

# THE DETERMINANTS AND ROLE OF AGILITY IN DIGITAL ORGANIZATIONS

*Research paper*

Holotiuk, Friedrich, Frankfurt School of Finance & Management, Frankfurt, Germany,  
f.holotiuk@fs.de

Beimborn, Daniel, Frankfurt School of Finance & Management, Frankfurt, Germany,  
d.beimborn@fs.de

Jentsch, Christian, University of Bamberg, Bamberg, Germany,  
christian.jentsch@uni-bamberg.de

## **Abstract**

*The changes in the business environment due to digital technologies and an increasing pace of innovation, have to be reflected in the organizational design of firms. In particular, agility has been put forward as an approach to cope with upcoming changes and to ensure organizational effectiveness in times of digitalization. We conceptualize agility as two types – detecting and reacting agility. In this paper, we analyze the organizational design and identify determinants for these two types of agility within the design. In our empirical study, we identified agility as a determinant of organizational effectiveness and discuss the relevance of agility in new forms of organizing in today's business environment. Our research is based on a quantitative study in the professional services industry where we conducted a survey with 217 respondents. The findings of our study carry theoretical contributions regarding the determinants of agility in the organizational design and the further delineation of detecting and reacting agility. Both of them carry essential importance for the design of digital organizations. Building on that, we derive managerial implications that yield the need to update the organizational design. In addition, we determine new forms of organizing and anchor agility as a management objective for digital organizations.*

*Key words: Agility, Organizational Design, Organizational Effectiveness, Digital Organizations*

## 1 Introduction

Due to digitalization, the business environment is changing, becoming increasingly complex, unpredictable and unstable (Westerman et al., 2014). Digitalization is defined as “a sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural.” (Tilson et al., 2010, p. 2). Consequently, organizations nowadays struggle to find an efficient organizational design that is flexible enough to adapt to changes in the environment (Worley and Lawler, 2010). Struggling to find the right organizational design is harmful to organizations as the characteristics of organizational design affect organizational performance (Tang et al., 2006). In the past, a number of different approaches have been put forward to respond to uncertainty, like dynamic capabilities (Teece et al., 1997) or agility (Sambamurthy et al., 2003). While dynamic capabilities focus on updating and changing capacities and the management of these capabilities (Teece et al., 1997), agility focuses on detecting and reacting as critical organizational capabilities to make organizations more flexible and adjustable (Overby et al., 2006; Sambamurthy et al., 2003; Yang and Liu, 2012).

The organizations’ ability to cope with changes by flexibly adjusting the organizational design in responding to these changes enables agility (Crocitto and Youssef, 2003). Although agility has been brought forward to cope with environmental changes and represents a “capability for competing in a digital economy” (Sambamurthy et al., 2003, p. 256), research has stressed the connection that remains to the organizational design (Hooper et al., 2001). Hence, the analysis of organizational design is fundamental for analyzing agility and its impact on organizational performance in times of digitalization.

Our objective is to investigate the relationship between organizational design and agility by identifying the determinants of agility in the organizational design. We suppose that different characteristics of organizational design determine agility differently – meaning that some characteristics of organizational design foster agility more so than others. As a result, achieving higher agility builds on leveraging a proper selection of determinants in organizational design and adjusting them in a way that is beneficial for agility. In return, organizations benefit from advantages created by higher agility: dealing with unpredictable changes (Sharifi and Zhang, 1999) by “swiftly chang[ing] businesses and business processes beyond the normal level of flexibility” (Van Oosterhout et al., 2006, p. 134). Also Ahsan and Ngo-ye (2005) emphasize agility as an capability to encounter and adapt to an unpredictable environment.

We follow the argument of Sambamurthy et al. (2003) and understand agility as an internal capability which improves the organizational effectiveness (as a measure of performance). Additionally, we build on their definition and conceptualize agility as the “ability to detect opportunities” (namely detecting agility) and “to seize market opportunities” (namely reacting agility) (Sambamurthy et al., 2003, p. 245). We want to better understand how the link between organizational design characteristics, agility, and organizational effectiveness and, hence, derive the following research question:

*RQ: How do organizational design characteristics determine organizations’ detecting and reacting agility and thus organizational effectiveness?*

In order to address the research question, we conducted a survey-based study in the consulting industry. We received responses from 217 consultants. Our findings contribute to the ongoing discussion on the design of digital organizations by providing important insights into needed design characteristics to achieve higher agility (which allows to better react to unpredictable changes due to digital innovation). We show that although activities have to be decentralized they have to be integrated to achieve agility. The tension has to be resolved within the organizational design. Furthermore, we show different effects of the design characteristics on the two types of agility. If an adequate organizational design is implemented, it will lead to a higher level of agility, which in turn leads to higher organizational effectiveness. Incorporation agility can thus lead to design more ‘digital organizations’ that are adequate for times of digitalization and corresponding changes.

The paper is structured as follows: First, we derive our research model. Then, we explain our empirical approach before we test our hypotheses and discuss the findings of our research. Finally, we provide theoretical as well as practical implications and discuss the limitations of our research.

## 2 Research Model

### 2.1 Model Overview

Our research sheds light on the linkage between organizational design and agility. Furthermore, the subsequent impact of agility on organizational effectiveness is analyzed to reinforce the advantages of agility in times of digitalization. Consequently, our research model is composed of three core constructs (namely organizational design, agility, and organizational effectiveness). First, organizational design is decomposed into five determinants. Second, agility is subdivided into detecting agility and reacting agility. Third, organizational effectiveness is determined by strategic growth and client satisfaction (see Figure 1). In the following, we provide a brief discussion of the constructs of our research framework and develop hypotheses that link them.

