Understanding Inertia in Digital Transformation: A Literature Review and Multilevel Research Framework

Completed Research Paper

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Abstract

The rise of new digital technologies requires organizations to adjust their current strategy, processes and product portfolio, a phenomenon known as digital transformation. Organizations undergoing digital transformation face substantial barriers and a range of inertial forces. While inertia has been studied to a great extent under the lens of organizational transformation, digital transformation provides a different and distinct context. Despite recent studies recognizing inertia as a key challenge for digital transformation, inertia remains poorly understood, making it harder to develop ways of successfully dealing with it. To address this gap, we conduct a literature review on inertia in relation to digital transformation. Our proposed framework incorporates the antecedents, key attributes, dimensions, moderators, and consequences of inertia. We conclude with a research agenda offering four avenues for advancing our understanding of inertia in the context of digital transformation to make digital transformation a more effective and successful endeavor.

Keywords: digital transformation, digital innovation, inertia, organizational transformation

Introduction

The successful development of ideas using digital technology has become a decisive factor for organizational survival in today's competitive environment (Nambisan et al. 2017). While new emergent entrepreneurial setups are quite successful in launching and managing these digital innovations, incumbent companies are facing significant barriers in building new digital capabilities (Vial 2019; Warner and Wäger 2019). The digital transformation these companies are engaging may be described as *"the combined effects of several digital innovations bringing about novel actors, structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within organizations, ecosystems, industries or fields"* (Hinings et al. 2018, p. 55). Practitioner studies report that 70% of digital transformation initiatives do not meet their objectives due to their efforts being hampered by *"organizational inertia from deeply rooted behaviors"* (Forth et al. 2020, p. 1). This is also substantiated by recent empirical studies investigating companies' digital transformation journey, which identify inertia in the organization as a major impediment for mastering digital transformation (Schmid 2019; Soto Setzke 2020; Vial 2019).

While inertia is a well-researched phenomenon in the context of Information Systems (IS)/ Information Technology (IT)-enabled transformation, Besson and Rowe (2012) recognize that most organizational transformation theories are *"pre-Internet theories of transformation"* (p. 116). Further, recent research has found that digital transformation is different to IS-/IT-enabled transformation both in its scope and impact (Hartl and Hess 2017; Vial 2019; Wessel et al. 2020). Firstly, in terms of scope, IS-/IT-enabled transformation focuses mainly on the deployment of technology in the organization (Markus et al. 1997; Venkatraman 1994) whereas Digital Transformation also takes place beyond organizational boundaries, such as at the ecosystem level (Appio et al. 2021; Hanelt et al. 2020). Secondly, in terms of impact, Wessel et al. (2020) argue that IS/IT-enabled transformation enforces existing value propositions and organizational identities, whereas digital transformation leads to a novel organizational identity and value proposition. Based on the nature of digital technology (Yoo et al. 2010), they further argue that existing models of transformation should be reconsidered (Wessel et al. 2020). Thus, the distinct characteristics of digital technology (e.g., generativity or modularity Nambisan et al. 2017; Yoo et al. 2010) could lead to different types of inertia during the exploration and exploitation of digital technology (Besson and Rowe 2012). At the same time, the lens of inertia may also allow for more relevant theorizing on the emerging phenomenon of digital transformation in its situated organizational context (Drechsler et al. 2020; Schmid 2019).

In the current body of knowledge on digital transformation, the term inertia is used broadly to describe employees' resistance or barriers that appear as part of organizations' transformation journeys (Schmid 2019; Vial 2019). Yet, while the relevance of inertia in transformational endeavors seems undisputable, a common understanding of inertia is missing (Besson and Rowe 2012; Schmid 2019). As Schmid (2019) has explained: *"To date, organizational studies have not come to terms with the phenomenon of inertia itself or its antecedents and consequences"* (Schmid 2019, p. 3). This lack of conceptual coherence has serious implications. First, it makes it harder to understand how inertia appears differently in the context of digital transformation than, for example, in IT-enabled transformation. Second, a lack of understanding of how inertia unfolds in the context of digital transformation, and its underlying causes, makes it difficult to find ways of supporting organizations to cope with inertia (Besson and Rowe 2012). As a first step towards addressing these issues, we aim to better understand current research on inertia in digital transformation. Hence, we pose the following research questions:

Research Question 1: What is the current body of knowledge on the role of inertia in the context of digital transformation in IS and management research?

