THE IMPACT OF BUSINESS PROCESS IT AMBIDEXTERITY ON BUSINESS PROCESS PERFORMANCE

Research in Progress

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Abstract

In todays digitized and globalized economy, many industries simultaneously face increasing competitive pressures and unprecedented speed of change in business conditions. As IT budgets are limited, process owners and IT departments need to decide how to divide their spending on efficiency-enhancing and flexibility-enhancing IT capabilities to optimally support the execution of business processes. Turning from thinking of efficiency and flexibility as trade-off towards ambidexterity puts focus on simultaneously pursuing efficiency through exploitative and flexibility through explorative business process IT (BPIT) capabilities. While these capabilities have been analysed independently, there is scarce research on the combined effects. This gap is addressed by investigating the impact of combining exploitative and explorative BPIT capabilities on business process performance. This is done through a quantitative study in the German utilities sector, which serves as one instance of highly competitive and dynamic industries. Distinct combination strategies are identified and a variance-theoretical model is developed, explaining their impact on business process performance. We intend to contribute to the area of business process management (BPM) by showing the importance of balancing efficiency and flexibility for a business process. Furthermore we add to research on ambidexterity in IS by expanding existing work through focussing on the process level.

Keywords: Business Process IT Ambidexterity, Ambidexterity, Business Process Management, Business Process Performance, Survey.

1 Introduction

In times of ever-increasing competition and a highly dynamic economic environment, companies need to achieve both efficiency and flexibility to maintain competitiveness (Teece et al. 1997). The information technology (IT) capability, i.e. the provisioning of information technology (IT) to support business processes has become increasingly important and is acknowledged to contribute to efficiency and flexibility (Chen et al. 2013; Lee et al. 2008; Lu and Ramamurthy 2011; Sambamurthy et al. 2003). However significant trade-offs have been faced while pursuing these two objectives (Kumar and Stylianou 2013; MacKinnon et al. 2008; Newell et al. 2003).

The German utilities sector faces significant challenges in trading-off between efficiency and flexibility. Before market liberalization in 1998 there hasn't been any competition. However since then the number of market participants increased and the amount of customers that switched their energy supplier has increased to more than 30 percent (Bundesnetzagentur and Bundeskartellamt 2013). Furthermore, increasing regulation and the shift from centralized carbon-based to decentralized energy generation based on renewable energies put high demands on the flexibility to adapt business processes and IT systems (Kopetzki and Wassermann 2014). For instance, regulation requires changes to data formats for intercompany data interchange twice a year. To implement these changes within their IT systems, utility

companies have less than one month (EDNA Bundesverband Energiemarkt & Kommunikation 2011). Business process automation rates of less than 80 percent in many cases is the result (Franz Hein 2008).

Business processes have been found central to the value-generation process for converting IT investments into firm performance (Melville et al. 2004). As IT budgets are limited, the question is how much to invest into exploitative capabilities, i.e. leveraging existing IT capabilities to support business processes and explorative capabilities, which focus on gaining access to new and innovative IT capabilities to support business processes. In such situations trade-off thinking is prevalent (Chen et al. 2013). Recently a shift from such trade-off thinking towards paradoxical thinking could be observed in management research (Gibson and Birkinshaw 2004). Simultaneously striving for short term efficiency through exploitation of available resources and for long term flexibility through exploration of new resources, has been conceptualized as organizational ambidexterity (Gibson and Birkinshaw 2004; He and Wong 2004).

Bringing the ambidexterity concept to the business process context, business process ambidexterity is considered as dynamic equilibrium of business process efficiency and flexibility and proposed to have an impact on business process performance (Xie et al. 2011). Similarly the ambidexterity concept is adapted to the business process IT (BPIT) context, i.e. addressing the trade-off between exploitative and explorative BPIT capabilities. While these capabilities have been extensively studied independently (Gebauer and Schober 2006; Joachim et al. 2013; Lee et al. 2008; Wagner et al. 2011), the question remains open how different combination strategies for explorative and exploitative BPIT capabilities impact business process performance. As exploration has been found to be more valuable in more dynamic industries (Jansen et al. 2006; Tang and Rai 2014) a further question is whether different combination strategies have the same impact depending on uncertainty characteristics of this business process.

What is the impact of different combination strategies for explorative and exploitative BPIT capabilities on business process performance and how is this impact moderated by process uncertainty and firm size?

