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Explicating Performance Impacts of IT Governance and Data Governance in Multi-Business Organisations

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Abstract

Achieving regulatory compliance, a 360 degree view on customer data, and an effective and efficient reporting are critical business requirements that can be traced back to a high quality of IT and data resources. Addressing these requirements, the regulation of decision rights and accountabilities for organisational decision-making about IT and data assets has become a key success factor for organisations. The aim of this paper is to analyse the performance impact of a combined IT and data governance concept. The study uses the resource-based perspective and integrates the theory of complementarities and the concept of relatedness. The proposed increase in business process performance is grounded in the generation of sustainable competitive advantages. The framework is developed by using nine exploratory case studies in multi-business organisations. The results suggest that IT and data governance are positively related with business process performance through the mediators of IT relatedness and data relatedness.

Keywords

IT Governance, Data Governance, IT Relatedness, Data Relatedness, Resource Based View

INTRODUCTION

Information Technology (IT) spending amounts up to 15% of corporate revenues (Gartner 2011). IT expenses have been growing steadily over the past decade. Analysts' estimates for IT spending in 2012 range from 3.7% to 6.9% increase compared to IT spending in 2011 (Gartner 2011; Shirer and Murray 2011). Hence, IT has been widely acknowledged as indispensable for the support, sustainability and development of businesses. This trend triggered a de-escalation of the discussion about the IT productivity paradox and the contribution of IT to firm performance (Dedrick et al. 2003; Melville et al. 2004; Silvius 2006). A number of well-known accounting scandals led to the passage of the Sarbanes-Oxley Act by the United States government. In addition, the IT landscape has been shaken by a number of spectacular failures of large IT investments, such as incorrectly planned or badly executed e-business projects, imperfect enterprise resource planning (ERP) systems, and newly developed IT systems that have never been employed effectively (Davenport 1998). As a result, many companies have been sharpening their focus on monitoring and assuring satisfactory returns on technology investments (Brown and Grant 2005). Organisations are collecting and storing huge amounts of data for business analytics but collecting data itself will not lead to a competitive advantage at all. In order to achieve a competitive advantage, companies need to make better predictions and smarter decisions that are grounded in the relevant dimensions (McAfee and Brynjolfsson 2012). The identification of business-relevant dimensions remains an unsolved issue in many organisations. Although financial and operational results are positively associated with data-driven decision making of a company, numerous enterprises fail in adequately managing their data which comes from different sources with differing degrees of data quality (McAfee and Brynjolfsson 2012).

Therefore, a concept of how to achieve above-industry-average returns on IT and data investments is desperately desired. The regulation of decision rights and accountabilities for an organisation's decision-making about its IT and data assets, also referred to as data governance (DG), has become a key success factor (Khatri and Brown 2010). For balancing both needs, a combination of IT governance (ITG) and DG practices is required. These activities mainly focus on the fulfilment of legislative regulations, the achievement of a 360-degree-view on the customer, and the development of a reporting system through a "single point of truth" (Khatri and Brown 2010). Only very few studies deal with the organisation of DG on a company-wide level even though the need has already been identified (Otto 2011). The concept is designed as a control framework for IT value creation and for synchronising IT decisions in order to enhance decision consistency (Weill 2004).

The relationship between IT resources, data resources, and organisational performance calls for further investigation (Melville et al. 2004; Tanriverdi 2006; Tanriverdi and Venkatraman 2005). Departing from the resource-based view (RBV) of the firm (Mata et al. 1995; Melville et al. 2004), the concept of relatedness (Campbell and Goold 1998; Davis and Thomas 1993), and the theory of complementarities (TOC) (Milgrom and Roberts 1995), a positive relationship between IT relatedness and organisational performance has been shown

(Tanriverdi 2006). We place the mediators IT relatedness and data relatedness between the governance practices and organisational performance. The novelty of the postulated research framework requires further research to revise and verify the quality of the framework, which leads to the following research questions:

(RQ.1)   What are relevant data governance elements and how are they related to IT governance?

(RQ.2)   How are IT and data governance practices associated with organisational performance?