Research Question 2: What are the future directions for studying inertia in digital transformation in IS and management research?

To answer our research question, we conducted a structured literature review. Based on our results, we propose a conceptual framework for the study of inertia in digital transformation. Our contribution to IS research is twofold. Firstly, our overview and framework can be seen as a first step towards developing a better understanding of inertia in digital transformation (Besson and Rowe 2012; Schmid 2019). Secondly, our framework helps to identify current gaps that can help scholars with their future research. Further, our understanding of inertia and of how the concept is used in the context of digital transformation may help develop insights into the particularities of digital transformation, and of potential different types of inertia emerging in this context.

Conceptual Background

Digital Transformation

In defining digital transformation, we follow Hinings et al. (2018), who understand digital transformation as the *"combined effects of several digital innovations bringing about novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within organizations, ecosystems, industries or fields" (p. 53)*. Digital transformation is often understood as a consequence of digital innovation (Hinings et al. 2018; Vial 2019). The latter has been defined by Yoo et al. (2010) as *"the carrying out of new combinations of digital and physical components to produce novel products" (p.725)*. In this context, digital transformation refers to a procedural understanding of the term digital innovation (Hinings et al. 2018; Vial 2019; Yoo et al. 2010).

In fact, the process of developing digital innovation is shaped by rather distributed collaborations of actors (Nambisan et al. 2017; Yoo et al. 2010). Further, the generative characteristics of digital technology allows for the realization of new affordances of technology (Baiyere et al. 2020; Yoo et al. 2010). This particular characteristic has challenged existing theories and led to the development of a digital form of innovation management (Nambisan et al. 2017) and of digital entrepreneurship (Nambisan et al. 2017). In the context of digital transformation, the afore-mentioned characteristics of digital innovation require companies to adjust the current organizational structure, strategy and product portfolio (Drechsler et al. 2020), and, as has been suggested, a move towards more malleable organizational designs (Hanelt et al. 2020; Weill and Woerner 2018). Similarly, it has been argued that digital transformation is a multiple level phenomenon. For example, Appio et al. (2021) distinguish between digital transformation on (1) a micro-level (individual), (2) a meso-level (organizational), and (3) a macro-level (ecosystem, industry). Further, as part of digital transformation initiatives and programs, organizations often set up new dedicated organizational structures like innovation labs or units (Dremel et al. 2017; Haskamp et al. 2021) and create new roles such as Chief Digital Officers and Digital Transformation Offices (Chanias et al. 2019; Singh et al. 2020; Tumbas et al. 2017). Similarly, they aim to implement a cultural change to embrace entrepreneurial and agile thinking within the organization (Drechsler et al. 2020; Dremel et al. 2017; Warner and Wäger 2019). As part of these endeavors, empirical studies of organizations pursuing this journey frequently mention inertia as a key barrier for organizations to overcome (Schmid 2019; Soluk and Kammerlander 2021; Töytäri et al. 2017; Warner and Wäger 2019). However, this currently covers a relatively broad spectrum of issues like for example, employee resistance (Soluk and Kammerlander 2021; Warner and Wäger 2019) and the rigidity of existing routines and IT infrastructure (Drechsler et al. 2020; Schmid 2019).

