The Influence of IT Governance on Service Processes in Multi-Business Manufacturing Enterprises: Performance Impacts from Structures, Processes, and Relational Mechanisms

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ABSTRACT

In the last 30 years, developing industrial services has emerged as a strategic imperative for most manufacturing firms. However, they struggle with the implementation of appropriate IT solutions. Being widely accepted as a strategic concept in the IT domain, IT governance (ITG) ensures effectiveness and efficiency in the usage of IT in multi-business firms. This paper aims to investigate the service performance impact of ITG. Doing so, the study takes the resource-based perspective, and integrates the economic theory of complementarities and the concept of relatedness. The proposed increase in service process performance is grounded in the generation of sustainable competitive advantage. The framework is investigated by using eight exploratory case studies in multi-business manufacturing organizations. The results suggest that ITG is positively related to service process performance through the mediators of IT relatedness and service process relatedness. Furthermore, ITG levers have been identified which might significantly increase service process performance.

Keywords  
IT Governance, Service Process, Resource Relatedness, Resource Based View, Theory of Complementarities.

INTRODUCTION

During the past three decades, developing customer-oriented services has emerged as a strategic imperative for most firms (Reichheld and Sasser, 1990; Tracey and Tan, 2001). This is shown in the continuous growing service sector, which accounts for about 70% of aggregate production and employment in Organization for Economic Co-operation and Development (OECD) economies (Wölf, 2005). Especially manufacturing firms facing challenges in terms of shrinking margins, service-demanding customers and increased competition try to reposition themselves by providing integrated customer solutions including service components (Oliva and Kallenberg, 2003). The paradigm shift from a product-dominant to a service-dominant logic can hardly be negated (Vargo and Lusch, 2004). Nonetheless, organizations still struggle to implement services that are complementary to their existing product portfolios (Oliva and Kallenberg, 2003). IT can help those firms to integrate and support resources in order to create valuable services that are aligned with customer expectations and firm-intern resources (Thomas, Walter, Loos, Nüttgens and Schlicker, 2007).

ITG is a concept that allows achieving above average returns of corporate investments through encouraging a desirable behaviour with IT (Weill, 2004). With yearly IT costs exceeding $1 billion in large multinational corporations and being accountable for up to 15% of the turnover (Gartner, 2011), the impact of ITG on organizational performance is undisputable. Today, ITG is a key enabler and success factor for organizational performance (De Haes and Van Grembergen, 2009). Weill (2004) even argues that ITG can account for a 20% profitability increase.

Since the passage of the Sarbanes-Oxley Act in 2002, many organizations started instituting deliberated ITG frameworks. Academic research within this area however is still in its early stages. While ITG best practices and descriptive frameworks have been available for years, theoretical models explaining the impact of ITG on organizational performance are lacking (De Haes and Van Grembergen, 2009). The available literature claims that ITG provides value and even offers guidelines in order to achieve value gains through ITG, but the mechanisms between ITG and an improvement of organizational performance...
remain unexplored. Based on the resource-based-view (RBV) of the firm (Mata, Fuerst and Barney, 1995; Melville, Kraemer and Gurbaxani, 2004), the economic theory of complementarities (Milgrom and Roberts, 1995), and the concept of relatedness (Campbell and Goold, 1998; Davis and Thomas, 1993), a positive relationship between IT relatedness and organizational performance is postulated (Tanriverdi, 2006). Being accepted as promising source of competitive advantage among the business processes (Melville et al., 2004), service processes heavily rely on IT for achieving synergies (Ray, Muhanna and Barney, 2005). We position the mediators IT relatedness (Tanriverdi, 2006) and service process relatedness between ITG and organizational performance. Further research is required to extend the research framework with the service process relatedness resulting in the following research questions:

RQ.1) How are IT governance, resource relatedness and organizational performance associated?
RQ.2) What are IT governance levers in multi-business manufacturing firms that contribute to service process performance?

In order to answer these research questions, this exploratory study conducts an in-depth literature analysis, forms a theoretical framework, and evaluates qualitative data from case studies of eight multi-business firms. The research is focused on multi-business firms because they have considerably more synergy potential than single-business firms (Tanriverdi, 2006).