In order to answer both research questions, this exploratory study first conducts an in-depth literature review, then forms a theoretical framework based on the theoretical background, and finally evaluates qualitative data from case studies of nine multi-business firms. The research is focused on multi-business companies because they show considerably more synergy potential than single-business companies (Tanriverdi 2006).

THEORETICAL BACKGROUND

IT and Data Governance

The heated scientific debate on ITG has concentrated on two main streams: Contingency analysis and the locus of decision-making structures (Brown and Grant 2005). Despite the practical value of the past research, most models and results remain strictly descriptive and lack rigorous depth in their theoretical foundation (Lazic et al. 2011). However, business-IT alignment (BITA)-centric models considering the relation between ITG and organisational performance present some exceptions from this trend. Most researchers find out that ITG and BITA are positively related (De Haes and Van Grembergen 2009; Luftman and Kempaiah 2007) and that this relationship positively influences organisational performance (Sabherwal and Chan 2001). ITG is only one out of six influence factors of BITA though (Luftman and Kempaiah 2007), which limits its implications (Lazic et al. 2011). Furthermore, the definition of BITA remains disputed among scholars (Chan and Reich 2007).

Whereas ITG has been quite precisely defined as a "*framework for decision rights and accountabilities to encourage desirable behaviour in the use of IT*" by Weill (2004), there is no consistent definition of DG in literature (Pierce et al. 2008). Literature scholars were inspired by this ITG definition and consider DG as a framework for decision rights and accountabilities to encourage desirable behaviour in the use of data (Khatri and Brown 2010; Weber et al. 2009). Otto (2011) identifies basic characteristics of DG based on the assumption that data is a company asset which has to be deployed usefully. DG is therefore the regulation of decision rights and decision tasks (duties) in regard to data handling. Logically, DG is defined as "*a company-wide framework for assigning decision-related rights and duties in order to be able to adequately handle data as a company asset*" (Otto 2011). DG and ITG are understood as intertwined concepts whose alignment is essential for the successful management of both data and IT assets (Begg and Caira 2012). A significant number of scholars mentions also the importance of data quality management for DG, especially with regard to establishing data quality guidelines and supervising data quality management (Khatri and Brown 2010).

IT business value (ITBV) has been one of the most intensively discussed topics in IS literature over the past 20 years. Most scholars have been analysing the value of IT, which can be described as the contribution of IT to organisational performance, from the resource-based view (RBV) of the firm (Rivard et al. 2006). The RBV assumes that a firm is a compound of resources including assets, humans, knowledge, and processes. The fundamental assumption of the RBV is that resources are heterogeneously distributed among competitors and since some resources are imperfectly mobile, this different allocation can create a source for sustainable competitive advantage (Barney 1991; Mata et al. 1995). The value created by IT is not created directly but through the mediation of complementary and strongly related resources (Mata et al. 1995; Melville et al. 2004). The improvement of business processes represents a fundamental mediating effect (Melville et al. 2004). At the same time, the growth of a company is related to the correct identification and employment of suitable resources (Penrose 1959; Rivard et al. 2006). Selecting, coordinating and managing resources such as IT (Mata et al. 1995) and data (Barney 1991) refer to governance practices.

Resource Relatedness and Performance Effects

The economic rationale for multi-business firms is grounded in the RBV which argues that strategic interrelations (synergies) between business units (BUs) have a positive effect on the organisational performance (Peteraf 1993; Robins and Wiersema 1995). Multi-business firms can exploit more synergy potential than single-business firms (Tanriverdi 2006) as they can exploit both economies of scale and economies of scope (Teece 1982). Synergies are defined in strategy and economic literature as either sub-additive cost synergies (Teece 1982) or super-additive value synergies (Davis and Thomas 1993). Strategic management scholars claim that proven synergies between different BUs increase the value of a multi-business firm (Goold and Luchs 1993). Known as the most prevalent source of synergy in multi-business firms (Tanriverdi and Venkatraman 2005), resource relatedness incorporates the presence of shared resources and related activities across BUs (Davis and Thomas 1993). Based on the RBV perspective, scholars argue that the organisational performance can be