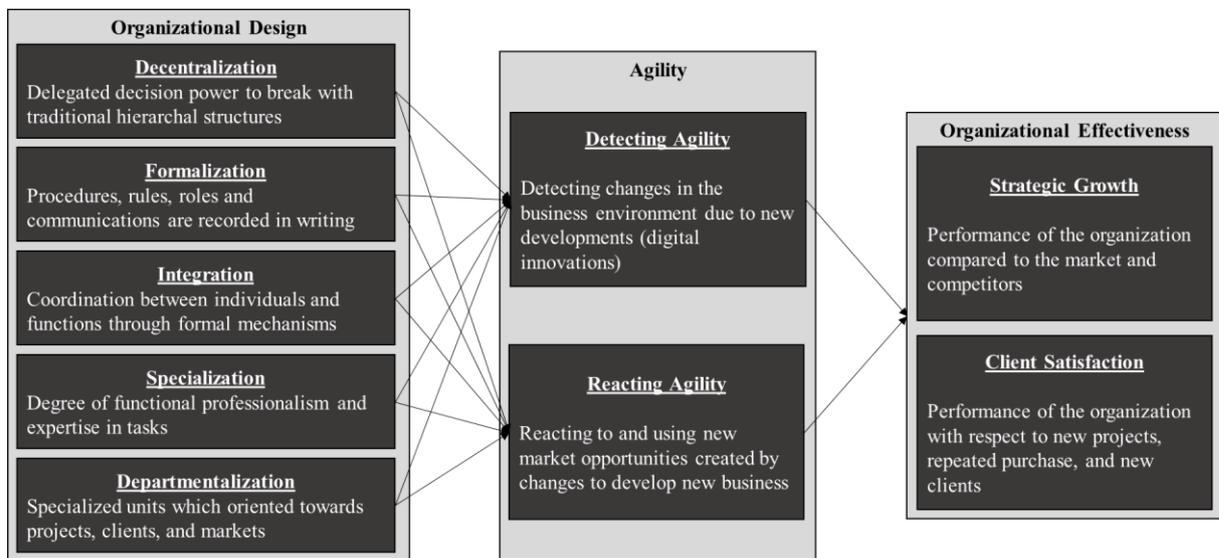


Figure 1. Conceptual research model.

### 2.2 Agility and Organizational Effectiveness

Agility is a fairly new concept and the missing clear definition or distinction to other concepts creates some complexity around it (Appelbaum et al., 2017, p. 8). Still, the concept has been around for over 30 years and has first been mentioned in manufacturing as well as in the area of software development (Ahsan and Ngo-ye, 2005; Hooper et al., 2001; Ramasesh et al., 2001; Sambamurthy et al., 2003). The 21st Century Manufacturing Enterprise Strategy Report analyzed how U.S. manufacturing has to change in order to stay competitive in light of pressure from Chinese mass production. The proposed answer was agile manufacturing which is based on the fragmentation of mass production, cooperative production partnerships, and a greater focus on customer expectations (Nagel and Dove, 1991). Both fields, manufacturing and software development, have struggled with increasing uncertainty, unforeseeable changes, and the need to adequately react. What has been true in these two areas is now also impacting other areas as digitalization unleashed “fundamental changes in almost all industries” (Veit et al., 2014, p. 45). Hence, agility is discussed to be applied more widely like in the service sector (Razmi and Ghasemi, 2015) and is expected to facilitate organizational performance.

Previous discussions on the concept of agility yield potential for improvements in organizational performance and put forward agility as a reasonable extension of flexibility (Ahsan and Ngo-ye, 2005). However, both concepts clearly differ with regard to the nature of the change and the forecasting power.

According to Van Oosterhout et al. (2006, p. 134), flexibility can only be applied “in areas where change is predictable and the response required can be largely predetermined” (namely predictable changes). On the contrary, unpredictable changes require a new level of flexibility, defined as agility (Van Oosterhout et al., 2006). Agility is “the continual readiness of an entity to rapidly or inherently, proactively or reactively, embrace change, through high quality, simplistic, economical components and relationships with its environment” (Conboy and Fitzgerald, 2004, p. 40). Agility allows to effectively manage unpredictable changes by “swiftly chang[ing] businesses and business processes beyond the normal level of flexibility” (Van Oosterhout et al., 2006, p. 134). With digitalization, the number of unpredictable changes has increased and radical changes are disrupting the business environment (Tilson et al., 2010). Hence, agility can provide a necessary organizational capability to adequately react to those changes caused by digitalization and lay the foundation of digital organizations. With these benefits of agility becoming more visible and “nowadays widely recognized and accepted” (Razmi and Ghasemi, 2015, p. 100), the interest in agility grew and led to its dissemination (Conboy, 2009).

Agility is conceptualized by us as consisting of two components. Although rudiments of this conceptualization are existent, there is no consistent terminology for the two. Pursuant to Overby et al. (2005, 2006), agility consists of sensing environmental change and responding readily. Others present the components as the “ability to sense highly uncertain external and internal changes and respond reactively or proactively” (Van Oosterhout et al., 2007, pp. 53–54). Further, agility has been described as the ability to sense, perceive, and predict forthcoming changes in the environment (Razmi and Ghasemi, 2015). Ramamurthy and Lu (2011) identify the components of agility as: market capitalizing agility and operational adjustment agility. Building on these advances, we put forward the two components as: first, detecting changes and opportunities in the market and second, reacting to those and leverage market opportunities (Sambamurthy et al., 2003). This terminology is in line with Dove’s notion (1999) that agility has a proactive and a reactive component. Consequently, we coin the two concepts as detecting agility and reacting agility.