Inertia

Originally, the term inertia originated in physics, where Isaac Newton understood it to be *"a power of resisting by which every body, as much as in it lies, endeavours to preserve its present state, whether it be of rest or of moving uniformly forward in a straight line"* (Newton and Chittenden 1850). From here, the term has expanded into disciplines of social science such as management (Hannan and Freeman 1984; Rumelt 1995; Tushman and O'Reilly 1996) and IS research (Besson and Rowe 2012; Polites and Karahanna 2012).

A first industry-level lens on inertia has been developed by Hannan and Freeman (1984) introducing structural inertia, which they define in relative as well as in dynamic terms. Thus, structural inertia "*refers to comparisons of the typical rates of change [...]. In particular, structures of organizations have high inertia when the speed of reorganization is much lower than the rate at which environmental conditions change. (*p.151). Taking an organizational lens, Rumelt (1995) draws on a resource-based view of the firm for an evolutionary view of transformation: *"Inertia is the strong persistence of existing form and function."* (p.103). Taking the theoretically connected lens of ambidexterity, Tushmann and O'Reilly (1996) later introduced the two types of structural and cultural inertia. They define structural inertia "*as a resistance to change rooted in the size, complexity, and interdependence in the organization's structures, systems, procedures, and processes"* (Tushman and O'Reilly 1996, p. 18) whereas cultural inertia deals with *"informal norms, values, social networks and in myths, stories, and heroes that have evolved over time"* (Tushman and O'Reilly 1996, p. 18). In IS, inertia gained prominence from two main roots. Firstly, in the context of IS-/IT-enabled transformation, Besson and Rowe (2012) define inertia as *"the first level of analysis of OT [organizational transformation] in that it characterizes the degree of stickiness of the organization being transformed and defines the effort required to propel IS-enabled OT* (p.105). In another step, the authors differentiate between five main inertia dimensions: negative psychology inertia, socio-cognitive inertia, socio-technical inertia, economic inertia and political inertia (Besson and Rowe 2012). Secondly, Polites and Karahanna (2012) introduce inertia in the context of new IT systems, describing it as the *"attachment to, and persistence of existing behavioral patterns (i.e., the status quo), even if there are better alternatives or incentives to change (p.24)"*. They further distinguish between three types of inertia, namely, behavior-based, cognitive-based, and affective-based inertia. Besson and Rowe (2012) argue for the need to better understand the relationships between different types of inertia, and how they unfold. While researchers (Audzeyeva and Hudson 2016; Ertl et al. 2020; Schmid 2019) have worked on developing the concept further, they also acknowledge that this lack of knowledge hampers the theoretical understanding of inertia, its antecedents and consequences (Schmid 2019).

Methodology - Structured Literature Review

The aim of our literature review is to develop a clear understanding of the current body of knowledge on the phenomenon of inertia in digital transformation. Thus, we conducted a structured literature review which is a recommended approach for gaining a comprehensive overview of existing research on a given topic (Webster and Watson 2002). As a result, a review *"may aim at understanding the phenomenon as a whole, its overall meaning and its relationships from the parts to the whole"* (Rowe 2014, p. 243). More specifically, our review can be classified as a theoretical review as we draw *"on existing conceptual and empirical studies to provide a context for identifying, describing, and transforming into a higher order of theoretical structure"* (Paré et al. 2015, p. 188). Such a review is a robust choice to *"tackle an emerging issue that would benefit from the development of new theoretical foundations or a mature topic for which an accumulated body of research exists but there is a lack of appropriate theories"* (Paré et al. 2015, p. 188). As described earlier, inertia in digital transformation presents an emerging issue (Schmid 2019; Vial 2019) that would highly benefit from a more advanced theoretical substantiation (Besson and Rowe 2012; Schmid 2019). As our structural dimension to synthesize our findings, we use the building blocks of theory by Whetten (1989) which have been used successfully in other contexts (Schilke et al. 2018). Our sample of papers does not cover all the relevant literature but focuses on a representative set of articles (Paré et al. 2015), thereby organizing prior research on the given topic and examining relationships to facilitate the development of new theories (Paré et al. 2015, p. 188; Webster and Watson 2002). Following established guidelines on conducting literature reviews (vom Brocke et al. 2009; Rowe 2014; Webster and Watson 2002), our review covers relevant publications in peer-reviewed journals and conferences without claiming exhaustiveness.

