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BUSINESS AGILITY WITHIN IS VALUE RESEARCH - PROPOSING A MEASUREMENT FRAMEWORK

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Abstract

In turbulent environments, business agility, which is the ability of firms to sense environmental changes and respond to them timely, is an important antecedent of long-term firm success. We introduce business agility as a construct consisting of sensing and responding dimensions reflected by market, network, and operational agility. Here, we explicate the underlying capabilities, drivers, and indicators. By proposing a measurement framework, we address several calls for an operationalization of business agility. Moreover, we validate our conceptualization by applying the business agility measurement framework to the 10 largest banks in North-America. As a result, we find first evidence of a relationship between business agility and a firm's capability to successfully master environments of higher dynamism. The presented conceptualization is meant to be a foundational building block for research on business agility and the enabling role of IT as an important research topic at the intersection of accounting and IS value research.

Keywords: Business Agility, Conceptualization, Operationalization, IS Value Research.

1 Introduction

In today's competitive economy represented by rapid innovations, as well as fast changing market demands, firms have to develop their alignment capability. This ongoing need to realize and adapt to environmental changes is reflected by the concept of business agility (BA) (Goldman et al. 1995) which define one of the key success factors for organizations striving to stay competitive even in uncertain and turbulent markets (Dove 2001). The dynamic nature of market environments reinforces the importance of BA as crucial antecedent of organizational long-term success. In particular, we argue that IT investments and capabilities influence firm performance through a nomological net of organizational capabilities (digital options and BA) and strategic processes (competitive actions) (Sambamurthy et al. 2003, Overby et al. 2006).

Here, the nomological net of BA has to be further conceptualized and empirically validated (Dove 2001, Overby et al. 2006, Sambamurthy et al. 2003). The still premature stage of research in this area may hinder the integration of BA into other well-established IS research streams. In essence, three major obstacles can be identified in the theoretical realm of BA that antagonizes a deeper integration of the concept: The first is that of "definitional dissensus" meaning that researchers cannot agree on a concise definition of BA and its associated characteristics. So far, the extant literature depicts several competing definitions of BA, mostly grounded in the manufacturing domain (see Ganguly et al. 2009 for an overview). Consequently, the second obstacle is the lacking theoretical foundation in order to account for the phenomenon observed and to lay the ground for further replication and extensibility of the BA concept. Finally, and despite several calls (e.g., Dove 2001, Overby et al. 2006, Sambamurthy et al. 2003), we still lack viable measurement scales to quantify BA as an important prerequisite to increase a firm's performance. Accordingly, we propose a measurement framework specification of BA based on different indicators on the organizational level of analysis. Grounded in extant literature and informed by expert interviews, we identify different dimensions of BA, organizational capabilities and drivers, as well as corresponding indicators. In addition, we validate the BA operationalization and thereby illustrate the general applicability of the developed measurement framework. The remainder of this article is organized as follows: first, we introduce the employed research design and methodology of the conceptual framing. Subsequently, the theoretical background of BA is depicted with regard to the required domain knowledge. Then, a conceptualization of BA is deductively derived and a measurement framework based on identified indicators is presented. Our measurement framework is validated by applying the capabilities identified and quantified in order to measure BA from the ten largest North-American banks ranked by total assets. We conclude with a summary of our findings, elaborate on its limitations, and provide venues for further empirical validation.

2 Research Design and Methodology

In order to design and validate our BA measurement framework, the study employs a longitudinal, multi-method research design consistent with the research cycle proposed by McGrath (1979). Consequently, our research design encompasses two main research stages: (1) an exploratory stage to conceptualize the theoretical model and identify corresponding capabilities of BA as well as related indicators and (2) a confirmatory stage to test the measurement framework based on quantitative data. The *exploratory stage* starts with an identification step, followed by a specification step. During the identification step, we identified the distinct dimensions and capabilities of a latent BA conceptual model. In the specification step, we discovered and quantified appropriate indicators and further specified the initial conceptual model. The main outcome of this stage is the depicted BA measurement framework. In addition, we triangulate our measurement framework by referring to two distinct sources of evidence. First, we base our conceptual model on well-established literature streams, such as market intelligence, agile manufacturing, corporate networks, and BA. Second, we elaborate on our propositions and further important issues as part of discussions with several experts to ensure overall coherence and to safeguard both theoretical as well as practical relevance. In the

confirmatory stage we validated our conceptualization and the corresponding operationalization by applying the measurement framework to organizational data of the ten largest North-American banks ranked by total assets. Future research will elaborate on the mutual discriminance and additivity of the different dimensions using for example data envelopment analysis (DEA) (Charnes et al. 1978) and confirmatory data analysis techniques (e.g., structural equation models).