Organizations embracing the concept of agility can better deal with uncertainties and, hence, gain positive implications for their organizational effectiveness<sup>1</sup>. Higher levels of agility enable organizations to better deal with uncertainties, be well prepared for sudden changes, and “to detect and exploit windows of market opportunity” (Sambamurthy et al., 2003, p. 253). Consequently, we propose agility to increase organizational effectiveness: First, the detecting component of agility provides organizations a better overview of current market developments and comprises the proper understanding of digital technologies. With these, organizations can transfer this knowledge internally to design new products or service and eventually improve their effectiveness based on the newly gained knowledge. Hence, detecting changes and understanding new demands enables organizations to excel the competition and better satisfy their customers. Based on these observations we derive the first hypothesis:

*H1: Detecting agility has a positive impact on organizational effectiveness.*

Second, the reacting component provides organizations with the needed speed in responding to emerging new opportunities in the business environment. It allows organizations to capture the potential of new technology by providing lean processes for the execution of new ideas based on the opportunities. Consequently, with reacting agility organizations can increase the effectiveness of their operations through the purposeful translation of opportunities into adequate actions. We derive the following hypothesis:

*H2: Reacting agility has a positive impact on organizational effectiveness.*

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<sup>1</sup> In congruence with Richard et al. (2009) we use the term ‘organizational effectiveness’ rather than ‘organizational performance’ (as used in earlier studies) because it captures *performance* in a broader, more qualitative context and inhabits less quantifiable indicators that can also reflect the outcome of new forms of organizing, such as efficient and effective operations. Organizational effectiveness is superior when organizational performance indicators are difficult to capture and subjective measurements can be considered and, hence, most frequently used as a dependent variable in research.

## 2.3 Organizational Design

Organizational design summarizes the inherent setup of the organizations. It captures how work is facilitated by the organizations and how the exchange of knowledge and the learning is organized. Organizational design can be decomposed into different characteristics like power, coordination, and control, which guarantee that organizations can act in a structured way to pursue their objectives (Grossi et al., 2007). The design acts as a framework of the entire organization and includes sets of interactions between the work roles within the organizations (Grossi et al., 2007). Furthermore, organizational design can be described as the formal allocation of work roles and administrative mechanisms to control and integrate work activities (Ghani et al., 2002). Hence, the concept refers to work divisions as the allocation of tasks, activities and coordination mechanisms (Meijaard et al., 2005). Due to its complexity, a multiplicity of structure, and multi-layered facets, the organizational design has to be considered as a multidimensional construct that comprises different characteristics of the design (Grossi et al., 2007). We build on previous research by Bergeron et al. (2004) who focus on five dimensions commonly used in organization and IS studies specialization, differentiation, professionalization, formalization, and centralization. Most of these dimensions also find support in the four dimensions used for characterizing organizational structure by Liao et al. (2011) (centralization, formalization, complexity, and integration) and Meijaard et al. (2005) (departmentalization, specialization, decentralization, coordination, and formalization). Based on those studies, we conceptualize organizational design according to our research focus by the following five dimensions: *decentralization*, *formalization* (both used in all studies), *integration* (as used by Liao et al. (2011) and labeled as coordination by Meijaard et al. (2005)), *specialization* (Bergeron et al., 2004; Meijaard et al., 2005) (included in complexity in (Liao et al., 2011) and *departmentalization* (Meijaard et al., 2005) (included in complexity in (Liao et al., 2011) that are outlined in the following.

According to Lunenburg (2012), there are three types of *decentralization*: vertical, horizontal and selective decentralization. In our research, we focus on vertical collaboration for decentralization and consider horizontal collaboration as aspect of the integration determinant. Vertical decentralization takes place when the decision-making power is delegated further down in the hierarchy, which results in more responsibility for more individuals (Schroth, 2007). When decision power is delegated to the lower level of the hierarchy, traditional hierarchal structures are disrupted and more employees are being involved in the decision making (Astley and Sachdeva, 1984). Thus, organizations can leverage the number of inputs for detecting new changes and further can increase the response time to changes as employees on the lower level can directly decide to react. Hence, we derive the following two hypotheses:

*H3a/b: Decentralization has a positive influence on detecting/reacting agility.*

*Formalization* defines the extent to which procedures, rules, roles and communications are documented (Pugh et al., 1963). Highly formalized organizations are characterized by many rules and procedures that are implemented to dictate certain behaviors (Damanpour, 1991; Liao et al., 2011). When a high degree of formalization is implemented in the organizational design, employees have to get approval or have to carefully document every task. Formalization hinders deviation from existing knowledge and restricts sensing the external environment (Jansen et al., 2006). Consequently, it also reduces employees' willingness as well as ability to detect changes outside the documented action field. The scope is reduced to documented tasks and/or procedures. In turn, the reaction to unpredicted changes is reduced. Thus, we hypothesize:

*H4a/b: Formalization has a negative influence on detecting/reacting agility.*

*Integration* describes the degree to which organizations coordinate activities between individuals and functions through formal coordination mechanisms (Liao et al., 2011). Coordination mechanisms play a central role in organizations because they help balance the design challenge between differentiation and integration (Lee and Grover, 1999). This type of integration is also called horizontal integration (Jian'an and Bei, 2007). When integration is encouraged by the organizational design, activities are

more integrated to allow for smoother operation. At the same time, it increases effort and time for alignment of the different tasks. The potential benefits of integration are then well-aligned tasks which interlock for better performance and more efficient operations. High integration builds on interlocking and aligned tasks that are adequate for agility, which allows us to derive the fifth hypothesis:

*H5a/b: Integration has a positive influence on detecting/reacting agility.*

With evolving digital technologies due to digitalization and the resulting increase of new business opportunities the number of tasks and changes inherent in organizations increases, which in turn increases complexity and creates the need of specialization (regarding expertise, domains, or industries) (Henfridsson et al., 2014). Hence, it is established that specialization also captures the organization's complexity (Meijaard et al., 2005; Zaltman et al., 1973) and that the number of different job titles or occupational types, the number of different departments, education and experience of the organizations' members as forms of specialization reflect the complexity of organizations (Damanpour, 1991). When high levels of *specialization* are enabled by the organizational design, employees can focus on specific tasks and develop a higher level of professionalism in their domain to address requirements of sudden changes (Willem and Buelens, 2009). The higher level of expert knowledge allows them to detect changes and come up with needed reaction within organizations. We derive our sixth hypothesis:

*H6a/b: Specialization has a positive influence on detecting/reacting agility.*

*Departmentalization* presents a different form of specialization (horizontal rather than vertical) determined by the variety of the different markets the organizations are targeting. We build on Damanpour's (1991, p. 574) notion that "functional differentiation representing the variety of organizational units" leads to higher departmentalization. Departmentalization in our study is based on the different focuses of the units (Meijaard et al., 2005). When organizations address different needs from different projects, clients, and industries their organizational design is more 'departmentalized' which in turn allows them to focus (Boyle, 1979) and, hence, improve their ability to detect the opportunities within in these domains and seize corresponding opportunities. Hence, we derive the following hypotheses:

*H7a/b: Departmentalization has a positive influence on detecting/reacting agility.*

### 3 Empirical Study

#### 3.1 Measurement Development and Study Design

In order to test our hypotheses, an empirical study based on a structured online survey has been conducted. Our research approach is structured in four stages: (1) operationalization of the nine constructs by adopting and adapting validated items from previous research (2) testing and validating the items and the research design, (3) reviewing and improving items based on feedback from practitioners (potential participants) as well as fellow researchers, and (4) implementing the items in an online survey.

We started the operationalization of the constructs based on the definition as well as corresponding sub-dimensions in the literature. Our research model includes five first-order constructs for organizational design, two constructs for agility (detecting and reacting agility), and two reflective first-order constructs for organizational effectiveness: client satisfaction and strategic growth. Our analysis draws on reflective measurement models only (Diamantopoulos, 1996; Podsakoff et al., 2003). Accordingly, the items represent the effects of the underlying constructs and are representative for all other possible items available within the conceptual domain of the construct. This allows single items to be omitted without changing the meaning of the construct (Hair et al., 2016).

The operationalization of our construct *decentralization* is based on Claver-Cortés et al. (2012). Based on the definition of decision making on lower levels of the hierarchy, we applied four items capturing on the decentralization of decision making. The distribution of power to the lower hierarchical levels is reflected in decisions about project assignments and new approaches to solutions and methods. In total, we selected four items to measure decentralization. For *formalization*, we adopted the items provided

by Jansen et al. (2006) and measured formalization based on two items. We selected items based on their focus on the formalization of tasks and procedures unfolding on daily basis. Important for us was the reflection of less flexibility and spontaneity due to predefined written procedures for tasks. We focused less on written job descriptions because context-specific and project-driven tasks are more often the norm (Robertson et al., 2003). Integration was measured using four items distinguishing integration based on a more departmental or team level as well as on an organizational level. Important for high integration is the execution on both levels. We specifically selected items that reflect integration in the organizational design. The integration of tasks and behavior is achieved through coordination (Willem and Buelens, 2009), hence we derived items from the horizontal coordination as defined by Willem and Buelens (2009) and informal coordination to reflect the sharing of information and experiences. Specialization is measured in various ways. Bergeron (2004) measure specialization with one item based on the number of distinct job titles in the organization chart. We built on their notion and extended our theoretical background based on higher specialization through a division of work (Liao et al., 2011). Hence, we applied the *specialization* measurements based on task diversity from Meijaard et al. (2005). Moreover, *departmentalization* concentrates on differences in terms of project, clients, and industries. Different units are established to address the needs across the different manifestations within these groups, which allows us to apply the departmentalization measurements based on divisional and functional configurations by Meijaard et al. (2005).

For agility, we followed our theoretical conceptualization and divided the measurement correspondingly into detecting agility and reacting agility. Although the separation into two dimensions is not uncommon (Lu and Ramamurthy, 2011), we did not find measures focusing on the two types of detecting and reacting agility, based on the definition of Sambamurthy et al. (2003). Hence, we reassigned measurements from existing studies based on our theoretical reasoning of the two types. We mainly used studies by Ahsan and Ngo-ye (2005) and Sambamurthy et al. (2007) to derive the items for *detecting agility* based on the ability to detect opportunities and foresee possible changes. In contrast, for *reacting agility* we drew on Lu and Ramamurthy (2011) and Sambamurthy et al. (2007). The measurements focus on the ability to quickly execute responding operations and capitalize on changes by providing new services.

To measure *organizational effectiveness*, accounting measures such as Return on Assets (Bharadwaj, 2000; Chakravarty et al., 2013; Claver-Cortés et al., 2012) or financial market measures (Richard et al., 2009) have been applied in earlier. However, in industries and contexts where objective measures are hard to attain subjective measures can be applied (Dess and Robinson, 1984). We used organizational effectiveness based on *strategic growth* and *client satisfaction* in our study to capture the performance. We argue that these indicators are adequate and can offer a good approximation of the performance for the respective organizations (Dess and Robinson, 1984). Strategic growth is used as a long-term effectiveness indicator at the organizational level (Ackoff, 1990) and considers the performance as compared to competitors and the market in general. For *strategic growth*, we used established measures based on performance indicators like new clients and reputation in comparison to competitors (Dvir et al., 2003; Leidner et al., 2011). Furthermore, we see client satisfaction as a fundamental pillar for future success and, hence, an important outcome, as client satisfaction indicates follow-up projects for professional service firms like consultancies (Nissen, 2007) or repetitive purchases (Taylor and Baker, 1994). For *client satisfaction* measures, we focused on the client's perspective and adopted measurements from prior research by Dvir, Raz & Shenhar (2003). The measurements reflect the most relevant dimensions from a clients' perspective regarding cost, quality, and service. Items for both constructs were measured relative to industry competitors (Leidner et al., 2011).

