

## Research Report

# Digitization Drives Knowledgeable Employees to Innovate

DIGITIZATION CHALLENGES COMPANIES TO ACCELERATE THEIR INNOVATION CYCLES TO STAY COMPETITIVE. THIS RESEARCH INVESTIGATES HOW IT KNOWLEDGE ESTABLISHED ON DIFFERENT HIERARCHICAL LEVELS LEADS TO ORGANIZATIONAL INNOVATIVENESS. DIFFERENTIATING BETWEEN STRATEGICALLY MORE AND LESS DIGITIZED ORGANIZATIONS, THE RESULTS REVEAL: ORGANIZATIONAL INNOVATIVENESS IS SIGNIFICANTLY HIGHER INFLUENCED BY THE IT KNOWLEDGE OF BUSINESS EMPLOYEES IN ORGANIZATIONS GIVING THE DIGITAL BUSINESS STRATEGY HIGH IMPORTANCE, WHEREAS THE MANAGEMENT'S ROLE DECREASES. WE FURTHER DEDUCE THE CIO'S POSITIVE ROLE FOR IT-ENABLED BUSINESS INNOVATION IN KNOWLEDGE-INTENSIVE INDUSTRIES, SUCH AS THE FINANCIAL SERVICES SECTOR.

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### Introduction

For more than nearly four decades, the question whether or not technology is able to generate new products is discussed. Fueled by digitization, highly digitized markets demand organizations to become more and more innovative. The commonly used digital infrastructure is not enough to stay competitive since it can be swiftly copied or imitated. Organizations face up with these digitization challenges by developing and executing a digital business strategy (DBS) that merges business and information technology (IT) strategies into a single one (Bharadwaj et al., 2013). A DBS allows organizations to generate more business value

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from IT and thereby profit in highly competitive markets. In order to implement a DBS successfully within a company, a continuous and organization-wide culture towards innovativeness needs to be established.

Organizational innovativeness expresses the capability of an organization to generate new ideas from the interplay between technical and administrative innovations. As especially IT contributes to understand, synthesize, and apply technical knowledge for developing innovations, this research concentrates on the role of the CIO as agenda setter, influencer, and distributor of IT knowledge within organizations.

Innovative organizations are characterized by leadership in particular balancing influences from "outside" with capabilities and knowledge from "inside" the organization to assess potential innovation opportunities. Herein, the CIO's role is mission-critical as he or she is in charge of turning IT capabilities into IT-enabled business innovation.

This research aims at exploratively investigating how different degrees of executed DBS lead to different organizational innovativeness outcomes. This will reveal first insights on organizational consequences of DBS. Further, we explain the role of the CIO in how the distribution of IT knowledge especially to the business side contributes to organizational innovativeness, which ultimately leads to organizational performance.

### Leadership, Knowledge, and Innovation

Leaders act as both (informational) sources of knowledge and (interpersonal) energizers for creating knowledge. Especially in knowledge-intensive industries, hierarchical exposed senior managers effectively lead in creating organizational knowledge by stimulating organizational learning. For innovative organizations, the leadership function has to provide

broad guidelines to the organization, balancing the knowledge transfer from "outside" to "inside" the organization and leaving enough room for the employees to act innovatively at the same time. In order to measure IT leadership by means of a state-of-the-art construct, we adapted items from a recent study revisiting managerial roles for IT leadership against the background of digitization (Wunderlich and Beck, 2017; Table 1). Especially in service and knowledge-intensive industries, such as the financial industry, IT knowledge is a pivotal organizational resource and becomes increasingly evident for the business side due to forced business process digitization.

Knowledge, IT, and innovativeness are closely intertwined: IT represents a crucial component for organizational knowledge storage and sharing, whereas knowledge plays a crucial part in innovation processes. Innovation requires to integrate heterogeneous knowledge resources from both external as well as internal sources to generate creative ideas, tasks, or procedures. IT offers a basis to acquire, collect, and internalize data and information, thereby enhancing the analytical capability of an organization and contributing to build organizational knowledge (Joshi et al., 2010).

Providing new business-side employees with adequate training for the introduction to the IT-related job tasks at hand.
Evaluating the quality of business-side employees' IT performance.
Gathering information about IT trends outside your organization.
Allocating IT equipment or related materials.
Learning about new ideas originating outside of your department.