enhanced by sharing of strategic resources across BUs as cross-business resource-based synergies are generated (Markides and Williamson 1994; Robins and Wiersema 1995). Unfortunately, the concept of resource relatedness is not designed to include the super-additive value dimension of resource combinations (Tanriverdi and Venkatraman 2005). In order to account for the shortcoming of the concept, we apply the TOC (Milgrom and Roberts 1995). Including the TOC, we assume that sub-additive costs that origin from relatedness are imitable by competitors and hence can only guarantee a temporary competitive advantage. In contrast, super-additive values from a complementary set of resources with high relatedness are imperfectly mobile and thus difficult to imitate; as a result, they are a potential source of a sustainable competitive advantage. IT relatedness is a source of cross-unit IT synergy and has a direct impact on organisational performance but also facilitates the realisation of cross-unit business synergies. This leads to the conclusion that IT relatedness has indirect effects on organisational performance through the mediation of cross-unit capabilities (Tanriverdi 2006). The construct of IT relatedness consists of a narrow set of IT resources necessary for conceptualization that are linked to the relatedness concept and that can be traced back to the ITBV literature (Wade and Hulland 2004): joint IT infrastructure (shared tangible resources), joint IT strategy (coordinated strategies), joint IT vendor management (pooled negotiating power), and joint IT human resources (shared know-how). Academic scholars investigating the relationship between IT relatedness and organisational performance revealed that the relatedness of singular IT resources leads to sub-additive costs only whereas the relatedness of complementary IT resources additionally generates super-additive value and hence increases organisational performance (Tanriverdi 2006).

The interconnection between IT and data resources seems obvious. Data refer to the product of IT resources (Raghunathan 1999) but are treated separately in extant RBV analyses (Khatri and Brown 2010). In line with this reasoning, we positioned each construct separately while considering the complementary effects in the resource relatedness construct. In concord with the development of business process relatedness (Lazic et al. 2011), we can extend the definition of resource relatedness to data relatedness as *the extent to which a multi-business firm uses common data management practices across its BUs*. We state that data relatedness is a source of cross-unit synergies. We used the procedure approach of Tanriverdi (2006) as a guideline to derive data relatedness from extant literature on data management and to connect them to the relatedness concept. Coordinated strategies refer to a major source of synergies. Strategies are the result of *decision-making processes* (Eisenhardt 1999) which are supported by processing relevant data (Raghunathan 1999). Scholarly literature outlines the positive influence of data quality on the decision quality (Bansal et al. 1993; Fisher et al. 2003). *Data management* enables the vertical integration (Campbell and Goold 1998) with suppliers and customers. Synergy potential is created in terms of different system applications, e.g. in enterprise asset management systems (Lin et al. 2006). However, all applications are strongly dependent on high quality master data for software support (Haug et al. 2009). Shared tangible resources correspond to data defined as resource (Goodhue et al. 1992). The *data architecture capability* represents a means to make resource transferrable and usable by providing a "*framework of standards and guidelines within which all new systems and revisions to old systems would be designed, gradually moving the firm toward a set of integrated applications and databases*" (Goodhue et al. 1992). The capability is investigated in various studies, e.g. in data warehousing context (Wixom and Watson 2001). Value generation in multi-business firms heavily builds on shared know-how (Campbell and Goold 1998; Tanriverdi 2006). *Data analytics capabilities* serve as one of the major levers to develop know-how. Consequently, usability requirements have to be fulfilled in the data design to enable an integrated data analysis with improved user behaviour. Wang & Strong (1996) explain this phenomenon as "*fit for use*" and derive four data quality requirement blocks building on prior research conducted by Ballou & Pazer (1985). More recent studies examine the special effect of *data consumer* influence in service firms (Chang et al. 2011) and the influence of data and information sharing (Mithas et al. 2011).