THEORETICAL BACKGROUND

IT Governance and IT Business Value

ITG has been strongly debated in the extant literature in the last few years focusing on two streams: the locus of decision-making structures and contingency analysis (Brown and Grant, 2005; Sambamurthy and Zmud, 1999). However, despite the practical value of such research, the results and models which have been developed are mostly descriptive and hence lack depth in their theoretical background (Lazic, Groth, Schillingler and Heinzl, 2011). Exceptions are the alignment-centric models that consider the association with ITG and organizational performance. Numerous researchers claim that ITG and business-IT alignment (BITA) (De Haes and Van Grembergen, 2009; Johanssen and Goeken, 2006; Luftman and Kempaiah, 2007) are positively associated, and that this in turn has a positive influence on organizational performance (Sabherwal and Chan, 2001). Anyway, ITG is only one out of six factors influencing BITA (Luftman and Kempaiah, 2007), and hence the implications remain limited (Lazic et al., 2011). In addition, there is still disagreement about the definition of BITA (Chan and Reich, 2007).

One of the most discussed topics within IS literature has been IT business value (ITBV). The value of IT, or, in other words, the contribution of IT to organizational performance, has been studied by academics inter alia from the perspective of the RBV of the firm (Rivard, Raymond and Verreault, 2006). The RBV includes assets, humans, knowledge and processes and is based on the fundamental assertion that resources can be heterogeneously distributed among competitors; some of these resources are imperfectly mobile and thus can provide sustainable competitive advantage (Barney, 1991; Mata et al., 1995). ITBV scholars have studied IT resources from the RBV, and conclude that the value is not directly created but through the mediation of strongly related and complementary resources (Mata et al., 1995; Melville et al., 2004). In particular, the improvement of business processes (Melville et al., 2004) and service processes (Ray et al., 2005) present critical mediating effects. The growth of a firm is associated with the identification and usage of the appropriate resources (Penrose, 1959; Rivard et al., 2006). Selecting, coordinating and managing resources such as processes (Barney, 1991) and IT (Mata et al., 1995) are governance activities.

Resource Relatedness and Performance Effects

The RBV provides the economic foundation for multi-business firms, as it clearly points out that strategic interrelations – known as synergies – among business units (BUs) positively affect organizational performance (Peteraf, 1993; Robins and Wiersema, 1995). Multi-business firms have significantly more synergy potential than single-business firms (Tanriverdi, 2006), since they rely on economies of scope (Teece, 1982). The literature in the fields of strategy and economics defines the concept of synergies in terms of super-additive value (Davis and Thomas, 1993) or sub-additive cost synergies (Teece, 1982). Whenever synergies exist among different business units, it is a key proposition of strategic management scholars that those synergies increase the overall value of the multi-business firm (Goold and Luchs, 1993).

The predominant source of synergy in multi-business firms is resource relatedness (Tanriverdi and Venkatraman, 2005), which refers to the presence of related activities and shared resources across BUs (Davis and Thomas, 1993). Based on the RBV, researchers claim that the sharing of strategic resources across BUs generates cross-business resource-based synergies, which consequently improve organizational performance (Farjoun, 1994; Markides and Williamson, 1994; Robins and Wiersema, 1995). However, the concept of resource relatedness cannot properly capture the super-additive value dimension
of the resource combinations. Hence, we apply the theory of complementarities (TOC) (Milgrom and Roberts, 1995). In other words, sub-additive costs arising from relatedness are imitable, and can only result in temporary competitive advantage. Whereas super-additive values from a complementary set of resources with high relatedness are a potential source of sustainable advantage, since they are imperfectly mobile and thus not easily imitable.

IT relatedness is a source of cross-unit IT synergy and has a direct impact on organizational performance, but also allows the exploitation of cross-unit business synergies, i.e., IT relatedness has indirect effects on organizational performance through the mediation of cross-unit capabilities (Tanriverdi, 2006). The IT relatedness construct comprises a tight set of IT resources for conceptualization that can be traced back to the ITBV literature (Wade and Hulland, 2004) and that is linked to the relatedness concept: common IT infrastructure (shared tangible resources), common IT strategy (coordinated strategies), common IT vendor management (pooled negotiating power), and common IT human resources (shared know-how). Examining the relationship between IT relatedness and corporate performance, scholarly literature shows that the relatedness of single IT resources leads to sub-additive costs, while the relatedness of complementary IT resources additionally generates super-additive value and thus increases organizational performance (Tanriverdi, 2006).