Taking a positivist epistemological stance this research question is addressed through a quantitative study following the survey method. Before an overview of the planned study is provided in section three, theory development and a presentation of the research model can be found in section two. This paper closes with section 4, summarizing the intended contribution of the overall study as well as limitations and opportunities for future research.

2 Theory Development and Research Model

2.1 IT Capabilities for Business Processes

A common finding in literature is the importance of business processes as mediator for the impact of IT on organizational performance (Gattiker and Goodhue 2005; Melville et al. 2004; Ray et al. 2005; Schryen 2013). Organizations can be viewed as a set of interlinked business processes, which significantly influences organizational strategy and performance (Benner and Tushman 2003). ***Business processes*** are the vehicle through which IT business value is generated from organizational and technological IT resources (Melville et al. 2004) and can be defined as *"the specific ordering of work activities across time and space with a beginning, an end and clearly identified inputs and outputs"* (Davenport 1998). Business processes are implemented using IT resources, such as functional systems, enterprise systems or BPM platforms. Consequently business process performance plays an important role in the conversion process of IT investments into business value (Melville et al. 2004; Shang and Seddon 2002).

Business process performance can be characterized along the dimensions of cost, time and quality (Jones and Linderman 2014; Karimi et al. 2007): The cost dimension reflects the traditional efficiency- or productivity-oriented perspective on performance (Gebauer and Schober 2006); the value of being able

to respond fast and flexibly is addressed through the time dimension; and the quality dimension covers customer-orientation and the possibility to differentiate through business processes (Ray et al. 2005). Performance can be seen as an absolute or a relative measure. Relative measures are used to compare performance before and after an intervention, e.g. implementation of an ERP (Karimi et al. 2007) or to compare performance between companies. Drawing on the conceptualization as relative measure, for this study ***business process performance*** is defined as *achievement of the objectives for a business process in relation to its external environment*.

The concept of exploitation is associated with mechanistic structures, tightly coupled systems as well as routinisation and control (Gibson and Birkinshaw 2004; He and Wong 2004). Consequently the goal of ***exploitative BPIT capabilities*** *is to leverage the usage of existing IT resources to support a business process*. The focus here is to get the highest yield out of the existing IT resources to support business processes. This can be done through automation (Shang and Seddon 2002), which can be increased by implementing so far manually performed tasks using IT. Furthermore tight coupling between IT resources is created through various integration mechanisms allowing automation not only of tasks but for complete business processes (Bahli and Ji 2007).

In times of highly dynamic business environments IT flexibility is important to quickly adapt business processes to changing customer demands and implement innovative technologies (Afflerbach et al. 2013; Chen et al. 2013; Gebauer and Schober 2006; Kumar and Stylianou 2013; Lu and Ramamurthy 2011; Wagner et al. 2011). We define this activity of *identifying and implementing and the usage of innovative and new IT resources to support a business process as* ***explorative BPIT capabilities***. To easily integrate new resources into existing IT infrastructures, integration mechanisms, such as service-oriented architectures need to be in-place (Joachim et al. 2013; Schelp and Aier 2009). Such mechanisms also allow for mixing of matching of task implementations to quickly adapt to changing requirements (Schilling 2000), for instance complementing the core ERP system with individual spreadsheet solutions (Alter 2014).

Individual effects of exploitative and explorative BPIT capabilities have been analysed independently (Afflerbach et al. 2013; Chen et al. 2013; Gebauer and Schober 2006; Lee et al. 2008; Lu and Ramamurthy 2011). However it remains an open question how different combination strategies impact business process performance (Figure 1).