RESEARCH APPROACH

In order to provide additional value for both scientists and practitioners, we selected a qualitative research design in accordance with the theoretical lens of the RBV and built on theoretical constructs. According to the stringent literature review in the field of ITG, the best-suited model to guide the research process is the model of processes, structures, and relational mechanisms (De Haes and Van Grembergen 2009). Since "*DG decisions should be tightly integrated with those in IT governance*" (Khatri and Brown 2010), we selected the relevant DG practices and constituted a comprehensive ITG and DG concept. We firstly conducted a structured literature review (vom Brocke et al. 2009) using a two stage keyword filter (Stage 1: "data governance" OR "information technology governance"; stage 2: "information systems" OR "information technology"). By evaluating the results of five relevant databases (EBSCOhost, Proquest (ABI/INFORM), Emerald, Science Direct, and Web of Science) through two iterative circles and a forward-backward search cycle 18 scholarly articles of interest were selected. The articles were subsequently coded with DG practices. The DG practices which are addressed in at least two articles were finally selected. The seven DG practices were classified as processes, structures and relational mechanisms (Peterson 2004; Peterson et al. 2000) and afterwards assessed in the multiple case study approach.
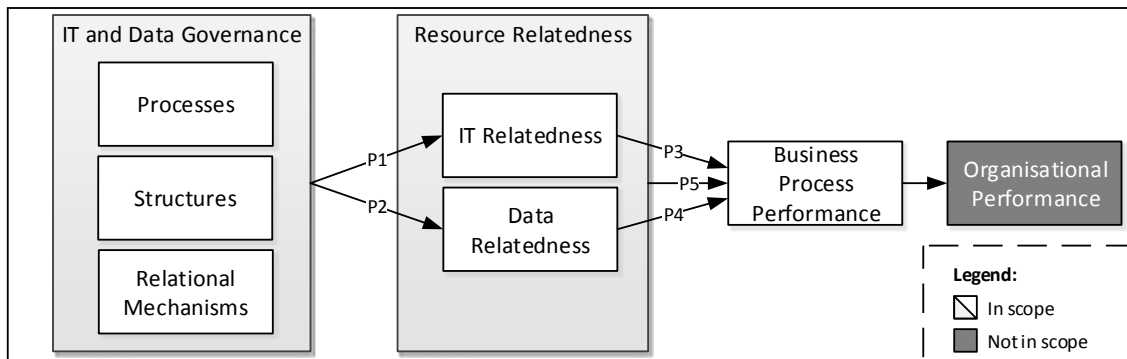
Figure 1: Research model

As depicted in Figure 1, we assume a positive association between ITG und IT relatedness since the harmonisation and consolidation of the IT landscape and IT management procedures is described only as a matter of time (Lazic et al. 2011). Further, ITG facilitates *the coordination and exploitation of cross-unit IT synergies*, i.e. IT relatedness (Tanriverdi 2006). In accordance with the RBV and other researcher streams, we are convinced that data assets are corporate resources (Barney 1991). Due to the often observed and strong interrelationships between IT and data (Khatri and Brown 2010; Raghunathan 1999), we position data relatedness as a second mediating construct affected by ITG and DG. Super-additive value can be created only through a complementary set of related resources, because competitive advantage generated by single IT-dimensions is imitable and thus not sustainable (Barua and Whinston 1998). Since ITBV scholars conclude with the positive association between IT and business process performance (Melville et al. 2004), we adopt that construct to conceptualise the performance effects of IT and data resources. Following the extant literature, harmonising business processes is attended by improved organisational performance (Ramakumar and Cooper 2004; Wüllenweber et al. 2008). To sum up, we employed well-established constructs (see Table 1).

Table 1. Research model constructs

Construct (Literature source)	Definition
ITG-DG processes (Peterson 2004; Peterson et al. 2000)	*Formalization and institutionalisation of strategic IT and data decision-making or IT and data monitoring procedures.*
ITG-DG structures (Peterson 2004; Peterson et al. 2000)	*Structural (formal) devices and mechanisms for connecting and enabling horizontal contacts, or liaison, between business and IT & data management (decision-making) functions.*
ITG-DG relational mechanisms (Peterson 2004; Peterson et al. 2000)	*Active participation of and collaborative relationship among corporate executives, IT management, data management, and business management.*
Resource relatedness (Davis and Thomas 1993)	*The use of common resources (i.e., common factors of production) across business units.*
IT relatedness (Davis and Thomas 1993; Tanriverdi 2006)	*Usage of common IT resources and management processes across business units.*
Data relatedness (Campbell and Goold 1998; Davis and Thomas 1993; Lazic et al. 2011)	*Usage of common data resources and management across business units.*
Business process performance (Melville et al. 2004)	*Operational efficiency of specific business processes, measures of which include customer service, flexibility, information sharing, and inventory management.*
Organisational performance (Melville et al. 2004; Sabherwal and Chan 2001)	*Overall firm performance, including productivity, efficiency, profitability, market value, competitive advantage, etc.*