Coordinated strategies correspond to the coordination of the service climate across all BUs. Service climate refers to the employees’ perceptions of the practices, procedures and behaviours, which are expected for customer service and service quality (Schneider, White and Paul, 1998). Being a valuable and heterogeneously distributed resource, service climate is an intangible resource which renders it difficult for competing firms to imitate at low costs (Ray et al., 2005). Fostering customer service requires improved service delivery and customization practices. An increased service delivery capability has a positive impact on performance in terms of sales growth and market share gain, which in turn helps a firm to differentiate its offerings (Tracey and Tan, 2001). Multi-business firms taking customization practices seriously provide a better fit between their offerings and customer needs, lead to a higher customer loyalty, hence service performance (Ghosh, Dutta and Stremersch, 2006). Shared know-how is advantageous for designing and implementing service processes when employees’ service knowledge can be distributed across the BUs. These findings are in line with previous research on resource relatedness and complementarities (Milgrom and Roberts, 1995). Tying together these lines of argument and in accordance to the development of business process relatedness (Lazic et al., 2011), the definition of service process relatedness can be derived from resource relatedness in terms of the extent to which a multi-business firm uses common service processes across its BUs. We propose that service process relatedness is a source of cross-unit synergy. In analogy to the procedure approach of Tanriverdi (2006), we derived service process relatedness from RBV-centered literature on service processes and linked them to the relatedness concept.

![Research Model](image)

**Figure 1: Research Model**

**RESEARCH APPROACH**

**Research Model**

According to the stringent literature review in the field of ITG the best-suited model to guide the research process is the model of structures, processes, and relational mechanisms (De Haes and Van Grembergen, 2009). In fact, this model is precise, relates to the essential body of knowledge, and fits the theoretical lens of the RBV. Once the required information and decision structures are available, the harmonization and consolidation of the IT landscape and IT management procedures is only a question of time (Lazic et al., 2011). Thus, we propose a positive relationship between ITG and IT
relatedness (see Figure 1). Based on the RBV, service processes are regarded as corporate resources (Barney, 1991). Since strong interrelations between IT and business processes (Melville et al., 2004), particularly service processes (Ray et al., 2005) can be observed, we integrated service process relatedness as a second mediating construct. The relatedness of single IT-dimensions can lead to sub-additive cost synergies, which are imitable and therefore not sustainable. A complementary set of related resources can achieve super-additive value synergies, which are coupled with sustained competitive advantage and an increase in performance. All in all, an increase in performance is associated with the generation of sustainable competitive advantage (Sabherwal and Chan, 2001). Following the existing literature, harmonizing service processes is attended by improved process performance (Lee and Kim, 1999). To sum up, we employed well-established constructs (see Table 1).

<table>
<thead>
<tr>
<th>Construct</th>
<th>Definition</th>
<th>Source</th>
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<tbody>
<tr>
<td>IT governance - Processes</td>
<td>Formalization and institutionalization of strategic IT decision-making or IT monitoring procedures.</td>
<td>(Peterson, 2004; Peterson, O'Callaghan and Ribbers, 2000)</td>
</tr>
<tr>
<td>IT governance - Structures</td>
<td>Structural (formal) devices and mechanisms for connecting and enabling horizontal contacts, or liaison, between business and IT management (decision-making) functions.</td>
<td>(Peterson, 2004; Peterson et al., 2000)</td>
</tr>
<tr>
<td>IT governance - Relational mechanisms</td>
<td>Active participation of and collaborative relationship among corporate executives, IT management, and business management.</td>
<td>(Peterson, 2004; Peterson et al., 2000)</td>
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<tr>
<td>Resource relatedness</td>
<td>The use of common resources (i.e., common factors of production) across BUs.</td>
<td>(Davis and Thomas, 1993)</td>
</tr>
<tr>
<td>IT relatedness</td>
<td>Usage of common IT resources and management processes across BUs.</td>
<td>(Davis and Thomas, 1993; Tanriverdi, 2006)</td>
</tr>
<tr>
<td>Service processes relatedness</td>
<td>Usage of common service climates, customer services and knowledge across BUs.</td>
<td>(Campbell and Goold, 1998; Davis and Thomas, 1993)</td>
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<tr>
<td>Service process performance</td>
<td>Operational efficiency of processes, which include measures of customer service, information sharing, flexibility, and inventory management.</td>
<td>(Melville et al., 2004; Ray et al., 2005)</td>
</tr>
<tr>
<td>Organizational performance</td>
<td>Overall firm performance, including productivity, efficiency, profitability, market value, competitive advantage, etc.</td>
<td>(Melville et al., 2004; Sabherwal and Chan, 2001)</td>
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</table>

