iterations, our goal is to develop consensus between quantitative and qualitative research and to identify contradictions, which serve as a starting point of a new iteration. For both quantitative and qualitative research iterations, we follow established guidelines for conducting qualitative and quantitative research (Miles and Huberman 1994; Stasinopoulos and Rigby 2007). Furthermore, we follow the guidelines of Venkatesh et al. (2013) in establishing our meta-inferences. We have adopted a sequential and iterative research design, where each iteration starts with a quantitative study followed by a qualitative study (Venkatesh et al. 2013). Conducting the quantitative study first allowed us to leverage organizational learning theory to investigate how exploitative and exploratory activities affect ITO vendor profitability. The qualitative study enabled us to understand why exploitative and exploratory activities affect ITO vendor profitability. We believe that this way, we are able to identify and understand the mechanisms of organizational learning in ITO vendors and their effect on profitability in great detail and can still develop a holistic understanding.

Initial Quantitative Analysis: Semi-parametric Models of Vendor Profitability

In the following, we will outline the quantitative research methodology of our first iteration. The aim of this iteration was to investigate the general relationship of exploitative and exploratory activities and ITO vendor profitability. More specifically, we investigated the relationship between our dependent variable
As our final model, we defined mod:

\[ \text{mod} \]

We applied semi-parametric models to account for non-linear relationships resulting from the dynamics and the complexity of organizational learning. Semi-parametric models allowed us to investigate the relationship of our independent variables and the dependent variable without any assumptions about the statistical model of the relationships (James et al. 2013). Researchers typically assume linear relationships of organizational learning activities and ITO performance (Ethiraj et al. 2005; Palvia et al. 2010). However, the continuous trade-off between exploitative and exploratory organizational learning in dynamic markets such as the ITO industry indicates more complex statistical models. Thus, we were particularly interested in the underlying statistical model of these relationships.

We modeled our continuous variables as B-splines and used factors to modeled our discrete variables as suggested by Eilers et al. (1996). GAMLSS models vendor profitability, the location (μ), standard deviation (σ), skewness (v), and kurtosis (τ) as separate sub-models. We included all independent variables and control variables from Table 2 in the sub-model for μ to investigate the effect of each variable on vendor profitability. Furthermore, we followed James et al. (2013) and used a forward stepwise selection method to establishing the sub-models for σ, v, and τ. As suggested by Akaike (1983), the model with the lowest Generalized Akaike Information Criteria (GAIC) with a penalty of 2 identifies the best model (Rigby and Stasinopoulos 2009). We found that the “Skew Power Exponential Type 4” (SEP4) distribution provided the lowest GAIC. SEP4 further allows us to represent positive and negative values of profitability and considers fat tails by supporting strong positive kurtosis. Given our large data set without starting values, we opted for the RS()-algorithm to calculate the model (Stasinopoulos et al. 2008).

As our final model, we defined mod:
mod <- gamlss(prof ~ pb(ln(pr_unc + 1)) + pb(ln(pr_bud)) + pb(rep_ind) + pb(rep_cli) + pb(cli_lo) + pb(total) + pb(pr_del) + pb(cli_s) + factor(co_ty) + factor(y) + factor(ind) + random(cli, lambd=0.0174), sigma.fo ~ pb(ln(pr_bud)) + pb(rep_ind) + pb(rep_cli) + pb(cli_lo) + pb(pr_del) + pb(cli_s) + factor(co_ty) + factor(y), nu.fo ~ pb(ln(pr_dur)) + pb(cli_lo) + pb(cli_s) + factor(co_ty) + factor(y), tau.fo ~ pb(ln(pr_dur)) + pb(total) + pb(cli_s) + factor(co_ty), family="SEP4", method=RS(), data=myOMEGA)

A visual analysis of the a semi-parametric models' residuals and qq-plots is crucial before interpreting the data (Stasinopoulos and Rigby 2007). We tested the residuals against each other and against the fitted values. We found that all plots were normally distributed without any patterns and without indicators of heteroscedasticity. The qq-plot showed a straight line and thus indicates a good specification of the underlying distribution without any unconsidered skewness and kurtosis.

Initial Findings

Table 3 summarizes the results of our analysis. All variables are at least very significant at the 1% level. On average the “total RI” and “RI within the same industry” are positively associated with vendors’ profitability. In contrast, “RI with the same client” is negatively associated with vendors’ profitability.