A qualitative research design based on a multiple case study approach was chosen in order to investigate the relatedness between DG practices and ITG (RQ.1) and DG practices and organisational performance (RQ.2) (Eisenhardt 1989). Case study research has broadly been applied within the field of IS research (Benbasat et al. 1987; Yin 2009). The research method appeared to be suitable for our investigation as well, since it lead to a better understanding of the complex phenomena and enhanced validity at the same time (Eisenhardt 1989). For the case selection, we assumed that companies with a diversified multi-business structure have significantly more potential for economies of scope and hence relatedness (Tanriverdi 2006). As unit of analysis we chose an organisation that implements governance practices (ITG and DG) and selected nine diversified corporations which all had considerable potential for economies of scope (Tanriverdi 2006). Data was collected by expert interviews which lasted between 50 and 120 minutes and were hold by two researchers between March 2012 and

October 2012. The interview partners held different ranks in their companies representing senior executives (CIO, Head of ITG), line managers (BU executives), and data analysts (Head if BI in sales, service or production BUs). Participating companies were active in different sectors, including manufacturing, financial services, utilities, and consumer services with revenues above two billion Euros. The data collection was supported by established ITG theoretical constructs (inter alia those in (De Haes and Van Grembergen 2009; Tanriverdi 2006)) and included an open component for aspects which were not addressed in the questions. Once the interviews were conducted, the interview-based data were enriched by further analysing corporate reports and afterwards discussed and approved by the industry partner. The data analysis was structured as iterative process following Miles and Huberman (1994). The interview data and company documentation were coded by different researchers focusing on ITG and DG, resource relatedness, and business process performance independently and afterwards mapping the dimensions in a qualitative assessment in order to answer RQ.1. In a second iteration, key levers were deduced from the discussions of the results (RQ.2) in a focus group workshop.

CASE STUDY RESULTS

IT and Data Governance

De Haes & Van Grembergen (2009) suggested a minimum baseline for ITG which we integrated for the purpose of comparison (represented in the legend of Table 2). As the RBV assumes that resources are deployed to their fullest extent, we evaluated ITG practices if they were implemented or not. The combination of all implemented processes, structures, and relational mechanisms into a single score enabled us to derive three maturity levels by comparing the scores across individual firms (see Table 2). A LOW ITG level means that companies are implementing their first relational mechanisms and structures whereas MEDIUM ITG level describes firms that show well-established structures and relational mechanisms but have room for process improvement. Finally, a HIGH ITG level is assigned to companies with mature processes that have gained real authority over the IT. For each firm we counted the processes, structures, and relational mechanisms and thereby derived the respective maturity level. In order to investigate the association between governance and consolidation initiatives, we confronted ITG and DG maturity with IT relatedness and data relatedness in a qualitative assessment (Figure 2).

Similar to ITG, which is concerned with the encouragement of desirable behaviour in the use of IT (Weill 2004), DG addresses the optimal usage of data resources closely linked with IT-related decisions and ITG activities (Khatri and Brown 2010; Begg and Caira, 2012). Since IT and data assets represent essential and closely-related resources, management takes advantage of available information and control structures to achieve the maximum output of both resources. A mature ITG and DG concept fosters information aggregation and data-driven decision-making. Accordingly, we propose: *The higher the maturity of ITG and DG processes, structures, and relational mechanisms the higher the IT relatedness [P1]*. BETA's application portfolio management follows a two vendor approach across business units. While SAP applications are used as back end transaction systems, front end software mainly is comprised of Microsoft products instead. EPSILON is undergoing a large ERP consolidation project to reduce the instance by using multi-tenancy. To balance the data needs of local BUs with the efficiency focus of the holding, a data steering committee has been enacted. The definition of standard attributes of the material master data is reported as first success towards a higher level of IT relatedness. DELTA, classified as low maturity, has recently introduced a budget control and reporting process. Being a strongly diversified enterprise, IT resources are coordinated and organised by a shared service centre. For the reporting, however, the data collection is mostly done manually, since the data quality and data properties are different - an example of a low level of IT relatedness. The CIO of DELTA explains that "*an efficient implementation of this reporting process requires a standardisation of data management processes*".