Lastly, we included control variables for organizational effectiveness based on similar research in our domain: organizational characteristics (size) and individual characteristics (age, gender, and work experience in the industry) (Leidner et al., 2011). In total, we applied 35 items for our study. To measure the items, we used a five-point Likert scale (where 1 = strongly disagree, and 5 = strongly agree) for all independent variables and a seven-point Likert scale (where 1 = strongly disagree, and 7 = strongly agree) for the dependent variables.

We made small adaptations to all items to fit our research setting. As research setting we chose the professional services / consulting industry. These firms are characterized by high knowledge, low capital intensity, and professionalized workforce (Von Nordenflycht, 2010). More specifically, we selected the consulting industry for the following reasons: First, the concept of agility is now, after having been introduced in other industries, also tested and experimented on in the consulting industry (Mason, 2010). Second, the consulting industry is not depending on physical products, hence new changes can quickly be reflected in the organizational design. Third, the consulting industry has previously been quite reluctant to changes and more innovative forms of organizing work are needed due to external influences such as digitalization (Christensen et al., 2013). Consequently, new configurations of the organizational design are tested and decisive adjustments to certain characteristics are made (Nissen et al., 2017), allowing us to observe various manifestations of our variables in this sample. The adaptations of items mainly cover changes in the wording to make items applicable to the consulting industry. Examples are the focus on clients instead of customers and on projects instead of products. Nonetheless, to keep our results comparable to former studies and preserve item validity, we applied the rule to stay as close as possible to the original items (Wunderlich and Beck, 2017).

We assembled all items in one survey and hosted it on the online survey platform Qualtrics. Due to our international focus, all items were translated from English to German and presented in both languages. The survey was not restricted to a specific country, due to the international nature of consulting industry. No restrictions were applied in order to achieve a fairly large sample. The survey was pre-tested with potential participants and fellow researchers to ensure content validity and smooth facilitation of the survey. Afterwards, the survey was conducted for 2.5 months, from June 2017 to August 2017. The link to the survey was sent out with a corresponding cover letter, which invited only consultants (due to our focus) to participate in the survey and contained a short description of the research objectives. All answers were collected anonymously. To target potential participants, we used different communication channels. First, we leveraged a sub-list of the mailing list of the German Consulting Association (BDU e.V.) and contacted members directly. Second, we published the survey on social media and forums with access to the consulting community (e.g., Xing, LinkedIn, Alumni Network). Third, personalized emails were sent to consultancies using their official company email addresses. Fourth, we directly contacted consultants by identifying contact names through general web research and social networking platforms. Finally, we used the research team's personal network to distribute the survey among further consultants. Finally, a total of 217 complete data samples were achieved<sup>2</sup>.

### 3.2 Measurement Model Evaluation

For the data analysis, we applied a multi-step approach. Following a series of quality criteria, we developed a structural equation model (SEM) based on our research model to test the hypotheses. Following the seminal work by Hair et al. (1998), we applied partial least squares structural equation modeling (PLS-SEM), which is now widely applied in our field (Hair et al., 2016). All calculations have been done in SmartPLS (v. 3.2.6) (Ringle et al., 2015). For bootstrapping we followed Hair et al. (2016) and used 5,000 subsamples. Table 1 presents the loadings within each construct as well as the reliability and validity measures as quality criteria. We followed Liao et al. (2011, p. 732) who consider indicators around .6 as acceptable and, additionally, take into consideration Sasidharan et al. (2012, p. 666) who accepted loadings of .5. For a sample of 150 respondents, Hair et al. (1998) recommend loadings of  $>.45$  as significant. Consequently, as all items in our study indicate factor loadings from .591 to .920, they are acceptable for our analysis.

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<sup>2</sup> We are unable to provide a response rate since the total number of (indirectly) contacted consultants via social network sites or by forwarding of our email within consulting firms is unknown.

Latent Variable	Loadings <sup>3</sup>	AVE	Composite Reliability	Cronbach's Alpha
Detecting Agility	.751-.851	0.659	0.885	0.827
Reacting Agility	.736-.841	0.626	0.869	0.801
Client Satisfaction	.842-.882	0.746	0.898	0.830
Strategic Growth	.777-.895	0.715	0.909	0.866
Decentralization	.676-.856	0.612	0.862	0.788
Formalization	.867-.920	0.799	0.888	0.752
Integration	.635-.788	0.510	0.805	0.681
Specialization	.781-.913	0.688	0.868	0.785
Departmentalization	.591-.881	0.590	0.808	0.650

Table 1. Assessment of the measurement model

The higher the indicator reliability the better the item works as a measurement of the construct (Hair et al., 2016; Hulland, 1999). Items below .7 and above .4 should only be deleted if this increases the average variance extracted (AVE) and R<sup>2</sup> (explained variance) substantially, which was not the case in our model. Further, AVE above .5 means that, on average, the construct explains more than half of the variance of its indicators, which is true for all latent variables in our model. To measure the internal consistency reliability (ICR), Cronbach's Alpha has been one of the most used criteria, but it is sensitive to item quantity and tends to underestimate ICR. Hence, ICR was measured using Composite Reliability and all items fall in an acceptable range (Composite Reliability values > .7).