**Table 1: Research model constructs**

Research Design

In order to analyze the relationship between ITG, resource relatedness and service process performance (RQ.1), and to identify the levers for the performance impacts of ITG (RQ.2), a qualitative research design based on a multiple case study approach was applied (Eisenhardt, 1989). We investigated the elements of the research model (see Figure 1) in eight case companies. To provide accuracy in the qualitative research design, we built on theoretical constructs and applied the RBV as a theoretical lens. In order to answer RQ.1, we studied ITG, resource relatedness, and service process performance independently before mapping the dimensions in a qualitative assessment. After that, key levers were deduced (RQ.2) from the discussions of the data and results. Leading to a better understanding of the complex phenomena, exploratory case study research is well-suited to guide our research (Eisenhardt, 1989). The multiple case study approach is preferable to the single case study design in terms of enhanced validity. The organization that implements ITG is considered to be the unit of analysis.

In summer 2012, we conducted eight case studies. Diversified manufacturing corporations were selected since they show more potential for economies of scope (Tanriverdi, 2006) and they are subject to paradigm shift towards service-based business. Being product-focused due to their engineering roots, manufacturing enterprises have to undergo a long way towards service-orientation (Oliva and Kallenberg, 2003). Now realizing the strategic significance of service processes, those companies begin to adapt processes and IT investments (Ray et al., 2005). This broad transformation challenge makes them interesting research subjects. The research model fits to the manufacturing focus, since the service process performance construct comprises both: the performance impacts of business processes (Melville et al., 2004) and the service specifics (Ray et al., 2005). The data were mainly collected by expert interviews that are based on a semi-structured questionnaire. The structured part builds on theoretical constructs, while the unstructured component ensures openness towards new aspects. All interviews lasted between 1.5 and 2 hours and were conducted by two researchers in person. After documenting the interview transcripts, we complemented interview-based data collection by further analyzing corporate reports. The final results were documented and triangulated in a case study report which consecutively was approved by the industry partner. The gathered information included more than 44,000 words.
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Table 2: Profile of case study participants

CASE STUDY REPORT

IT Governance Analysis

Throughout all analyzed companies, the consolidation of the IT infrastructure and information systems landscape has been found to be one of the primary goals after introducing activities of an active revision of ITG. The ITG model, developed and validated by De Haes and Van Grembergen (2009), proved to be well applicable in the context of this study and was thus adopted. For the purposes of comparison we employed the minimum baseline as suggested by the literature (De Haes and Van Grembergen, 2009) (see Table 3). Since the RBV is based on the assumption that resources are always applied to their fullest extent, we assessed ITG practices by whether they were implemented or not. By counting the distinct processes, structures, and relational mechanisms we were able to derive three maturity levels: low, medium and high (see Table 3).

<table>
<thead>
<tr>
<th>IT governance practices</th>
<th>Maturity level</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Structures, Processes, Relational mechanisms)</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>S2</td>
</tr>
<tr>
<td>ALPHA</td>
<td>✓</td>
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<tr>
<td>BETA</td>
<td>✓</td>
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<tr>
<td>GAMMA</td>
<td>✓</td>
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<td>DELTA</td>
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<td>EPSILON</td>
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<td>ZETA</td>
<td>✓</td>
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<tr>
<td>ETA</td>
<td>✓</td>
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<tr>
<td>THETA</td>
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</table>

Table 3: IT governance assessment

In the case company assessment (Figure 2), we confronted service process and IT relatedness with the ITG maturity. The link between ITG and consolidation initiatives appears quite obvious and is described in the following passage.