Grounded in the RBV, data resources are arrangements of corporate assets. In order to realise critical business requirements, such as a 360 degree view on customers, management drives data-related harmonisation efforts throughout the BUs. ITG and DG practices do not only affect IT management procedures and IT landscape, but also result in an increased harmonisation of data management procedures and data quality principles. On the lines of IT relatedness, we position the construct data relatedness as the second instance of resource element (Davis and Thomas 1993; Tanriverdi and Venkatraman 2005) and claim a positive association between *the maturity of ITG and DG and data relatedness [P2]*. The CIO of LOTA reports on serious data issues that resulted in the wrong pricing for products: "*LOTA encountered an issue with the pricing group assignment to customers. That defect led to over hundred inaccurate invoices and caused costs of 3% of the EBIT! Incorrect figures were printed in the quarterly reports, while customer complaints overstretched the call centre capacity.*" The cleanup work took two months and finally makes the management constitute a data steering committee. BETA, classified as high maturity, harmonised its customer data across business units by launching a comprehensive customer data consolidation initiative. This initiative was triggered when BETA found out that its global-operating customer was redundantly managed in different CRM systems and hence a consistent view on the customer was very hard to obtain.

Table 2. IT and Data Governance assessment and maturity level

	Structures, Processes, Relational mechanisms																		Maturity Level	Legend
	IT governance										Data governance									
	S1	S2	S3	S4	S5	P1	P2	P3	P4	R1	S1	S2	S3	P1	P2	P3	R1		
Alpha	✓		✓	✓			✓	✓				✓	✓	✓				Medium	
Beta	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	High	
Gamma	✓	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓		High	
Delta		✓				✓		✓									✓	Low	
Epsilon	✓			✓		✓				✓		✓		✓				Medium	
Zeta			✓			✓						✓			✓			Low	
Eta	✓	✓		✓			✓			✓	✓	✓				✓	✓	Medium	
Theta	✓	✓		✓	✓		✓			✓	✓	✓		✓			✓	High	
Lota	✓	✓			✓		✓			✓	✓						✓	Medium	

Legend

IT Governance
- **S1** IT steering committee
- **S2** CIO on executive committee
- **S3** IT strategy committee on board level
- **S4** IT project steering committee
- **S5** CIO reporting to CEO or COO
- **P1** Portfolio management
- **P2** IT budget control and reporting
- **P3** Strategic information systems planning
- **P4** Project management methodologies
- **R1** IT leadership

Data governance
- **S1** Data steward
- **S2** Data steering committee
- **S3** Data architect
- **P1** Data quality management
- **P2** Data life-cycle management
- **P3** Training / documentation
- **R1** Coop. data scientist / business expert

Resource Relatedness Analysis and Business Process Performance

Performance analyses of IT resources conclude with mediating effects of complementary and strongly related resources (Mata et al. 1995; Melville et al. 2004). The improvement of business processes performance (Melville et al. 2004; Wüllenweber et al. 2008) can be confirmed by our data set. In accordance with Tanriverdi (2006), we propose 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 business process performance of a multi-business firm [P3]*.

While IT resources refer to the technological assets that foster automation of well-defined tasks, data resources are concerned with the factual documentation (Khatri and Brown 2010). After achieving a medium level of IT relatedness, it becomes transparent that plenty of data processes are governed sub-optimal. As part of an IT efficiency program, the IT steering committee in THETA enacted the database consolidation and discovers valuable information for the sales unit: *"We did a large database consolidation project to optimise ETL load in the reporting process. Doing so, we realised what valuable customer data were buried in the legacy systems."* Hence we come to the following proposition: *Super-additive value synergies arising from a complementary set of common data resources and data management processes have a positive impact on the business process performance of a multi-business firm [P4]*.