Search Process

Our review topic - inertia in digital transformation - can be categorized as interdisciplinary research area (Management, IS, and Psychology). Therefore, we decided to use the databases Web of Science Core Collection (WoS), Science Direct (SD), Business Source Ultimate (BSU), APA PsychInfo (APA) and the AISeLibrary (AIS). Building on keywords that have been proven successful for reviews on digital transformation (Hanelt et al. 2020; Vial 2019), we used the keywords "digital" and "transform" or "disrupt" for the term of Digital Transformation. For inertia, we searched with the terms "inertia" and "barrier" (Schmid 2019). Combining these two terms resulted in search strings such as "inertia" OR "barrier" AND "digital transform*" OR "digital disrupt*". Search strings were entered into the databases and, depending on the database, we searched the title, abstract and keyword. To ensure the quality of the articles, we used the option to search for only peer-reviewed articles within the databases.

The WoS generated 144 results which were then reviewed based on screening the abstract. This resulted in the selection of 10 papers. In terms of the selection criteria at this stage, papers had to be in English and required a connection to both inertia (Besson and Rowe 2012) and digital transformation (Hinings et al. 2018).

Where we were unsure, we briefly screened the paper by reading the abstract, and searching within the paper for the keywords. We then searched the databases SD (196 hits and 16 selected papers), BSU 98(5), APA 403 (7) and for the AIS 184(10). This resulted in a total of 48 papers based on 1025 initial hits. From the 48 papers we moved on to a second stage of screening in which the entire paper was read. In terms of the inclusion criteria, we checked if the paper had a clear connection to digital transformation and was explicitly talking about inertia or barriers on the micro, meso or macro level. As part of reading the papers, we also checked if the paper was published in a peer-reviewed journal or conference for the corresponding area. Regarding our exclusion criteria, we removed all those papers that focused only on inertia or digital transformation, and those that were referring to our phenomenon in a non-organizational context. This resulted in 29 papers being retained. A forward and backward search of our sample added three more articles, resulting in a final set of 32 papers. An overview of the process is shown in Figure 1.