3 Multidimensional Specification of Business Agility

So far, the extant literature encompasses several competing definitions of BA, mostly grounded in the manufacturing domain. For instance, Ganguly et al. (2009) elaborate on the term of agility as the ability of an enterprise to operate profitably in a rapidly changing and continuously fragmenting global market environment by producing high-quality, high-performance, customer-configured goods and services. Beyond the manufacturing domain, BA is defined as the ability of an organization to sense environmental changes and respond to these changes in an efficient, effective, and timely manner (e.g., Dove 2001). More broadly, Overby et al. (2006) define BA as the ability of an organization to detect changes in its business environment and hence respond to input from its customers and stakeholders by reconfiguring its resources, processes, and strategies. Accordingly, we differentiate between two basic capabilities associated with an improvement in BA: *sensing* and *responding* (Overby et al. 2006). These two appear in multiple definitions of agility in prior academic and business literature. For example, Dove (2001) refers to the responding component as “response ability”, which he defines as the physical ability to act, and to the sensing component as “knowledge management” which he defines as the intellectual ability to find appropriate course of action. Furthermore, BA encompasses a firm's sensing and responding capabilities related to different forms of interactions with customers, (re-)structuration of internal operations, and utilization of its ecosystem of external business partners (Sambamurthy et al. 2003). Specifically, we argue that BA comprises three interrelated capability sub-dimensions: market agility, network agility, and operational agility.

Consistent with Sambamurthy et al. (2003) and Grewal and Tansuhaj (2001), we define *market agility* as the organizational ability to manage economic risks by sensing changes and responding to market threats and opportunities in a timely manner. Grounded on a flexible resource pool and a diverse portfolio of strategic options, market agility enables firms to co-opt with their customers in order to sense market changes and effectively manage market opportunities (Aaker and Mascarenhas 1984). *Network agility* reflects the ability to leverage available resources from actors of a value network (e.g., supplier and strategic partners) in order to improve and sustain the competitive position (Sambamurthy et al. 2003). Indeed, the network within which a firm is embedded has a dual nature and thus encompasses two networks: an inter-organizational network that reflects inter-organizational collaboration and an interpersonal network that reflects the relationships residing in the former network. Recent results from organizational research indicate that these interpersonal corporate networks crucially determine the firm's economic behavior and outcomes (e.g., Gulati et al. 2000) due to two important mechanisms. The first is the diffusion of information within a network, which is driven by efficiency concerns (Grant 1996). The second is the mimetic adoption and instantiation of decisions of other firms or individuals, which is driven by legitimacy concerns (Greve 1998). Therefore, in consistency with Ma et al. (2009) this article investigates how the characteristics of the two aforementioned networks simultaneously affect a firm's adaptive capability as a sub-dimension of network agility preceding BA. *Operational agility* is defined by the competence of a firm to dynamically rearrange and reconfigure its resources and organizational structures (e.g., business processes) in order to exploit upcoming opportunities for innovation and competitive action. Especially, information and communication technology (ICT) can be seen as a digital options generator leading to an overall BA improvement (Sambamurthy et al. 2003). Since operational agility initially enables a firm to co-opt within and beyond its borders, it facilitates the development of market and network agility (Nambisan 2002).

In conclusion we follow the argumentation that all three agility types collectively form BA. We therefore propose that firms which have developed all of these agility capabilities should be in a better position to engage in more competitive action as well as complex action repertoires by sensing and responding to changes in the market (e.g., demand shifts), changes in the corporate network (e.g., new suppliers or purchaser), and situational challenges on the operational level (e.g., new regulatory requirements).