BETA is characterised as a typical engineering company that relies heavily on its innovation and customer service capability. A continuous product improvement process presents a well-recognised means in achieving both value synergies. The head of the service division points out the value of service operations data for product re-engineering activities of the R&D department: *"Digital failure protocols and sensor data are aggregated and consolidated. In the data cleansing process we prepare the information for defect analytics. The compiled information can contribute to the development of new products and services."* When the implementation of cross-business processes is combined with the smart usage of IT resources (transaction processing of business processes) and data resources (documentation of facts) to achieve improved customer satisfaction, super-additive value synergies can be realised. Hence, we propose that: *Super-additive value synergies arising from a complementary set of common IT resources and common IT management processes on the one hand, and common data resources and data management processes on the other, have a positive impact on business process performance* [P5]. Confronted with changing legislative regulations and uncoordinated rules in different markets, ZETA had to separate two BUs organisationally and treat them like competing organisations. The regulation further pertained to the corresponding enterprise systems and corporate data. The head of ITG points out that "*the licence to operate in three markets was heavily dependent from the capability to separate the business units and the IT systems. To conform to these requirements, we had to project new enterprise systems and databases within a pretty short period of time. Data quality and data integration requirements have also changed.*" Thereby ZETA serves as a negative example contrary to P5.

Due to the high complexity of the equipment and inefficiency issues in service operations, ETA launched a project with the objective to develop a mobile client for the service unit in the U.S. The CIO outlines the use case in which "*the service technician performs maintenance, repair or overhaul operations at customer facilities.*"

After concluding that existing CRM solutions (including back end data and their front end replications) do not provide the required technical depth of the material data, the project steering committee makes the decision for a proprietary solution instead. As explained by the CIO, the solution comprises IT resources and data management processes. *"For the back end data provisioning, we enrich the bill of material from ERP [for production planning] with the customer master data from the CRM to provide our technicians with detailed technical specifications when they are on tour."* The developed solution settles the information needs (e.g. coherent view on customer equipment) of the technician that finally lead efficiency increases and higher customer satisfaction.

After providing first proof and practical examples for each proposition, we merged the investigated constructs IT relatedness, data relatedness and governance over IT and data resources in a qualitative assessment for cross-case analysis (see Figure 2). More recent findings on the consolidation and harmonisation efforts in IT and business processes can be confirmed (Lazic et al. 2011) and extended in terms of the data resource. DELTA's Head of ITG suggests *"a unified terminology, corporate guidelines and frameworks, cost and standard definitions"* as the very basic incentive for governance initiatives, since only those instruments *"put us into the position to govern the group with the aim of achieving synergies."* In fact, we were able to derive three phases for a combined ITG and DG concept. The implementation of a basic set of ITG and DG practices (structures and processes) constitute the first phase that aims at the consolidation of IT and data assets. DELTA recently employed an ITG steering committee and IT budget control process. IT infrastructure consolidation and the definition of IT costs determine the agenda in the steering committee (LOW IT relatedness). When data issues escalate e.g. in financial reporting, they are managed in projects. However, a structural and holistic approach to govern data resources is not given. Once a basic governance body is established, case companies in the second phase strive for the harmonisation of IT processes in the entire organisation, a standardised IT service portfolio, and the consolidation of the application landscape (activities for HIGH IT relatedness). Data quality plays a central role to bring efficiency into central business processes such as customer service. In order to coordinate marketing and sales activities for global acting business customers, ALPHA's customer master data are stored centrally as one version of the truth. In the third phase, innovative business processes are realised that are based on the smart usage of IT and data resources. The enterprise wide harmonisation and consolidation of IT resources (HIGH IT relatedness) fosters the synergy potential that can be achieved by the implementation of common data resources. ETA uses data on sold equipment for providing a 360 degree view on the business customer's installed equipment. By analysing the usage behaviour and condition of all sold equipment, this view allows not only a single version of the truth for one particular customer, but also outlines up-selling opportunities. Top-performing firms were able to implement an end-to-end optimisation of a valuable business process across different BUs and thereby achieving cross-unit value synergies. The prudent increase in interaction and knowledge sharing between IT, data scientists and business fosters the harmonisation of data and IT supported processes.
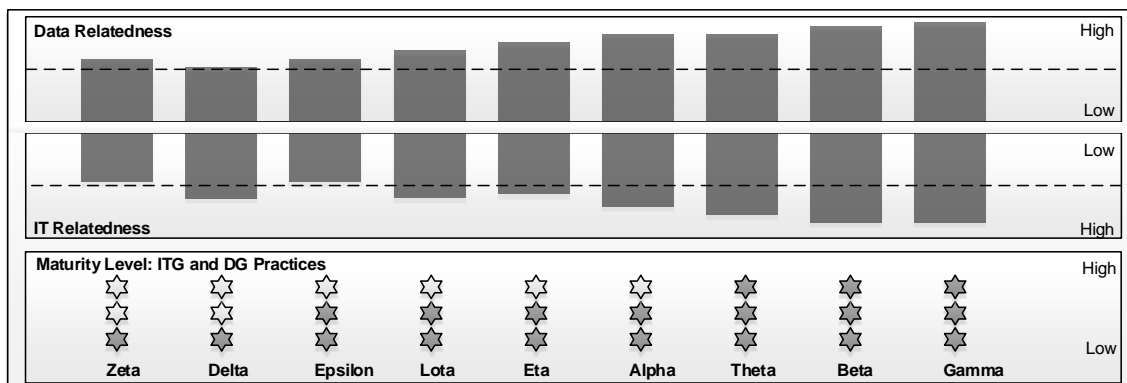