Since ITG is concerned with the encouragement of desirable behavior in the use of IT (Weill, 2004) and IT presents one the essential resources of the firm, management will utilize the available information and related control structures in order to achieve the maximum output that can be generated by that particular resource (Barney, 1991). Maturity in ITG drives corporate information aggregation and conscious decision-making. Hence we propose a positive association between the maturity of ITG processes, structures and relational mechanisms and IT relatedness [P1].
BETA provides a standardized client in version 3; IT infrastructure and IT processes are globally available and consolidated. Additionally, the processes are defined and practiced on ITIL-basis. THETA’s application landscape is consolidated and mainly consists of SAP and Microsoft products, both covering ERP, SRM, CRM, BW and HR modules. Further, multi-tenancy has been introduced on several systems in line with consolidation projects. Embedded in the IT strategy, GAMMA coordinates enterprise-wide IT contracts and software licenses globally. For that reason the demand is internally pooled to possess the bundled negotiation power towards the software vendors and service providers.

In line with the RBV, business processes and their sub-group service processes are considered as resource arrangements of a company (Barney, 1991). Harmonisation of service processes is fostered by the management with the aim of increasing performance. ITG is claimed to drive consolidation of the IT landscape and IT management procedures while at the same time leading to an increased harmonization of service processes across the different BUs. We posit that the construct of service process relatedness, as an instance of resource relatedness (Davis and Thomas, 1993; Tanriverdi and Venkatraman, 2005) is positively influenced by the ITG practices: The higher the maturity of ITG processes, structures, and relational mechanisms the higher the service process relatedness [P2].

The two top-performing case companies provide strong indication for P2. In THETA, the IT works on the harmonization of service projects. Starting out in a pilot region, the other regional business managers show interest and can be convinced by a successful implementation. The CIO of THETA explains how a service process is gradually rolled out: “Those processes are defined, followed by best practice identification and then translated into the SAP systems. Finally the processes are rolled out as European and later on as global standard.” In GAMMA, the IT is the only virtual global organization within the whole corporation. More recently, managers of functional areas such as the R&D, service division and HR make inquiries about the mechanisms applied by the IT-unit for the implementation of a global strategy. Once those departments have started their initiatives, some of the business managers recognize how sophisticated the IT organization has driven its global processes. The IT organization serves as a reference model for the BUs to consolidate structures and processes.

Resource Relatedness and Service Performance Levers

However, top-performing firms such as GAMMA consider that “ITG is the basic requirement for any kind of process-harmonization and for the realization of global synergies”. After reaching a high IT relatedness, the IT unit finds out that, in fact, plenty of service processes are governed sub-optimal. Following Tanriverdi (2006), we claim that super-additive value synergies arising from a complementary set of common IT resources and common IT management processes have a positive impact on the service process performance of a multi-business firm [P3].

Several case companies have difficulties in achieving super-additive synergies, in particular, when these organizations possess a low maturity in ITG. However, first consolidation efforts reveal the potential for those synergies, although sub-additive cost synergies are predominant. For instance, transparency in terms of costs is pretty difficult to obtain for ZETA, since the issues were aggregated for the first time last year. Nevertheless, the IT manager explains their efforts as follows: “We are coming from a system landscape with 23 distinct ERP systems including support and external maintenance with numerous interfaces. In years, there will be only one system. That number speaks for itself.”

In contrast to ZETA, consolidation of applications and the system landscape is far more advanced at THETA. The CIO considers cross-divisional processes as a source for super-additive value synergies. Synergies arise, when the product-IT, that is organizationally part of R&D, calls for cooperation with the commercial IT. The manager explains that “the implementation of cross-divisional processes is a permanent issue in the search for synergies. For that purpose, we must not only implement optimal IT processes, but also define the necessary optimal organizational structures and processes.” Furthermore, the growing strategy of THETA demands an efficiency increase on the part of IT department, since the IT investments are planned to be lower than those required for non-IT activities. However, after a process is lean, it is hard to optimize processes anymore. The next option is then to eliminate parts through automation and for that intention IT plays a significant role for both IT and service processes. This example particularly refers to the following proposition: Super-additive value synergies arising from a complementary set of common service processes have a positive impact on the service process performance of a multi-business firm [P4].

This proposition can neither be confirmed nor be denied. The interview partners did not provide the necessary information to assess P4. The reason might be that mostly IT managers have so far been interviewed. Nevertheless, there are initiatives in these companies to harmonize service processes.