4 Measurement of Business Agility

Recent calls (e.g., Dove 2001, Ganguly et al. 2009, Sambamurthy et al. 2003) assert that there is a need for a comprehensive conceptualization and measurement framework of BA. More recently, initial measurement metrics were proposed: especially in manufacturing research, significant effort has been spent to operationalize the BA concept (see Giachetti et al. 2003 for an overview). Dove (1994) presented one of the first discussions on the measurement of BA and developed a set of metrics comprising cost, time, quality, and scope to measure the overall agility of an enterprise. This concept of “change proficiency” was further developed by Metes et al. (1998) to a framework which contains a six-step methodology using a balanced scorecard to assess different domains of BA. Other efforts to measure BA resulted in the development of an agility index (Datta 2006), a scorecard (van Hoek et al. 2001), and an agility evaluation method based on fuzzy-logic (Lin et al. 2006b). However, existing derivations of agility measures basically focus on how manufacturing organizations enhance their agility. Moreover, these approaches often emphasize only on responding capabilities, although sensing of market and environmental changes is mandatory as well (Overby et al. 2006). Accordingly, we present an aggregated conceptualization of sensing and responding capabilities accounting for BA in a more holistic way. Additionally, we propose a set of initial indicators based on market and financial data. In doing so, we address the issue of measuring BA by answering three central research questions: What should be measured, how it should be measured, and how should the results be aggregated and evaluated (Goldman et al. 1995). Consequently, these questions guide our conceptualization of BA measurement framework introduced in the next sub-sections.

4.1 Conceptualization of Business Agility

Based on the discussion in section 3, BA can be specified with regard to the two-dimensional paradigm of sensing and responding and along the three different agility types (market, network, and operational agility). As depicted in Figure 1, we propose a conceptualization which forms BA over an aggregated hierarchical approach of different capabilities and thereby specify BA as an aggregate or composite model (Law et al. 1998).

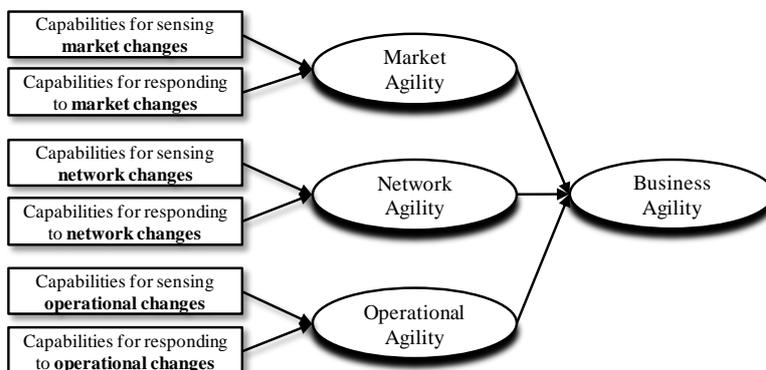


Figure 1. The business agility model

In the proposed model, the multidimensional construct ‘business agility’ is defined as the outcome of its sub- dimensions ‘market agility’, ‘network agility’, and ‘operational agility’. These sub-dimensions are therefore determined by first-order, latent constructs. Thus, the causality of the measurement is

directed from the metrics to the multidimensional, second-order BA construct (Petter et al. 2007) wherefore the multidimensional construct can be illustrated by an algebraic representation of its dimensions (Law et al. 1998). In the proposed measurement framework BA will be calculated indirectly by measuring capabilities which enable an enterprise to sense and respond to relevant environmental changes (Overby et al. 2006). Consequently, the first challenge is to identify enabling capabilities and corresponding indicators of sensing and responding to market, network, and operational changes. Finally, we assume that firms having developed these dimensions of agile capabilities should be better off than others by leveraging their market, network, and operational agility.

4.2 Identification of Organizational Capabilities and Possible Indicators

Grounded on the developed BA conceptualization, we identify different capabilities for sensing and responding market, network, and operational changes by analyzing extant literature. Moreover, we determine several examples of corresponding indicators based on organizational data derived from data consolidators (i.e., Compustat, Datastream, Thomson One Bank, and Information Week 500). In addition, we refined our thinking in focus group sessions facilitating discussions with business consultants and IT experts from an international acting bank and leading consulting firm in the financial service sector. Table 1 provides an overview of the different sub-dimensions of the BA conceptualization, related sensing and responding capabilities and drivers, as well as examples of corresponding indicators.