Table 1: CIO IT Leadership, 5-Item-Conceptualization (Wunderlich and Beck 2017)

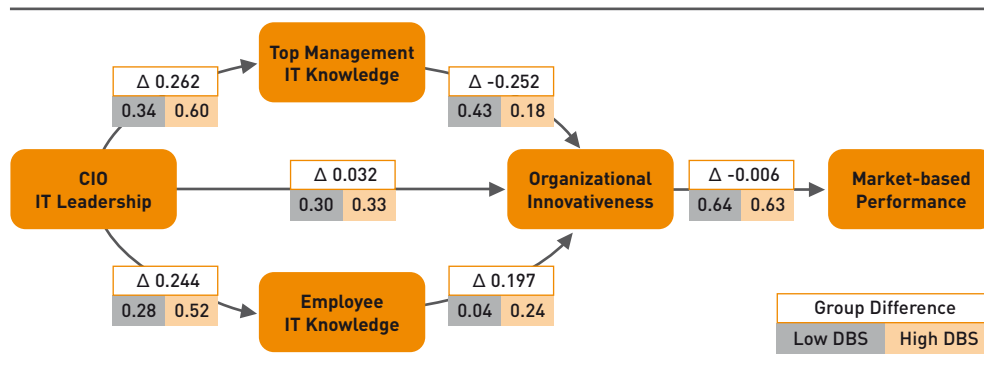


Figure 1: Resulting Group Differences (Wunderlich and Beck, 2018)

Especially for complex and technical undertakings, digital platforms serve to understand, synthesize, and apply knowledge in innovations developing (Yoo et al., 2012).

Not surprisingly, organizational innovativeness is closely related with organizational culture that stimulates learning, development, and participative decisions. In particular, organizational innovativeness significantly influences firm performance in turbulent markets, where a technology-centered strategy catalyzes the effect of organizational innovativeness on firm performance. In highly digitized markets, organizational innovativeness serves as a longer lasting capability since it appears difficult to imitate.

**Empirical Investigation**

This research concentrates on how internal, IT-related competencies and resources (IT leadership, IT knowledge) lead to more business value (organizational innovativeness, market-based performance). According to the

definition of a DBS as guideline how to configure the internal resources in order to impact on the market, this exploratory research focuses in particular on how the regarded influences vary in accordance with the degree of established DBS. By validating the proposed hypotheses (each represented by one arrow in Figure 1), we gain first quantitative results about realized DBS in organizations.

In order to test the proposed hypotheses, a study sample of 228 senior IT decision makers in the US was collected within a questionnaire-based online survey between December 2016 and January 2017. 1,015 participants of a CIO panel operated by a large international market research institute were invited to answer the survey. In particular, we focused on knowledge-intensive organizations as classified by the OECD to concentrate on firms that are most likely to have a DBS. In addition, to control for industry sector, we ensured for firm sizes larger than 50 employees and IT departments with more than two employees. To test

the proposed hypotheses, we computed the research model within a structural equation modeling (SEM) achieving very high quality criteria for all measurement constructs.

To differentiate the degree of executed DBS within the knowledge-intensive organizations, we asked the respondents to indicate how much the following statement applies to their organization (rated on a 5-point Likert scale): “Our organizational strategy is formulated and executed by leveraging digital resources to create differential value”, adopted from the given DBS definition (Bharadwaj et al., 2013, p. 472). A descriptive analysis of the variable led to a group division resulting in low-DBS (n=98, for Likert values 1-3) as well as high-DBS organizations (n=130, for Likert values 4 and 5). The comparison of the two groups shows several significant deviations (Table 2): mainly, high-DBS firms are larger than low-DBS firms. Likewise, market share and IT department size correlate with firm size and show higher values for high-DBS organizations. The calculated relation of firm size towards IT department size results in a significantly higher IT support intensity in high-DBS firms, in particular, 8.5 employees ministered by one IT employee in high-DBS firms versus 10.2 in low-DBS firms. IT experience and organizational tenure of a CIO is at same level for both groups, slightly higher in high-DBS firms (about one year).