Figure 2: Qualitative Assessment

CONTRIBUTION, LIMITATIONS, AND OUTLOOK

The aim of this paper was to analyse resource relatedness and ITG and DG in the context of business process performance. The concept of resource relatedness was specified as IT relatedness and data relatedness. Relevant theoretical constructs (see Table 1) were identified in a structured literature review. In order to answer the first research question (RQ.1) on *"relevant data governance elements and the relationship to IT governance"*, the authors analysed the concepts of ITG, resource relatedness, and business process performance independently and conducted a structured literature review to identify the mostly cited DG elements. The interrelation between ITG and DG was verified in a multiple case study with nine multi-business firms. For the second research question (RQ.2) on how ITG and DG practices are associated with organisational performance, five propositions were derived from these theoretical constructs and transformed in an analytical framework for the multiple case study. The application of the relevant ITG and DG dimensions to the case study companies enabled us to derive three

maturity levels for ITG and DG. The maturity levels were then mapped to the levels of data and IT relatedness and qualitatively assessed in a cross-case analysis. Companies with higher ITG and DG maturity levels proved to have higher levels of data relatedness and IT relatedness. The results of the multiple case study approach support the five propositions implying that a well-developed ITG and DG positively influences IT relatedness and data relatedness which in turn have a positive impact on business process performance.

The study comes also with limitations; the qualitative research design with nine case study companies allows for inductive theory building but lacks the necessary sample size for quantitative theory testing. An enlarged company sample could help to verify the stated propositions quantitatively in the future. The proposed set of mediating constructs in our research model may not be complete and may be subject to scientific extensions. The interview partners work predominantly in the IT departments of the participating companies. The inclusion of business department representatives could further enrich the analysis. Further, an extension of the sample to non-European companies and single-business firms could support the understanding of resource relatedness in a broader variety of companies. The research project focuses on business value generation of IT although ITG gives attention to business value preservation too. Cultural dimensions have been excluded from the study to reduce the degree of complexity. Nevertheless, cultural dimensions and additional potential moderators, such as specificity of knowledge, top-management characteristics (as evaluated by Li and Tan (2013), industry and the size of the corporation could improve the generalisability of the findings. The integration of the knowledge-based view would provide an expedient extension of the research as it would distinguish between resources and knowledge (Teoh and Pan 2009). Finally, the transformation of competitive advantages from the business process performance level to the organisational performance level requires further research to evaluate the organisational performance impact of data relatedness and IT relatedness.

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