Dimensions	Capabilities / Drivers	Indicators (Examples)	Rationale
Market Agility			
Sensing	<ul style="list-style-type: none"> ▪ Market intelligence 	<ul style="list-style-type: none"> ▪ Market research expense ▪ Number of business segments 	Identification, collection, and analysis of market information foster a firm's potential to sense and anticipate relevant market actions (e.g., Day 1994, Kohli et al. 1993).
Responding	<ul style="list-style-type: none"> ▪ Market communication ▪ Market opportunities <ul style="list-style-type: none"> - Competition - Diversification 	<ul style="list-style-type: none"> ▪ SG&A expense ▪ Advertising expense ▪ Market concentration ▪ Number of different business segments 	Market communication and innovation capabilities encourage the ability for launching new products or services, creating new distribution channels, or targeting new business segments (Day 1994, Drucker 1954)
Network Agility			
Sensing	<ul style="list-style-type: none"> ▪ Corporate networks <ul style="list-style-type: none"> - Strategic partners - Social networks 	<ul style="list-style-type: none"> ▪ Social network of board members (e.g., network centrality measures) 	Access to insider information about environmental changes through corporate networks anticipate network sensing capabilities (Uzzi 1996, Venkatraman and Henderson 1998)
Responding	<ul style="list-style-type: none"> ▪ Market power ▪ Social capital ▪ Capital networks 	<ul style="list-style-type: none"> ▪ Market shares ▪ Amount of holdings and shareholdings 	The ability to assert and realize strategy resolutions and mobilize strategic resources is determined by the power of an organization in its corporate networks (Boulding and Staelin 1990, Chung et al. 2004)
Operational Agility			
Sensing	<ul style="list-style-type: none"> ▪ Governance, risk and compliance management ▪ Information exchange 	<ul style="list-style-type: none"> ▪ Organizational structure ▪ R&D expense ▪ ICT intensity 	A comprehensive governance, risk and compliance management, as well as a pervasive ICT infrastructure contributes directly to retrieving and spreading information within and across an organization (Lin et al. 2006a, Ganguly et al. 2009)
Responding	<ul style="list-style-type: none"> ▪ Process flexibility ▪ Services/product innovation ▪ Liquidity ▪ Operational efficiency 	<ul style="list-style-type: none"> ▪ IT innovation capability ▪ Bond ratings ▪ R&D expense ▪ Liquidity ratio ▪ Cost-to-income ratio 	Modularization of business processes and innovativeness improve the ability to rapidly redesign existing processes and create new processes, services, products, and corresponding business models (Bharadwaj 2000, Santhanam and Hartono 2003, Ganguly et al. 2009)

Table 1. Business agility dimensions, capabilities, and corresponding indicators

Following the work of Kohli et al. (1993) and Day (1994), we operationalize *market agility* in terms of market information generation and information dissemination as sensing capabilities and response design as well as response implementation as responding capabilities. While information generation reflects the organizational emphasis on gathering information about customer needs and market

developments, information dissemination is the degree of sharing of information across departments. Accordingly, these market sensing capabilities are enabled by effectiveness of market intelligence, which deals with the identification, collection, and analysis of information relevant to a company's markets (Miles and Snow 1978). For instance, market research expense and the number of business units can be considered as proxies for market intelligence as they suggest favorable market information channels (Kohli and Jaworski 1990). Hence, it is assumed that a higher spending in market research compared to competitors leads to the establishment of a qualitatively enhanced market intelligence. For instance, a continuous competitor and customer analysis as part of market research fosters a firm's potential to sense and/or anticipate market actions (Kohli and Jaworski 1990). Moreover, increased market intelligence improves the sensing of consumer preference changes and alleviates economic shifts. Consequently, market research expenses mainly quantify a firm's sensing capabilities. The firm's ability to respond to the identified market changes is enhanced by market communication capabilities and the ability to realize innovations (Drucker 1954). These capabilities encompass the ability to launch new products, create new distribution channels, or target new customer segments. Following Chauvin and Hirschey (1993), advertising as well as selling, general and administrative expense (SG&A) in relation to the company size can be used to account for marketing efforts like advertising, branding, direct marketing, sponsorship, public relations, and sales. Moreover, market concentration (e.g., calculated by the Herfindahl-Hirschman index) in the primary market fields considers the market pressure and the accompanied improvement of flexibility concerning innovativeness and market movements (Aghion et al. 2005).