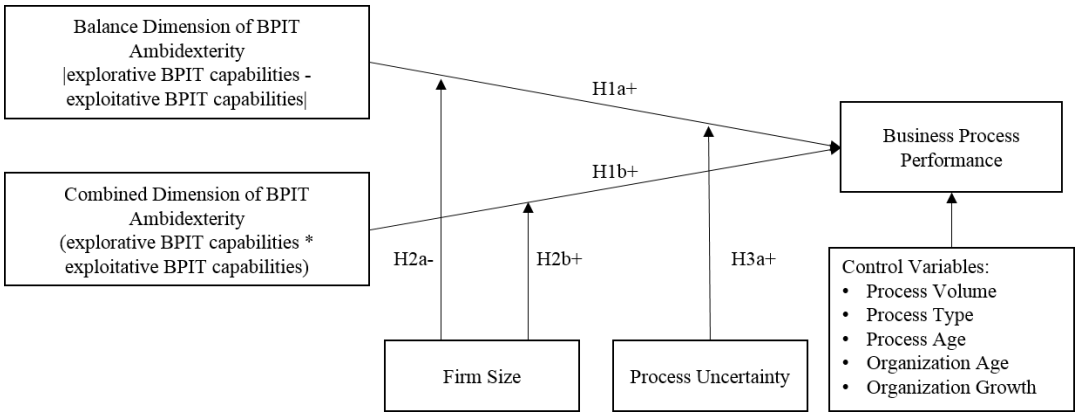

Figure 1. Business process performance impacts of balancing and combining BPIT capabilities.

2.2 Combination Strategies for Exploitative and Explorative BPIT Capabilities: Balance vs Complementarity

Enterprises constantly face trade-offs, for instance between investments into current and future projects, differentiation versus low-cost production in manufacturing processes, incremental against radical

change in innovation management or exploitation and exploration in organizational learning (Duncan 1976; Gibson and Birkinshaw 2004; He and Wong 2004). An extensive body of research in management and organization science focusses on the *management of trade-offs with conflicting objectives* under the umbrella term ***ambidexterity*** (Lee et al. 2008). Simultaneously striving for short term efficiency through exploitation of available resources and for long term flexibility through exploration of new resources, has been conceptualized as organizational ambidexterity (Gibson and Birkinshaw 2004; He and Wong 2004).

In the IS context, ambidexterity has been conceptualized as one dimension of IS capabilities and found to influence process innovation (Tarafdar and Gordon 2007). Furthermore, positive impacts of both the exploitative and explorative IT capability on organizational agility were found (Lee et al. 2008). Further research aimed at analysing antecedents for an ambidextrous IT capability, showing importance of alignment between business processes and IT as well as the effect of IT as enabler of modular business processes (Ling et al. 2009). On a business process level, organizational ambidexterity has been found to be rooted in pursuing both explorative variation-decreasing and exploitative, i.e. efficiency-oriented, business process management practices (Benner and Tushman 2003).

Combining exploitative and explorative capabilities has been found to positively impact organizational performance (He and Wong 2004). On this basis, strategies for combining exploitative and explorative capabilities for organizational innovation have been conceptualized and their impact on organizational performance has been analysed (Cao et al. 2009). Furthermore research from the area of supply chain management found evidence for a positive association between these combination strategies on a business process level and competitive performance (Tang and Rai 2014).

We build on different combination strategies of ambidexterity that have been found in previous studies on the organizational-level (Cao et al. 2009; He and Wong 2004). Table 1 illustrates this distinction with four examples. The question is which combination strategy of explorative and exploitative BPIT capabilities shows the best performance for the given business process.

	Explorative BPIT Capabilities Score	**Exploitative BPIT Capabilities Score**	**Balance Dimension**	**Complementarity Dimension**
Process A	5	5	High	Low
Process B	15	5	Low	High
Process C	5	15	Low	High
Process D	15	15	High	High

Table 1. Illustration of different combination strategies for explorative and exploitative BPIT capabilities. Suggested outcomes ignore potential moderator effects.

The first strategy focuses on the balance between explorative and exploitative BPIT capabilities (Cao et al. 2009). This ***balance dimension of BPIT ambidexterity*** is defined as *the fit between the magnitude of exploitative and the magnitude of explorative BPIT capabilities*. The underlying logic of pursuing a balance strategy is to mitigate risks in IT management for business processes (Tang and Rai 2014).

Companies that overemphasize exploitative BPIT capabilities, i.e. investing heavily in task automation and data integration face the risk of being tied too strong to current business process implementations in the future. High levels of exploitative BPIT capabilities indicate that business processes are largely supported by IT, both in terms of task automation as well as in terms of data integration for business process automation. This allows companies to implement highly-performant business processes (Bahli and Ji 2007). However, not adequately investing in explorative BPIT capabilities bears the risk of becoming too inflexible in case of environmental change (Gebauer and Schober 2006; Kumar and Stylianou 2013). In such cases companies fail to adapt their highly performant business processes to changed market requirements, thus making these business processes obsolete and risking future profitability and

sustainability (Tang and Rai 2014). Efficiency-oriented exploitative BPIT capabilities are proposed as a requirement to capitalize on business processes with high levels of explorative capabilities in place (Tang and Rai 2014).