The IT unit of THETA receives high acceptance, especially in user satisfaction surveys. The feedback helps the IT function to identify service issues. Further, the user satisfaction also indicates the value generated by IT. The management is asked to reply to questions trying to measure perceived relevance, priority and performance of the IT services and processes. The exchange between the individual departments and IT should be increased to strengthen the build-up of process knowledge and to improve the customer focus of IT employees. Based on the consolidated IT infrastructure and application landscape, it
is possible to deploy and maintain harmonized service processes that are used by multiple departments in the company. When the implementation of cross-divisional processes can be combined with the application of innovative IT to achieve an improved customer satisfaction, super-additive value synergies can be obtained. Hence, we concluded with the following proposition: Super-additive value synergies arising from a complementary set of common IT resources and common IT management processes on one hand, and common service processes on the other, have a positive impact on the service process performance [P5].

Confronted with high complexity of the machines and inefficiency in the repair and maintenance operations, BETA developed a mobile solution that provides the service technician with master data, historical data, service catalogues, and access to the knowledge base. The technician is informed about the defect and can prepare the customer visit with the appropriate equipment. Moreover, when he reports about the customer's need, the local sales representative will be automatically informed. This solution is associated with numerous benefits such as coherent and integrated customer information, more efficient service processes, etc. that finally result in lower costs and higher customer satisfaction. After the roll out in the U.S., the mobile solution was accepted as valuable and rolled out globally.

THETA was challenged by the business customers that request a 24/7 service for the purchased capital equipment goods. Hence, the IT department developed a solution that continuously analyses the sensory data. By informing the service staff when problems occur, THETA is able to ensure an immediate replacement of the correct defect product, while providing accurate predictions on the remaining lifetime. Since the service division was able to ensure reduced downtimes of production facilities, the sales went up, while the company saved money by optimizing service processes.

![Figure 2: Case company assessment](image)

### CONTRIBUTION, LIMITATIONS, AND OUTLOOK

The objective of this paper was to analyze resource relatedness and ITG in the context of service process performance. Therefore an extensive analysis of the literature was conducted to identify relevant theoretical constructs that formed the basis for the analytical framework, which in turn was applied to the multiple case studies. The first research question (RQ.1) addressed the issue of how IT governance, resource relatedness and service performance are associated. Based on the literature analysis, we set these three constructs in context. The insights from the multiple case studies were examined using the analytic framework, which we derived from the identified theoretical constructs. This framework focused on ITG maturity, the IT relatedness and service process relatedness for each case company. The results of these analyses were discussed, to discover levers, which increase service process performance coordinated by ITG, in order to address the second research question (RQ.2). After the consolidation initiatives of IT processes and service processes that are triggered by ITG,
firms are conscious about their cross-divisional resources. When they are able to combine innovative IT with valuable service, super-additive value synergies can be achieved. Particularly, mobile solutions for service technicians and condition monitoring for installed machines that rely on a high data quality and integration show high potential.

However, the analytic framework is the result of an exploratory study with solely eight companies. The dataset needs to be enlarged in order to refine the framework for the purpose of quantitative theory testing. We do not propose that the set of mediating constructs within the relationship of ITG and service performance is yet complete. One central limitation is that we primarily talked to the IT side of the corporations. Consequently, the framework is yet to be contrasted with case studies within business departments. ITG is further concerned with both generation and preservation of value. Both objectives can lead to higher organizational performance. This research only analyzes the effects of the generation of business value. We chose to limit ourselves to multi-business corporations from Europe for our initial research, enabling us to reduce complexity considerably. The framework needs to be further expanded to include additional potential moderators, such as specificity of knowledge, industry and the size of the corporation. Finally, the transformation of competitive advantages from the service process performance level to the organization performance level calls for further investigation for a full exploitation of the potential of the research model employed. The objective is hence to deeply explain and prove the performance effects of ITG in the context of service process relatedness. Instead of the perceived performance values, a large-scale quantitative test of the suggested explanatory model may employ objective quantitative measures to complement perceived business performance values. Theory testing requires the transformation of the propositions into hypotheses. Following Tanriverdi (2006) service process relatedness and business performance can be investigated in a similar methodological setup. Expected outcomes comprise a more granular and significant explanation of the model.

REFERENCES