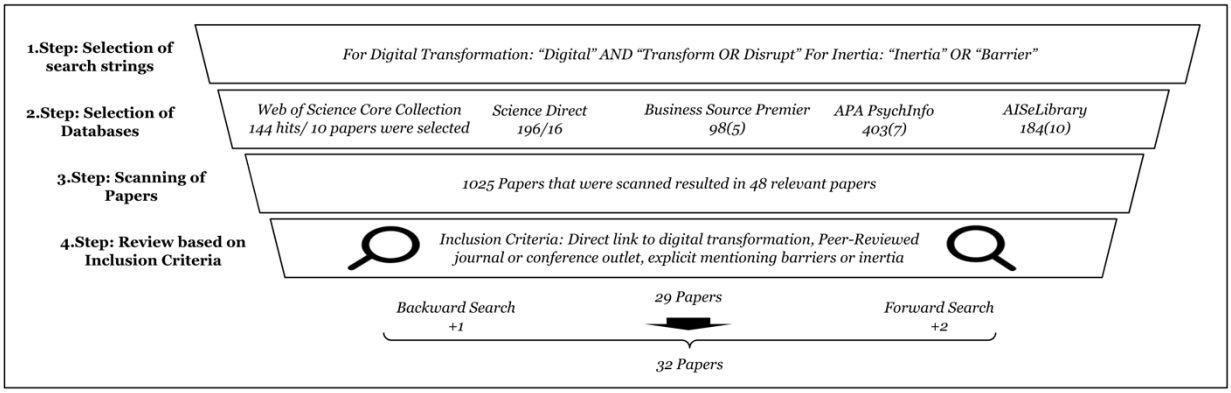

Figure 1. Overview of Literature Review Process

Analysis

The 32 papers were then subject to our analysis in which we created an Excel sheet with key information about the paper (author, title, outlet, year and research design). With the intention to clarify the current body of knowledge on the concept of inertia, we started to work with the fundamental building blocks of theory (Whetten 1989) and added them as columns to our analysis sheet. Whetten (1989) distinguishes between the *what*, *how*, *why* and the *who/where* and *when* of the phenomenon. The *what* refers to the nature and properties of the phenomenon of interest, in our case inertia. Our coding resulted in two subareas, i.e. dimensions and attributes of inertia. The *how* refers to the relationship of inertia with other dependent and independent variables. This resulted in the subdimensions of consequences and antecedents. The *why* refers to the underlying assumptions and explanations of inertia which we summarized in the subarea assumptions. Lastly, aiming to clarify the boundary conditions of inertia, we aim to answer the *who/where/when* aspects of inertia by providing moderators for the manifestation of inertia. In the analysis, we considered digital transformation a multi-level phenomenon, thus using the level of micro, meso and macro (Appio et al. 2021). Regarding the process of the analysis, informed by earlier review endeavors (Besson and Rowe 2012) and Whetten's (1989) building blocks of theory, we chose 10 articles that were part of our sample for a first coding that was discussed by the team of authors. Ending up with Whetten's (1989) subdimensions we coded the remaining papers. Thus, we followed an iterative approach as we moved between existing research and our data (Webster and Watson 2002). Regarding publication outlets, our final set contained 22 studies belonging to IS and ten studies being published in management.

Results

Our findings are structured along the concepts that resulted from our literature review, and that focus on (1) inertia per se with its assumptions, attributes, and dimension, (2) antecedents and consequences of inertia, and (3) moderators of inertia. Building on those, we synthesize the extant body of knowledge in the form of our conceptual framework that builds on our concept matrix of the review. On this basis, we propose research avenues to develop a more robust and in-depth understanding of inertia in digital transformation.

Understanding Inertia: Assumptions, Attributes and Dimensions

In this subchapter, we embed inertia into theories on change and transformation, based on our analysis. We further identify key attributes that help to characterize inertia, thus extending Rowe and Besson (2012)' dimensions.

Assumptions: Embedding Inertia in Change and Transformation

The concept of inertia can only be understood in light of a clear conceptual understanding of change and transformation (Besson and Rowe 2012). As part of our analysis, we identified three main theoretical understandings of inertia in the context of change (see Table 1).

Theoretical Assumption	Explanation and Source
Evolutionism	Organizations go through an evolutionary journey in which they reproduce themselves and are replaced by other more adaptable forms (Hannan and Freeman 1984)
Punctuated equilibrium	Organizations evolving through relatively long periods of stability (equilibrium periods) in their basic patterns of activity that are punctuated by relatively short bursts of fundamental change (revolutionary periods) (Romanelli and Tushman 1994, p. 1141)
Path dependency	Organizations move through three developmental phases of path dependence, starting with (1) singular historical events, (2) which may, under certain conditions, transform themselves into self-reinforcing dynamics, and (3) possibly end up in an organizational lock-in (Sydow et al. 2009, p. 690)