Contrary, higher levels of explorative BPIT capabilities indicate a focus on identifying and adopting new and innovative IT resources that have the potential to support business processes in the future. Explorative BPIT capabilities can be viewed as digital options, which are particularly important in dynamic environments (Sambamurthy et al. 2003). To continuously adopt new IT resources and integrate them with the company's IT infrastructure requires a modular architecture (Ling et al. 2009). This can be implemented using service-oriented architectures (Joachim et al. 2013) or platform-approaches (Tiwana et al. 2010). The ability to constantly integrate latest value-adding IT components provides the potential to constantly innovate business processes (Afflerbach et al. 2013; Gebauer and Schober 2006). Despite these benefits, companies emphasizing explorative BPIT capabilities, often fail to operate their business processes economically. As they are constantly adapting their business processes, there is neither time for process harmonization nor optimization (Joachim et al. 2013; Muenstermann et al. 2009).

Thus, aiming at a balance between exploitative and explorative BPIT capabilities, allows companies to mitigate individual risks of these strategies. Therefore, we hypothesize that balanced explorative and exploitative BPIT capabilities are positively related to business process performance:

H1a: The extent of balance between explorative and exploitative BPIT capabilities is positively related to business process performance.

The second strategy, the ***complementarity dimension of BPIT ambidexterity***, is defined *as the absolute magnitude of exploitative and explorative BPIT capabilities*. This strategy is built on the concept of complementarity between resources and capabilities (Cao et al. 2009; Tang and Rai 2014). The assumption is that exploitative and explorative BPIT capabilities compete for different resources. For explorative activities required skills comprise a broad and creative understanding of the business and the market as well as an overview of recent technological innovations. Conversely, the know-how that is required for exploitative activities includes deeper, more technical knowledge about the implemented systems and business process specifics to optimize and improve business processes using already deployed resources.

Synergistic effects can be identified between explorative and exploitative BPIT capabilities. Having strong explorative BPIT capabilities, e.g. in form of a highly flexible application platform that allows to integrate new technological components and to adapt business process implementation in fast ways, enables implementation of exploitative BPIT capabilities, such as automation or integration mechanisms with much less effort (Joachim et al. 2013).

In a similar way high levels of exploitative BPIT capabilities typically imply a high level of documentation of interfaces, data types and others, that is required for automating tasks, control flows and data flows (Markus and Tanis 2000). This allows pursuing explorative BPIT capabilities with less effort. We therefore hypothesize that the combined dimension of BPIT ambidexterity is positively related to business process performance:

H1b: The extent of complementarity between explorative and exploitative BPIT capabilities is positively related to business process performance.

2.3 Moderating Impacts on Business Process Performance

The organizational context, which is formed by organizational characteristics as well as IT and business process characteristics, plays an important role for realizing benefits from IT (Markus and Tanis 2000; Melville et al. 2004). Various contextual factors have been found to influence the impact of ambidex-

terity on performance both on the organizational and business process level, such as environmental uncertainty (Benner and Tushman 2003; Jansen et al. 2006), competitive intensity (Cao et al. 2009; Jansen et al. 2006), firm size (Cao et al. 2009; He and Wong 2004; Tang and Rai 2014) and others. While we acknowledge the variety of contingency factors, the focus of this study will be on the moderating effects of firm size and process uncertainty, as these have been found to be relevant throughout a variety of studies (Cao et al. 2009; Jansen et al. 2006).

Firm size is supposed to be an indicator of organizational slack, i.e. resources that are available to use (Cao et al. 2009). Companies that have more slack benefit less from the balance dimension of organizational ambidexterity. On the opposite for smaller firms, it is important to focus on the right balance, as overall resources are limited (Cao et al. 2009). Consequently, large companies that possess slack IT resources are less threatened by not having a balance between exploitative and explorative BPIT capabilities.

H2a: Firm size moderates the relationship between the balance dimension of business process IT ambidexterity and business process performance, where a higher balance dimension is expected to be more beneficial for smaller firms.