Network agility is defined as the ability to leverage the assets, knowledge, and competencies of strategic partners (Venkatraman and Henderson 1998). It can be delineated along the sensing and responding capabilities. Especially, social networks of top managers enable sensing and anticipating capabilities due to the access to insider information about competitors, market changes, legal or regulatory shifts (Uzzi 1996). As a consequence, one can explore interlocks of directorships (Mizuchi 1996) and investigate structural and centrality measures (e.g., degree, closeness, and betweenness centrality measures) from the social network of executives as indicators for network sensing capabilities. The ability to assert and realize strategies and resolutions is determined by the power of an organization in its corporate network and thus also improves response capabilities. In addition, corporate networks foster the mobilization of heterogeneous strategic resources to support organizational and customer needs (Chung et al. 2004). Accordingly, network centrality measures also indicate the resulting responding capabilities. Moreover, the market share can be considered as an indicator for market power (Buzzell et al. 1975). Firms with a larger market power have proven to be more responsive and adaptive to these changes than their competitors (Ganguly et al. 2009). Therefore, the market share metric primarily indicates capabilities enabling the responding capacity of a company.

Operational agility is defined as the ability to detect changes in the value chain and dynamically rearrange and reconfigure organizational resources and organizational structures accordingly (Sambamurthy et al. 2003). Flexible resource utilization allows firms to shift resources to areas of need, which will help them to embark on new ventures or adjust existing ventures (Overby et al. 2006). Retrieving and spreading information within and across an organization contributes directly to the operational sensing capabilities leading to an overall increased level of BA (Grant 1996). Accordingly, operational sensing capabilities rooted in the IT infrastructure are facilitated by a high level of interoperability and networking (Tsourveloudis and Valavanis 2002). In this context, IT enables superior internal and external coordination through information sharing (Lee 2002). However, IT innovativeness and IT infrastructure capabilities could also be identified as driving the modularization of business processes and enabling their (re)combination to create best practice and new business models and therefore especially improve the operational responding ability (Malone et al. 1999, Sambamurthy et al. 2003). Consistent with Bharadwaj (2000) data from the rankings provided by InformationWeek in their annual IW 500 special issue can be used as proxy variables for the IT innovativeness and IT capabilities. Moreover, these data can also be combined with overall IT intensity (Ray et al. 2009) and research and development (R&D) expenses as indicators for

improvements in product and system development representing operational responding enablers (Lin et al. 2006a, Overby et al. 2006). For example, product development capabilities facilitate a firm's ability to innovate with regard to its business operations (Ganguly et al. 2009). Another major enabler of operational agility is reflected by the ability to immediately and effectively respond to operational changes due to the absence of investment restrictions and illiquidity. Risk assessments based on Moody's, S&P, or Fitch bond ratings quantify the rater's "judgment" about the firm's ability to make the scheduled interest and principal payments (e.g., Pogue and Soldofsky 1969). Finally, cost-effectiveness is also an important indicator in the light of operational agility. Although a firm might be able to align with the changing business environment in an effective fashion, it may still not be considered as an agile organization if it does so by incurring an astronomical amount of cost (Ganguly et al. 2009). Therefore, for any company to be operational agile, it should respond both effectively and cost-efficiently. Hence, an indicator such as the total operating cost divided by the firm size (measured by the value of total assets) can be taken into account in order to measure for cost effectiveness.

4.3 Measurement Framework of Business Agility

After the theoretical conceptualization of BA and identification of suitable capabilities, in the following we introduce a BA measurement framework encompassing a generalized approach to quantify the overall BA of a company. In this context, it is important to emphasize that the corresponding capabilities, indicators, and weights are industry specific and therefore may differ depending on the field of business activity. Accordingly, this BA measurement framework serve as a guideline that can be used to, e.g., operationalized a BA measurement instrument. Figure 2 delineates the corresponding sequence of process steps.