To further validate the model, we assessed the discriminant validity to ensure that all constructs are statistically distinct from each other by empirical standards (Hair et al., 2016). Of the three different approaches available (Cross Loadings; Fornell-Larcker Criterion; Heterotrait-Monotrait Ratio (HTMT)), we chose the HTMT. The HTMT was selected for two reasons: first, research has found that the first two approaches tend to perform poorly (Hair et al., 2016); second, Henseler et al. (2015) propose the use of HTMT as the most accurate approach. The results are presented in Table 2 and provide sufficient levels of discriminant validity (all HTMT values of our model are equal to or smaller than .8).

Constructs	1	2	3	4	5	6	7	8	9
1. Detecting Agility									
2. Reacting Agility	.703								
3. Decentralization	.520	.497							
4. Formalization	.086	.248	.052						
5. Integration	.769	.611	.387	.105					
6. Departmentalization	.342	.374	.274	.119	.332				
7. Specialization	.254	.142	.152	.099	.107	.153			
8. Client Satisfaction	.558	.516	.354	.096	.476	.222	.068		
9. Strategic Growth	.535	.397	.342	.093	.486	.270	.137	.459	

Table 2. HTMT statistics for correlations among all constructs.

### 3.3 Structural Model Analysis

Our analysis was focused on two aspects: first, we analyzed the impact of the two types of agility on organizational effectiveness (H1 and H2), second, in order to validate the proposed impact of organizational design on determining detecting and reacting agility, we investigated the significance of main effects of the five independent variables (H3-H7). The estimations of our SEM were calculated using the bootstrapping routine in SmartPLS (v. 3.2.6) (Ringle et al., 2015). According to Bollen and Stine (1992), the bootstrapping can correct for standard error and fit statistic bias that occurs in SEM applications due to non-normal data.

The results are presented in Figure 2. The findings show that organizational design plays a substantial role for determining *detecting* agility. In particular, decentralization, integration, and specialization have a significant impact and explain 46.3% of the variance of detecting agility. According to Hair et al.

<sup>3</sup> For a detailed list of loadings for each item please refer to the Appendix.

(2011) we can classify our model as having moderate explanatory power. Accordingly, we can confirm hypotheses H3a, H5a, and H6a.

Further, the results also indicate that most determinants in the organizational design were significant in determining reacting agility. In particular, decentralization, formalization, integration, and departmentalization explained 37.7% of the variance of reacting agility (confirming H3b, H4b, H5b, and H7b).

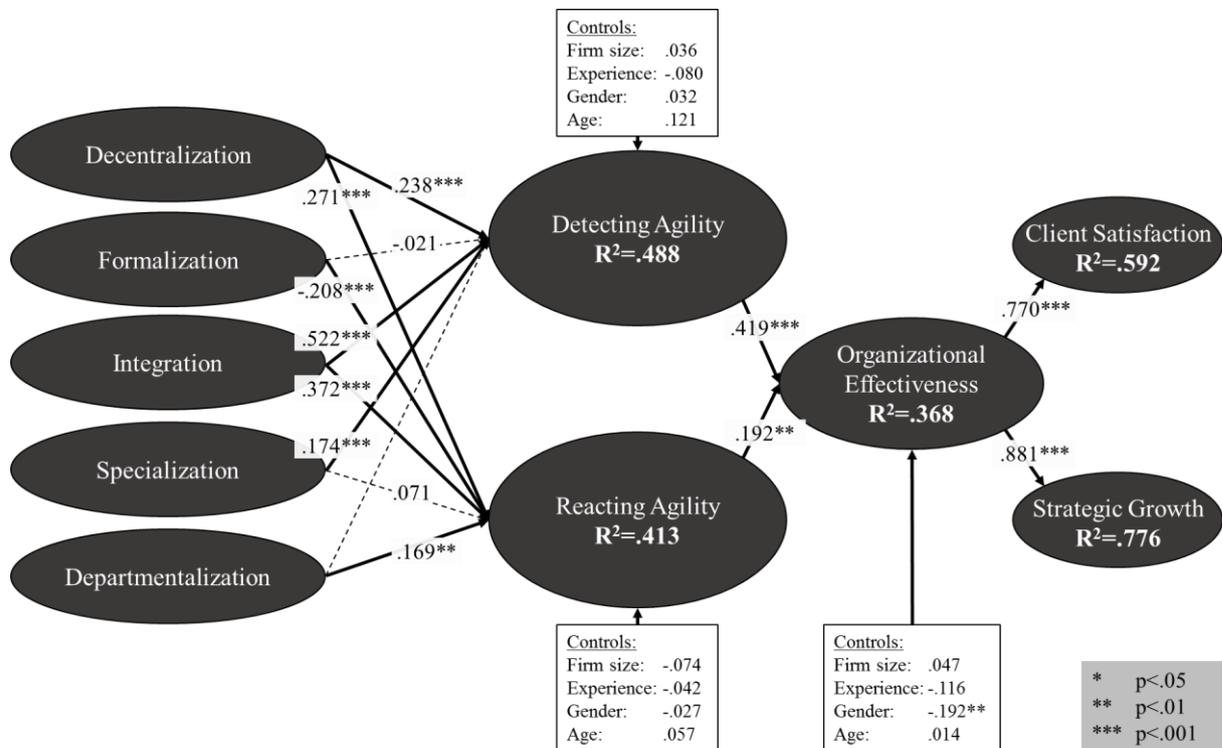


Figure 2. Structural Model Test Results

The paths between formalization and detecting agility, specialization and reacting agility, as well as between departmentalization and detecting agility are not significant (rejecting H3a, H6b, and H7a).