The more resources, and the more diverse and deep the pool of resources, the more likely it is that there are resources available, that allow striving for both exploitative and explorative capabilities (Cao et al. 2009). Following this logic, we suggest that large firms, having both centralized IT departments and decentralized IT experts in the line-of-businesses have more potential to benefit from the combined dimension of business process ambidexterity (Benner and Tushman 2003). The corporate IS department has the required overview and foresight to ensure future-readiness of the underlying architecture, while local optimization can be done within the departments.

H2b: Firm size moderates the relationship between complementarity dimension of business process IT ambidexterity and business process performance, where a higher combined dimension is expected to be more beneficial for larger firms.

Furthermore, various studies showed the importance of process uncertainty for the value of flexibility and thus for the value of explorative BPIT capabilities (Gebauer and Schober 2006; Jansen et al. 2006; Sambamurthy et al. 2003). Consequently the concept of ***process uncertainty*** reflects the environmental and organizational uncertainty with regard to a single business process (Benner and Tushman 2003; Gebauer and Schober 2006) and is defined *as the difficulty to predict the exact tasks and resources that are required to perform a particular process.*

Potential sources of environmental uncertainty are changes in customer behaviour or legislation. For instance the European energy sector and the German energy sector in particular experience significant uncertainty with regards to a variety of business processes. This is due to unclear political agenda setting and various turnarounds during the last years (Kopetzki and Wassermann 2014). Companies operating in less turbulent market places need to adapt less frequently and to lower degrees than those in highly dynamic market environments and therefore have lower requirements on explorative capabilities. Thus the more turbulent the market place the more flexible a company must react and the more important becomes having the exploitation capability matched by appropriate exploration capability (Cao et al. 2009).

Process flexibility has been found to be more important as a predictor of business process performance in cases of high process uncertainty (Gebauer and Schober 2006). This means that in cases of low process uncertainty, the risk of overemphasizing exploitative BPIT capabilities is less severe, thus pursuing the balance strategy yields less benefits. Consequently, the balance dimension of BPIT ambidexterity is supposed to have a lower effect on business process performance in cases of low process uncertainty.

H3: Process uncertainty moderates the relationship between balance dimension and business process performance, where a higher balance dimension is expected to be more beneficial in case of higher process uncertainty.

3 Research Design

For this study a confirmatory quantitative approach is chosen. A survey on exploitative and explorative BPIT capabilities and the corresponding business process performance will be conducted with utilities from the German-Speaking D-A-CH region (Germany, Austria, Switzerland) in the beginning of 2015.

We select the utilities sector for various reasons: First, the utilities sector in these countries provide highly dynamic and competitive environments. This is due to recent regulatory transitions from state-controlled monopolies into liberalized industries as well as the transition towards sustainable energy generation. Frequent regulatory changes to inter-company business process as well as changing customer demand leads to high levels of process uncertainty. These requires utilities to be highly flexible to continuously adapt business models and processes (Kopetzki and Wassermann 2014). Second this sector covers different market designs along the value chain, ranging from highly regulated grid operators to liberalized areas of energy generation and sales. Third, the complexity of the energy value chain allows us to cover a wide range of business processes including customer service for business-to-consumer (B2C) and business-to-business (B2B), sales for B2C and B2B and the meter-to-cash process, which is the core business activity within utilities. An overview of the business processes covered within this study is shown in Appendix A.

3.1 Operationalization & Measurement

Business process performance cannot be measured accurately without acknowledging the specifics of a business process (Ray et al. 2004). Consequently most existing measurement scales for business process performance only address specific business processes, such as customer service (Ray et al. 2005), sales (Reinartz et al. 2004) or recruitment (Muenstermann et al. 2010). For the business processes of type sales and customer service we apply established scales (Ray et al. 2005; Reinartz et al. 2004). These measurement scales are self-reported measures. However, they have been found to be positively correlated with objective performance measures, such as customer satisfaction measured through a customer survey and objective measures such as the retention rate (Ray et al. 2004). However, to the best of our knowledge there is no instrument for measuring business process performance of the meter-to-cash process in the utilities sector. Thus we will develop a new instrument, building on existing conceptualizations of business process performance for other business processes (Muenstermann et al. 2010; Ray et al. 2005; Reinartz et al. 2004), following established guidelines (DeVellis 2011; Moore and Benbasat 1991).