Table 1. Theoretical Integration of Inertia

First, evolutionism understands organizational transformation as a process through which organizations reproduce themselves. Further, selection through adaptability is vital for organizational survival (Hannan and Freeman 1984). Here, inertia refers to the attribute of organizational alignment with the environment. Thus, inertia is triggered through a change within the external environment in which organizational adjustments for alignment result in inertia. Second, following the view of punctuated equilibrium, organizations evolve over time and go through different periods of stability and change. Thus, change happens through revolutionary events over time (Romanelli and Tushman 1994). Hence, inertia must be very prominent in such revolutionary events which underlines its relational character. Third, path dependency is often mentioned as vital to explaining inertia. It refers to the understanding that organizations go through three developmental phases in which events reveal organizational dynamics which lock-in the organization (Sydow et al. 2009). This understanding of inertia recognizes time dependency and that historic actions determine an organization's available options. To our surprise, all studies within the sample relied on an either post-positivist or constructivist worldview which confirms other reviews in the area of digital transformation (Kutzner et al. 2018). A critical realist understanding of change and transformation was hard to find although such a lens has proven its benefits in the study of technology-mediated change (Allen et al. 2013; Volkoff and Strong 2013) and recent studies have asked for it (Vega and Chiasson 2019).

Attributes

Inertia is consistently characterized by five key attributes (see Table 2) across the studies we analyzed. These principal attributes help to better understand the phenomenon of inertia in studying digital transformation.

Attribute	Explanation and Source
Paradoxical duality	Inertia plays a dual role in organizations: it is both required for organizational efficiency and an antecedent of resistance to change (Besson and Rowe 2012; Schmid 2019)
Rigidity of existing entities	Inertia signals an existing rigidity of social (knowledge, habits, routines, identities, capabilities) and material (organizational resources and infrastructure) entities which act as barriers to change (Rumelt 1995; Schmid 2019; Tripsas 2009; Vial 2019)
Relational	Inertia is a relative/relational phenomenon, thus requiring an intervention to be activated (Utesheva et al. 2016)
Time-dependency	Inertia is a time-dependent concept as historical decisions on the individual, organizational or industry level determine present options for change (Rolland and Hanseth 2021; Warner and Wäger 2019)
Misalignment between entity and environment	Inertia signals a form of misalignment between the entity and its environment (Besson and Rowe 2012; Hannan and Freeman 1984)

Table 2. Attributes of Inertia

Firstly, inertia is part of a paradoxical duality (Schmid 2019; Weick and Quinn 1999). On the one hand, inertia and its positive manifestation of highly routinized organizational behavior is vital for organizational efficiency. On the other hand, it is exactly this high level of routinizing that turns into a barrier when adjustments are necessary, as is the case in digital transformation (Vial 2019). The second key attribute refers to the rigidity of an existing entity in the social or material realm. This rigidity is mentioned by seminal papers on inertia (Rumelt 1995) and across the previously identified dimensions of inertia (Schmid 2019; Tripsas 2009). In rather classical understandings of inertia, this rigidity often refers to existing routines and capabilities (Tripsas and Gavetti 2000). In the context of digital transformation the rigidity is also referred to as the characteristics of the digital artifact and describes how organizational members deal with the introduced technology (Schmid 2019; Schmid et al. 2017; Soto Setzke 2020). Thirdly, inertia has been characterized to be a relational phenomenon (Hannan and Freeman 1984; Utesheva et al. 2016). While the studies in our sample often assume this implicitly, Utesheva et al. (2016), for instance, proposed this relational understanding by conceptualizing inertia as *"a relational phenomenon that emerges and becomes visible differently – as psychological, socio-cognitive, sociotechnical and political – depending on the observers' viewpoint." (p.355).* They further advocate: *"Inertia as a relational phenomenon results from intra-actively entangled actors […].* In explaining inertia as relative phenomena they recognize that inertia *"is not just there".* Inertia needs to be understood in a situated context and must therefore recognize the specific external conditions that favor and trigger it. Fourthly, to understand inertia, one must recognize the importance of time (Hannan and Freeman 1984; Rumelt 1995). Inertia and its different dimensions are the result of an individual's history (education, habits), an organization's past (Successes, Brand, Market position) or even the historic context of an industry in which preexisting decisions determine the present options. Lastly, one can understand inertia in terms of the meaning it takes on in the organization. As mentioned, it can be interpreted as a sign of misalignment between an organization's status quo and its position compared to other actors in the competitive environment (Hannan and Freeman 1984). Thus, one could interpret inertia as a positive alarm signal that informs organizational members that the affected entity is in danger of missing an evolutionary step of development to secure its survival. To summarize, we understand inertia as a form of resistance to change that is determined by past experiences and actions and that manifests itself on multiple levels as part of digital transformation activities.