Finally, we found that detecting and reacting agility are determinants of organizational effectiveness, and hence, we found support for our proposed relationships between the two types of agility and organizational effectiveness. Precisely, detecting agility ( $\beta = .419$ ,  $p < .001$ ) and reacting agility ( $\beta = .192$ ,  $p < .01$ ) both have significant paths, while the relationship among detecting and effectiveness is stronger. As a result, we can confirm H1 and H2.

As an alternative model, we tested a mediation model by adding direct paths from the organizational design determinants to organizational effectiveness to the original model. However, the results remain structurally the same<sup>4</sup>. To summarize, H3a, H5a, and H6a for detecting agility, H3b, H4b, H5b, and H7b for reacting agility, and H1 and H2 for organizational effectiveness are confirmed. Our results are further discussed in the following section.

<sup>4</sup> Notable changes to the results from testing the original model: R<sup>2</sup> of org. effectiveness increases from .368 to .396; path from reacting agility to org. effectiveness becomes insignificant ( $\beta = .108$ ,  $p = .127$ ).

Direct paths from org. design characteristics to org. effectiveness: decentralization (.11 n.s.), formalization (-.048 n.s.), integration (.169\*), specialization (.011 n.s.), departmentalization (.033 n.s.).

## 4 Discussion

Our research disentangles the effects of organizational design on detecting agility and reacting agility. We coin and term the two types of agility and see that, based on our analysis, both types are promising and important capabilities for digitalizing organizations. Consequently, the organizational design should reflect the needed adjustments to best enable these two agility types. Our findings are supported by the evidence found in the literature, which strengthens our argument for the two types of agility. On top of that, our analysis now provides empirical evidence for the different determinants in the organizational design for the two types. Following our analysis, we can derive organizational design recommendations regarding new forms of organizing for digitalization:

First, decentralization increases organizations' agility in detecting environmental changes. Clients' needs and preferences can be sensed directly and more rapidly, which is particularly important for service firms that are highly dependent on their clients. In more decentralized environments, employees can make decisions in proximity to changes and customer, which allows them to detect opportunities faster (Claver-Cortés et al., 2012). Decentralization supports this approach because departments become more responsible for decision making and operational success (Harraf et al., 2015). Organizations with delegated decision-making power are better in responding to the environment as reactions tend to be more attuned and accurate when employees at lower levels can directly react (with decision-making power) to the changes (Harraf et al., 2015). Resulting adaptations are implemented with fewer delays usually associated with approval processes.

Second, digital organizations should be less formalized. Although the effect on detecting agility is not significant, the effect on reacting agility is negative. The negative path coefficient indicates our predicted constraints on organizational agility due to formalization (Alavi et al., 2014). The formalized and bureaucratic controls can ensure high-quality work (Brock, 2006), but limit freedom to react directly upon new opportunities due to digitalization. The execution of new ideas is hindered by written procedures and predefined rules as they do not reflect the new opportunities. We could not find any significant effect of formalization on detecting opportunities. We assume this is mainly due to different implementations of formalization in organizations. Whereas the search for new opportunities can be implemented in written rules in innovative organizations (and thus support detecting agility), formalization can reduce chances to detect new opportunities if formalization is focused on "existing knowledge and a unit's variation-seeking behavior" (Jansen et al., 2006, p. 1663).

The effects of integration are strongly positive both on detecting and reacting agility. Both types of agility are supported by integration as the exchange of knowledge and information among employees is reinforced. As a result, it is easier to detect market opportunities because colleagues can share what they have detected in one field with the rest of the organization. Integration allows sharing information and colleagues can leverage this information to detect even more opportunities. Although new opportunities are numerous and new business fields are created due to digitalization (Westerman et al., 2014), departments can only share information about them if they are integrated. Establishing an overarching organizational memory by integration with the knowledge that has been accumulated from different departments throughout the years is crucial to detecting and reacting to changes in the environment (Luca and Atuahene-Gima, 2007; Nätti et al., 2015). Integration allows organizations "to be adjusted quickly in order to meet changing environmental conditions" (Overby et al., 2006, p. 127) allowing organizations to capitalize on that through reacting agility.

We could not identify an effect between specialization (regarding the tasks and the degree of professionalism) and the ability to react to environmental changes. High professionalism can increase the emotional and functional attachment to established solutions and paths. Hence, it might increase reluctance to change and new approaches are often considered as a threat by experts in the field. On the contrary, the effect between specialization and detecting agility is significantly positive. Although high specialization limits the proper action, experts are able to assess the environment better and, hence, detect the relevant changes. Through specialization, their understanding of environmental changes is

better. However, if firms implement departmentalization with regard to external/market variables (e.g. structuration along client segments), the detection of environmental changes will be hindered. Hence, the effect of departmentalization on detecting agility is insignificant. In contrast, the effect of departmentalization on reacting agility is significant, which means that specialized departments (regarding the served clients/markets) can increase the reaction of organizations to environmental changes due to high market knowledge. Employees in highly specialized organizations understand market requirements better and can ensure the attuned reaction of organizations for higher organizational effectiveness.