For the measurement of *BPIT ambidexterity* through the dimensions of explorative and exploitative BPIT capabilities, we adapt He and Wong's scale for organizational ambidexterity, consisting of items addressing exploration and exploitation (2004) to the context of this study following established procedures (DeVellis 2011; Moore and Benbasat 1991) Building on prior researchwe measure the *balance dimension of BPIT ambidexterity* as the absolute difference between the magnitude of exploitative and exploitative BPIT capabilities and the *complementarity dimension of BPIT ambidexterity* as the product of exploitative and explorative BPIT capabilities (Cao et al. 2009; Tang and Rai 2014).

Process uncertainty is measured using Jansen's scale for environmental uncertainty (2006). *Firm size* is measured through the average number of full-time-equivalent employees from the last year (Tang and Rai 2014). Furthermore we include organization age, organization growth rate (Jones and Linderman 2014; Tang and Rai 2014) as organizational control variables and business process age, type of business process or company as process-specific control variables.

3.2 Data Collection

A major challenge is to identify relevant survey participants, which in this case consists of business process owners and line-of-business managers, who have responsibility multiple for business processes. In contrast to CEOs, there is neither publically available listing of such persons, nor is it easily possible to identify these using company databases, company websites or social media. Due to these challenges we limit the scope of this study to one specific industry, allowing us to leverage industry-incumbent firms as multipliers. Therefore we cooperate with a well-established market research organization from the German utilities sector, which provides a pool of 1.200 relevant study participants. To incentivise survey participants a benchmark report is provided upon completion, which benchmarks process performance as well as explorative and exploitative BPIT capabilities against other participants. Furthermore higher-level managers are used as multipliers, as they can invite process owners within their organization to participate in the survey. While we acknowledge that this sample is not necessarily representative, there is no better way to get access to the relevant target group. As the study is conducted in Germany the questionnaire will be in German language, making a forward-backward-translation of the items that are adapted from English literature necessary (Cha et al. 2007).

4 Expected Contribution

This paper presents the conceptual foundations of a research project with the goal to develop a variance-theoretical model explaining the impact of different combination strategies for exploitative and explorative BPIT capabilities on business process performance. We extend the work on different combination strategies for exploitation and exploration (Cao et al. 2009; Tang and Rai 2014), by providing empirical evidence for this relationship. Furthermore this study sheds light on the moderating role of process uncertainty and firm size. Thus, this study contributes to the BPM research community by indicating the requirement to pursue adequate combination strategies for exploitative and explorative BPIT capabilities. This study also addresses the call for more micro-level studies on the topic of ambidexterity to understand the details of the inherent complexity to provide actable guidance for managers in practice (Turner et al. 2013).

From a practical point of view, this model can serve as a guideline for process owners to better assess the optimal levels of exploitative and explorative capabilities for a given business process in a specific business context. Practitioners can further benefit from our findings in the sense that contingency factors will be identified that can be used to determine adequate levels of exploitative and explorative BPIT capabilities depending upon specific business process characteristics.

We acknowledge that this study is not free from limitations. Data collection is limited to the utility sectors of the German-speaking D-A-CH region. To further validate and generalize our findings replication studies in other contexts can be seen as potential future research endeavours. Furthermore, the emergence of business process ambidexterity over time remains an open question. Here longitudinal approaches could provide the basis for developing process theory explaining how business process IT ambidexterity is developed over time in the form of different combination strategies for explorative and exploitative BPIT capabilities and how these strategies evolve over time.

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Appendix A

	Market Role	
Business Process	**Energy Sales**	**Distribution Grid Operator**
Customer Service B2C	Customer service for private end consumers of electricity or gas.	Customer service for private connection owner.
Customer Service B2B	Customer service for private end consumers of electricity or gas.	Customer service for grid users, i.e. energy sales units or commercial consumers.
Sales B2C	Selling of electricity or gas products to private end consumers.	Offer grid connection for new buildings and renewable energy sources.
Sales B2B	Selling of electricity or gas products to commercial end consumers.	Offer grid connection for new buildings and renewable energy sources.
Meter-to-cash	Bill the consumed amount of energy to the end consumer.	Bill the grid usage to the energy sales unit or commercial consumers.

Table 2. Overview of important business processes in the liberalized German energy sector separated by market roles.