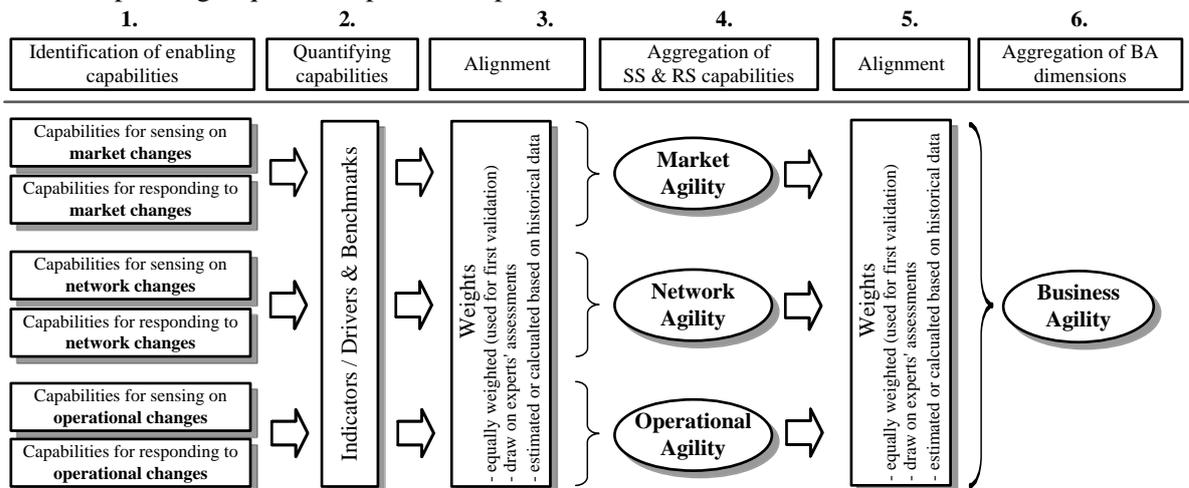


Figure 2. Business agility measurement framework

First (1.) enabling capabilities and corresponding indicators are identified (see section 4.2). In a second step (2.), organizational data for the capability indicators are collected and related benchmarks are identified. In order to provide viable metrics for the identified indicators, we draw upon industry (or competitive) benchmarking approaches (Camp 1989). Thereby, we focus on an external rather than internal view to support BA by learning from other firms within a regarded industry (Cox and Thompson 1998). The selection of the benchmark influences the robustness and validity of the metrics and is therefore a critical aspect of this approach (Sarkis 2001). Following Bharadwaj (2000), in this paper we have chosen a single benchmark (the so-called "leader") concerning the indicator of interest (e.g., operational efficiency) for each firm based on the criterion that it was of comparable size and in the same industry as the investigated firm. Thus, we use benchmarking techniques at the industry level, to determine how well certain capabilities of BA for a specific organization exhibits in comparison to the leader. Hence, the firm-specific value of an indicator is divided by the value of the benchmark (leader) in order to quantify the corresponding sensing or responding capability. The

robustness of this benchmarking technique could be improved by using the average of an industry as the benchmark and a more generalizable standard of comparison in research and practice (e.g., Robbins and Pearce 1992). In an alignment step (3.), the quantified sensing and responding capabilities are linearly accumulated to the different forms of agility (4.), depending on industry specific emphases and characteristics. Finally, the results are transformed and aggregated to the BA score (5.) with respect to the idea of the complementary relationship of market, network and operational agility (6.). Apart from our procedure to determine of the industry-specific weights of the alignment steps (steps 3 and 5), several other data analysis and empirical methods could be applied. A state-of-the-art method in the area of benchmarking is for example DEA (Sarkis 2001). DEA is an analytical approach that is based on productivity ratios and efficient frontiers (Charnes et al. 1978). Thereby, the problem is transformed into a linear programming input/output model that helps to define the efficiencies of various entities called decision making units (DMUs). This approach facilitated the identification of the importance of the divergent sensing and responding capabilities in relation to different success factors like, e.g., the firm's overall return on equity (as a measure for firm performance) or the stock volatility (as a measure for firm stability).

5 Business Agility of Financial Service Providers

In order to validate and illustrate the viability of our measurement framework, we apply the procedure as described in the last section on data from the ten largest North-American banks ranked by total assets. The rationale behind the investigation of the financial services industry is motivated by the fact that financial services providers are among the most capable of exploiting innovations, whereby IT is crucial to sense environmental dynamics and respond to intense competitive pressures, increased market turbulences, new regulatory requirements, and ever rising customer demands (Heckl et al. 2010). From an empirical perspective, focusing on a single industry allows to control for extraneous industry factors that could otherwise confound the analysis, thereby enhancing internal validity. An exemplary step by step calculation of the BA measure (as depicted in Figure 2) is depicted in Table A1 in the Appendix. In this case, we consider indicators that can be calculated based on organizational data from sources, such as Compustat, Datastream, Thomson One Bank, and Information Week 500. In the current version of the measurement framework we aggregate the different indicators and dimensions with unit weights (i.e., $1/n$, n = number of indicators or dimensions). These weights will be estimated and validated as mentioned before with confirmatory analysis methods based on historical, quantitative data in a subsequent research stage.