Overall, we find that the majority of the organizational design characteristics are determinants of agility in organizations – while there are some differences regarding detecting vs. reacting agility. Nonetheless, we argue that both types of agility are important for the design of digital organizations as both influence agility. The differences should be considered when changing the organizational design and transforming how work is performed and managed in digital organizations. Consequently, our discussion underlines the effects uncovered by our research and puts agility forward as a requirement for digital organizations (rather than as just an add-on). Interestingly, the manifestation of the significant determinants matches the structural characteristics represented by Damanpour's (1991) characteristics of organic structures: decentralized, high levels of complexity, and high levels of integration. Furthermore, we believe that agility, due to its nature of better detecting change and reacting to opportunities as well as the effects of agility on organizational effectiveness in our model, can be a mediator for the anticipated benefits of organic structures like easier “adoption of innovation” and higher creativity (Damanpour, 1991, p. 579). Consequently, based on our result we can also support the notion of an ‘organic’ organizational design to support agility.

Although our study carries some substantial practical and theoretical implications, limitations have to be noted as well. First, organizational design is only one determinant of agility. Other studies discuss culture or technology as being also relevant determinants of agility. Second, although we use a fairly established set of characteristics of organizational design, more design determinants are plausible. Thus, the investigation of more characteristics might be promising. Third, an issue with questionnaire designs is possible common method bias (CMB), correlations among independent and dependent variables due to their measurement in a single survey (Podsakoff et al., 2003). To test for potential CMB, we added a theoretically unrelated marker variable to operationalize a common method factor (Lindell and Whitney, 2001; Sharma et al., 2009). We then compared changes in significance levels, path weights, and  $R^2$  of the dependent variables. Those comparisons did not show any structural differences which lets us assume that CMB is not a major issue in our data to a degree that it flaws our results. Fourth, our study is placed in the consulting service industry as a representative of the service sector and the survey addressed only consultants. Hence, future research can extend our findings to different industries and maybe uncover effects that are not significant in our study. We argue that further generalizability can be achieved as measures and hypotheses have not been developed with a focus on our research setting (only have been adapted to it). Future research can also build on our two types of agility to disentangle the effects of agility on more performance indicators and digital innovation.

## **5 Conclusion**

The results of our study show the important role of organizational design characteristics as determinants of agility. Consequently, we recommend managers to consider adequate design variables based on our study for digital organizations to be well prepared for coming changes due to digitalization. Next to these practical contributions, our study carries theoretical contributions: First, our study underlines the positive effect of agility on performance. This allows us to stress the importance of agility to improve performance when a lot of changes are caused by digitalization and digital innovation. Second, we bring forward the notion of the two types of agility. We highlight the importance to differ among both and we show how organizational design contributes differently to them. Third, the set of organizational design determinants allows to further theorize the design of digital organizations and advances the understanding of the relationship between organizational design and agility. Incorporating agility can thus lead to design more ‘digital organizations’ that are better prepared for current times.

## 6 Appendix

Name	Item Label	Loading	Reference
	In your consultancy, managers and consultants can independently from top management decide about ...		(Claver-Cortés et al., 2012)
DEC1	... project assignments.	.844	
DEC2	... approaches to the solution and working.	.739	
DEC3	... priority of projects and clients.	.856	
DEC4	... employee recruitment and layoffs.	.676	
FOR1	Whatever situation arises, written procedures are available for dealing with it.	.867	(Jansen et al., 2006)
FOR2	Rules and procedures play a central role in our consultancy.	.920	
INT1	Inter-departmental teams are set up regularly to allow for cooperation and joint decision-making.	.696	(Willem and Buelens, 2009, p. 158)
INT2	Intra-departmental meetings or calls are set up regularly for information exchanges.	.788	
INT3	Consultancy-wide information platforms and portals have been established to which all employees have access to.	.635	
INT4	The consultancy-wide allocation of human resources (e.g. their knowledge, disposability) takes place efficiently and effectively.	.728	
SPE1	All consultants have one particular focus (one industry, one service line, etc).	.788	(Meijaard et al., 2005)
SPE2	Our consultancy is dominated by a variety of highly specialized units.	.913	
SPE3	We have much more specialists than generalists in our consultancy.	.781	
DEP1	Projects are never the same and the scope of our projects has no overlap.	.591	(Meijaard et al., 2005)
DEP2	Our clients have very different needs and pose different challenges.	.881	
DEP3	The industries we serve have very different needs and pose different challenges.	.803	
DEA1	We seek novel approaches to satisfy future clients' needs.	.815	(Ahsan and Ngo-ye, 2005; Sambamurthy et al., 2007)
DEA2	To detect diverse opportunities for new services, we utilize cross-functional teams.	.844	
DEA3	We partner with other firms to better detect changes in the business environment.	.751	
DEA4	The screening for unforeseeable changes is implemented in all our business activities.	.835	
REA1	We always fulfill special requests of our clients whenever such demands arise.	.736	(Lu and Ramamurthy, 2011; Sambamurthy et al., 2007)
REA2	We can quickly scale up or scale down our service offerings to support changes in demand from our clients.	.765	
REA3	We quickly capitalize changes and apparent chaos as new opportunities for services.	.841	
REA4	We are quick to make and implement appropriate decisions in the face of client changes.	.818	
	Compared to our competitors in the last 12 months... {much higher   much lower}.		
CLS1	... our fulfillment of time goals for our client projects was ...	.866	(Dvir et al., 2003)
CLS2	... our fulfillment of budget goals for our client projects was ...	.883	
CLS3	... our staffing of projects with the right human resources which made us faster and more efficient was ...	.842	
STG1	... our overall performance was ...	.828	(Dvir et al., 2003; Leidner et al., 2011)
STG2	... our reputation in the market was ...	.777	
STG3	... our number of wins (new clients) was ...	.878	
STG4	... our number of new projects was ...	.895	
CO1	What is the total number of employees of your consultancy?		
CO2	How many years of work experience do you have in consulting?		
CO3	What is your gender?		
CO4	How old are you?		

Table 3. Overview Items

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