**Research Results**

Interested in group differences between high-DBS and low-DBS firms, we state a higher influence of employee IT knowledge on organi-

zational innovativeness in high-DBS firms. In parallel, the top management’s IT knowledge on organizational innovativeness remains on lower level in high-DBS firms. This interaction effect is demonstrated in Figure 1, presenting the path intensity for both high-DBS and low-DBS groups and the respective difference Δ. Notably, the first effect is exclusively found for high-DBS firms, while almost all hypothesized influence from employee IT knowledge on organizational innovativeness was rejected for low-DBS firms (0.049).

Representing the CIO-initiated process to achieve IT knowledge distributed on two hierarchical levels of the business side (top management and employees), we find significantly higher influence of a CIO’s leadership activities on IT knowledge in high-DBS firms on both top management and employee IT knowledge. This confirms prior findings on how the CIO influences IT knowledge throughout the whole organization; and underlines the exceptional role of IT knowledge on all hierarchical levels in knowledge-intensive industries. Further, we state the CIO’s leadership function as playing a crucial role especially in high-DBS organizations.

The direct influence of the CIO on organizational innovativeness stays nearly equal in both groups, but on lower level than the IT leader’s influence on IT knowledge in high-DBS firms. Finally, the influence of organizational innovativeness on market-based performance was found similar for the whole sample as well, underlining the general importance of this

organizational ability on firm performance in knowledge-intensive businesses.

### Discussion of the Results

This research found convincing empirical evidence how knowledge-intensive organizations transfer external influences by means of an IT-integrated business strategy, namely DBS, to effective internal organizational structures and resources and finally firm performance. Especially organizations conducting a DBS (Bharadwaj et al., 2013) take advantage of the pivotal resource of IT knowledge on the managerial and the business employee level. We primarily want to highlight that the positive consequences of firm IT knowledge exclusively occur in organizations executing DBS to achieve organizational innovativeness. This is particularly essential for competitive reasons, organizational innovativeness as part of organizational culture is even harder to imitate (Joshi et al., 2010).

Based on a sample of industries grouped upon the degree of knowledge intensity provided by the OECD, we are able to confirm recent considerations on organizations becoming increasingly dependent on IT-based innovations. This supposes that the type of strategy

an organization conducts significantly impacts how organizational knowledge is utilized for organizational innovativeness, resulting in increased firm performance in the same step. Generally, we can underline the costly and – at first glance – inefficient processes of sharing and creating organizational knowledge as relevant for organizations to cope with the challenges arising in highly digitized markets by means of organizational innovativeness.

For the entire sample, we can state a hierarchically similar influence of the CIO on IT knowledge of the top management or of business employees. Differentiating between the two DBS groups, we find a significantly higher influence of CIO leadership on both types of IT knowledge, underlining empirical results that both IT knowledge and CIO leadership play a more present role in DBS organizations.

We can state that high-DBS organizations more intensively take advantage of the improvements offered by utilizing IT and IT capabilities for innovation processes (Yoo et al., 2012). Furthermore, we can concretize prior findings on how the hierarchical level distinguishes in being affected by knowledge processes.

In more detail, we found strong evidence for two general relationships on the basis of the complete sample. First, the influence of organizational innovativeness on market performance reacts similar in both subsamples, confirming prior research results. This emphasizes the relevance of business strategies to transfer innovations effectively to the market in general. Second, the influence of the CIO on organizational innovativeness performs nearly equally for both groups, underlining the pivotal influence of the CIO's potential for IT-enabled business innovation.

For IT leaders in practice, our findings reassure and intensify the CIO to utilize IT for business innovation. We applied a modernized and comprehensive CIO IT leadership construct (Wunderlich and Beck, 2017), verifying the CIO's function as crucial institution in executing a (digital) business strategy. The findings underline the CIO's leadership role as mediator between the external environment and internal structures and resources since the used items express the process of gathering information from outside of the organization as well as from the business-side for acquiring new organizational knowledge. Our findings further confirm the influence of organizational leaders on knowledge creation and dissemination. Organizations executing DBS generate organizational innovativeness by integrating more employee IT knowledge than top management IT knowledge, compared to low-DBS organizations. In practice, CIOs in highly digitized business environments shall concentrate on rein-

forcing this beneficial employee level based organizational resource.

### References

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Means of Groups	Firm Size	Market Share	Size IT Unit	Firm Size / IT Unit
Low-DBS	3,166	35	149	10.2
High-DBS	47,698	46	8,684	8.5
Full Sample	28,557	41	5,016	9.2

Table 2: Differences in Group Characteristics