Consistent with the extant literature, we expect that an increased level of BA facilitates the emergence of competitive actions resulting in a strategic growth (measured by market growth), a positive impact on overall financial firm performance (measured by the return on equity) and better firm stability (measured by stock volatility). Moreover, we argue that arising environmental turbulence challenges a firm to sense and adequately respond to arising environmental changes in order to eventually safeguard firm performance (Sambamurthy et al. 2003). Therefore, we compare the calculated BA values with the financial performance, market growth, and stock volatility of financial institutions in the last five years. Furthermore, we include annual average values for the years 2008 and 2009 due to high voluntary markets and environmental turbulences during the financial crises. The results of an appropriate correlation analysis are summarized in Table 2. Even if not all correlation coefficients are significant, which may be traced back to few degrees of freedom, the correlations exhibit the expected signs and show medium to strong relations. Especially, institutions with high BA capabilities seem to show positive market growth, firm stability (indicated by a relatively low stock volatility) and better financial performance values (indicated by a relatively high return on equity). In contrast, institutions with a relatively small BA value seem to have difficulties with arising environmental turbulence and the corresponding sensing and responding challenges. Nevertheless, some values in our sample do not fully support and even contradict our arguments of the BA measurement as an important antecedent of firm performance of varying dynamism. As an example Wells Fargo demonstrate a stable average ROE, even though the BA value is relatively low. Another example is the Citibank that have an

extreme negative average ROE inconsistent with the accurate BA value. One explanation for the Citibank case might be the high amount of risky assets that lead to extreme losses in value as a result of the financial crisis. Unfortunately, we are not able to provide valid results due to the lack of statistical power that could be attributed to the small sample size. However, our results provide first evidence for the validity of the presented operationalization and indicate the viability of the BA measurement as an important antecedent of firm performance in environments of varying dynamism. Additionally, our results emphasize the value of BA as a potential multidimensional dependent variable within IS value research.

Financial Institution	BA ¹	Growth ²	Volatility ³	Volatility ⁴ (Crisis)	ROE ⁵	ROE ⁶ (Crisis)
<i>Bank of America</i>	0.54	0.13	103.80	35.25	4.11	4,25
<i>Citibank</i>	0.58	0.10	97.28	51.91	1.18	-19,10
<i>JPMorgan Chase Bank</i>	0.64	0.23	67.16	29.06	8.20	4,00
<i>PNC Bank</i>	0.61	0.52	76.74	42.92	14.40	8,15
<i>Royal Bank of Canada</i>	0.64	0.16	44.52	32.11	19.24	15,00
<i>State Street Corporation</i>	0.70	0.21	66.96	29.90	17.00	17,45
<i>SunTrust Bank</i>	0.57	0.04	n.a.	47.79	5.48	-2,94
<i>Bank of New York Mellon</i>	0.76	0.38	n.a.	23.60	16.34	11,30
<i>U.S. Bank</i>	0.56	0.08	67.23	37.90	17.68	10,55
<i>Wells Fargo Bank</i>	0.54	0.11	71.83	32.85	14.22	7,34
Pearson Correlation Coefficient⁷		0.54	-0.61*	-0.73*	0.54	0.49

¹ Business agility measure (between 0 - 1)
² Average annual growth of total assets (2005 - 2009)
³ Average annual stock volatility in % (2006 - 2009)
⁴ Average annual stock volatility in % (2009)
⁵ Average annual ROE in % (2005 - 2009)
⁶ Average annual ROE in % (2008 - 2009)
⁷ * = significant at 0.05 level; Due to the merger of Wells Fargo and Wachovia, the corresponding results are not considered

Table 2. Correlation analysis between the business agility and firm performance measures