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>t-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept) ^</td>
<td>+34.2</td>
<td>***</td>
</tr>
<tr>
<td>pb(total RI)</td>
<td>+0.000202</td>
<td>***</td>
</tr>
<tr>
<td>pb(RI within the same industry)</td>
<td>+0.0000706</td>
<td>**</td>
</tr>
<tr>
<td>pb(RI with the same client)</td>
<td>-0.00218</td>
<td>***</td>
</tr>
<tr>
<td>pb(client loyalty)</td>
<td>+0.520</td>
<td>***</td>
</tr>
<tr>
<td>pb(ln(client size))</td>
<td>-0.0000200</td>
<td>***</td>
</tr>
<tr>
<td>pb(project budget)</td>
<td>-0.197</td>
<td>***</td>
</tr>
<tr>
<td>pb(project delay)</td>
<td>-0.764</td>
<td>***</td>
</tr>
<tr>
<td>pb(ln(project duration))</td>
<td>-0.436</td>
<td>***</td>
</tr>
<tr>
<td>pb(ln(project uncertainty + 1))</td>
<td>-0.122</td>
<td>***</td>
</tr>
</tbody>
</table>

*** = significant at the 0.1% level, ** = significant at the 1% level
^ For reason of confidentiality we multiplied the estimate values by a constant factor.

Table 3. Linearized GAMLSS results (Dependent variable: vendor profitability)

Figure 1 illustrates the relationship of the variables “RI within the same industry”, “RI with the same client”, and “total RI”. The GAMLSS specifies the expected contribution of these variables on the profitability of projects of OMEGA. A 95% confidence interval is given through dotted lines.

Figure 1. The expected contribution of repeated interactions to vendor profitability

RI in the same industry have a linear positive relationship with vendor profitability. More experience within an industry indeed increases the contribution of each project to the vendor profitability from -0.2% to +0.4%. This lends support to our conceptualization of RI in the same industry as exploitative learning.
activities. RI within the same industry follow the experience curve model (Saraswat and Gorgone 1990). OMEGA is able to exploit accumulated experience through the design, implementation, and operation of ITO services for large variety of clients within the same industry (Bharadwaj 2000; Ethiraj et al. 2005).

In contrast, RI with the same client have a highly non-linear relationship with vendor profitability. Our data lends support to our conceptualization of RI with the same client to represent exploratory learning activities. We see phases of rising contributions to vendor profitability alternating with phases of decreasing contributions to vendor profitability. The linearized estimate, however, is negative at -0.00218. One could argue that OMEGA deliberately relaxes profitability objectives and invests into co-creating new capabilities together with the client (Lusch and Vargo 2006; Sarker et al. 2012; Vargo and Lusch 2004). However, turning new capabilities into service offerings that are attractive to a larger client base is risky and has a less projectable contribution to vendor profitability.

Total RI have a non-linear relationship with vendor profitability. Until about 17,000 interactions raised the contribution of each interaction from -4% to -2%. Until about 30,000 interactions, we find strong contributions to vendor profitability up to +3%. However, beyond about 30,000 interactions, the relationship between total RI and vendor profitability turns negative to about +1%. The non-linear relationship supports March’s (1991) notion of a continuous balancing act of exploitative and exploratory activities in fragile market dynamics such as the ITO industry March (1991).

**Expected Contributions & Current Status of the Research**

The rationale of our research is to understand how exploitative learning and exploratory learning, conceptualized as repeated interactions, affects ITO vendor profitability. Initial findings suggest that ITO vendors benefit from exploiting projectable experience curve effects, which is why we find a positive linear relationship between repeated interactions within the same industry and vendor profitability. In contrast, exploratory learning means taking risks and invest into innovative capabilities. Our findings support this conceptualization, as repeated interactions with the same client have a negative and non-linear relationship with vendor profitability.

Studying repeated interactions as exploitative and exploratory learning offers a fresh perspective on the relationship of clients and vendors in an increasingly competitive market. In particular, we offer a new approach to reconcile mixed results on the relationship of repeated interactions with the same client and vendor profitability (Gopal et al. 2003; Hoermann et al. 2014). Our initial findings suggest that the client is an important locus of innovation as vendors co-create new capabilities together with clients. However, the risks associated with innovation, need to be balanced by harnessing experience curve effects through standardizing and routinizing these capabilities in subsequent projects. In turn, clients should refrain from limiting the vendor in learning activities but rather leverage exploitative and exploratory motives to establish more effective client-vendor-relationships (Dongus et al. 2014).

Our next step in the research project is to investigate the qualitative data to leverage our findings and to enrich our overall study (Venkatesh et al. 2013). Our goal is to understand the mechanisms that OMEGA is using to continuously balance exploitative and exploratory activities. In particular, we study the role of risk management in balancing exploitative and exploratory activities in OMEGA’s project portfolio. We have already structured our qualitative data and are currently in the first iteration of interpreting the data. In further iterations, we are also conducting an additional quantitative analysis with another ITO (non-ERP) vendor to see whether our findings replicate. Eventually, we develop a model that enables us to test our hypotheses.

In sum, our research contributes to the theoretical advancement of organizational learning of ITO vendors by offering new insights into the trade-off between exploitative and exploratory activities and the effect of this trade-off on profitability, an essential dimension of success for an ITO vendor. By combining quantitative data with qualitative data from an unprecedented data set, we hope to describe and understand the mechanisms of the trade-off between exploitative and exploratory activities in more detail. We feel this is a crucial prerequisite for offering sound and relevant guidance to the ITO industry.

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