6 Conclusion and Limitations

If BA leads to firm performance, a better understanding of the BA dimensions allows the selection of appropriate solutions to achieve a desired level in the different agility types. Especially, with regard to information systems as an enabler of BA (Sambamurthy et al. 2003) a better understanding of BA allows the management to make IT investment decisions based upon strategic and operational goals. Here, IT provides digital options that complement the referring enterprise's business capabilities and eventually leads to an enhanced degree of BA. Our measurement framework addresses recent calls to operationalize BA (Dove 2001, Overby et al. 2006, Sambamurthy et al. 2003) and thereby lays the ground to empirically analyze and extend the nomological net of BA. We based our conceptualization and the final operationalization on a thorough literature review, identifying relevant issues related to BA and prevalent benchmarking techniques. As a result, we differentiated three dimensions (i.e., market agility, network agility, and operational agility) with regard to organizational sensing and responding capabilities that shape the construct of BA. Consequently, we derived an initial set of industry-specific (i.e., financial services industry) indicators that reflect the identified sub-dimensions. The results of the application of our BA measurement framework to large financial services providers indicate the viability and relevance of our measurement approach. We found first evidence that there is likely a relationship between BA and an organization's capability to successfully master environments of high dynamism. However, the evidence of our results is not sufficient from an empirical perspective. Therefore, in the confirmatory stage future research will elaborate on more comprehensive data sets in order to provide more evidence on the relationship between BA dimensions and firm performance. Moreover, further research is required to validate and adapt our proposed BA measurement framework in different settings to achieve generalizability of its current operationalization. Thus, as part of the aforementioned confirmatory stage, we will conduct further expert interviews within different industries as well as a quantitative field study based on

(longitudinal) secondary data. In our course of action we used accounting data as indicator for organization's capabilities. Although the selection of these indicators is based on established studies one cannot automatically assume these indicators to be non-interchangeable. Moreover the indicators presented in our study are examples and may be extended or adjusted in different settings. We are also aware of the fact that our study sets up on a high level of abstraction while using accounting data as indicators. Nevertheless, this is suitable for our analysis because we are interested in the results on an organizational level. Furthermore, due to regulatory requirements concerning disclosure, accounting data is accessible easily and therefore also available for practitioners.

Based on a robust BA measurement framework, the nomological net of BA can be further analyzed and extended. In particular, the consequences of organizational BA will inform extant IT value research as well as strategy research in highly turbulent environments. Thereby, the business value of investments in IT systems can be investigated by analysing the impact on the different sensing and responding capabilities. For instance, customer relationship management systems or relation management automation, as well as arising Web 2.0 platforms addressing (the sensing and responding part of) market agility, electronic data interchange systems, and social network platforms fostering network agility as well as production planning, business process planning, risk management information, or project management systems strengthen operational agility. Accordingly, these IT systems are assumed to positively influence the different dimensions of BA. From a practical perspective, our BA measurement framework lays the ground for a management decision support system that explicates the BA as antecedent of long-term performance in comparison to competitors and market leaders. As such, the system could help managers to derive appropriate course of action to increase the degree of a firm's BA.

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Appendix

Dimensions		Indicators for the capabilities	Ratio ¹	S&R Values ²	BA Dimensions ³	BA ⁴	
Market Agility							
Sensing	$\frac{\text{Market research expense}}{\text{Value of total assets (three year average)}}$		0,62	0,81	0,71	0,64	
	Number of business segments		1,00				
Responding	$\frac{\text{Advertising expense}}{\text{Value of total assets (three year average)}}$		0,56	0,61			
	$\left(\frac{\text{Market capitalization}}{\text{Avg. market capitalization of the biggest competitors}} \right)$		0,66				
Network Agility							
Sensing	Social network of directors		0,76	0,76	0,70		
Responding	Holding and shareholdings		0,72	0,64			
	Number of executives in "foreign" boards of directors		0,56				
Operational Agility							
Sensing	$\frac{\text{ICT expense}}{\text{Value of total assets (three year average)}}$		0,52	0,47	0,51		
	$\frac{\text{R\&D expense}}{\text{Value of total assets (three year average)}}$		0,41				
Responding	IT innovation index		0,43	0,54			
	Moody's, S&P and Fitch bond ratings		0,75				
	Capitalization ratio		0,46				
	$\frac{\text{Tier 1 capital}}{\text{Core capital ratio = Value of total assets}}$		0,62				
$\frac{\text{Operating expense}}{\text{Value of total assets (three year average)}}$		0,46					
¹ calculated as the firm specific value divided by the benchmark value (= 1 for the benchmark); ² S&R = sensing and responding; ³ market agility, network agility, and operational agility; ⁴ BA = business agility							

Table A1. Business agility of JPMorgan Chase Bank - calculation example