Dimensions

Inertia has been associated with different terms and meanings over time (Besson and Rowe 2012; Polites and Karahanna 2012; Rumelt 1995; Tushman and O'Reilly 1996). While we started our analysis on basis of the identified dimensions of inertia proposed by Besson and Rowe (2012), we noticed during our analysis that we required more fine-grained boundaries between different manifestations of inertia. Therefore, based on existing literature on inertia (Barnes et al. 2004; Besson and Rowe 2012; Hannan and Freeman 1984; Kim and Kankanhalli 2009; Polites and Karahanna 2012; Rumelt 1995; Schmid 2019; Tushman and O'Reilly 1996) and on our set of papers from the analysis, we derived three dimensions of inertia on the individual level, five dimensions on the organizational level and one dimension on the industry level. Some are rather descriptive in character while others provide a partial explanation for our phenomenon of interest (Suddaby 2010). An overview of our dimensions is given in Table 3.

Dimensions of Inertia on the Individual, Organizational and Industry Level
Behavior-Based Inertia (Individual): Resistance to change due to unconscious reproduction of routines and habits because it has always been done without giving any thoughts (Polites and Karahanna 2012; Rumelt 1995)
Cognitive-Based Inertia (Individual): Resistance to change due to conscious decisions to keep making similar decisions despite the presence of new information (Besson and Rowe 2012; Kim and Kankanhalli 2009; Polites and Karahanna 2012)
Affective-Based Inertia (Individual): Resistance to change due to strong emotional attachment to status-quo making it stressful for the individual to change (Barnes et al. 2004; Polites and Karahanna 2012)
Organizational Structural Inertia (Organizational): Resistance to change rooted in the size, complexity, and interdependence in the organization's structures, systems, procedures, and processes (Tushman and O'Reilly 1996, p. 18)
Cultural Inertia (Organizational): Resistance to change due to past learnings and history that resolves from informal norms, values, social networks, myths, stories, and heroes that have evolved over time (Tushman and O'Reilly 1996, p. 18)
Socio-Technical Inertia (Organizational): Resistance to change due to the relative unresponsiveness of material technical entities such as existing IT infrastructure which are intertwined with the organizational-social system (Schmid 2019).
Political Inertia (Organizational): Resistance to change due to networks of vested interests that undermine or constrain change (Besson and Rowe 2012, p. 106).

Economic Inertia (Organizational): Resistance to change due to economic decisions based on the resource allocations between exploitation and exploration (Besson and Rowe 2012, p. 106).
Industry Structural Inertia (Industry): Resistance to change of an organization which is embedded into a larger ecosystem of actors in which preexisting structures (value chains, regulatory affairs) determine transformation (Hannan and Freeman 1984).

Table 3. Dimensions of Inertia

On the individual level, following Polites and Karahanna (2012) we distinguish between the behavioral, cognitive and affective aspects of inertia. On an organizational level, extending the work of Besson and Rowe (2012) and integrating that of Tushmann and O'Reilly (1996), we propose structural, cultural, socio-technical, political and economic inertia as different manifestations of resistance to change. Trying to recognize that inertia may also be enacted on the industry level and considering Hannan and Freeman's (1984) work, we use the term of industry structural inertia in which transformation is constrained through macrostructures in industry such as value chains or regulatory issues.

Regarding these dimensions of inertia, most papers in the sample (21) draw upon either directly or indirectly upon Hannan and Freeman's (1984) understanding of structural inertia. In the context of digital transformation, for instance, this refers to the reorganization of internal organizational structures (e.g. setting up dedicated units that aim to explore and develop digital innovations) or to the readjustment of internal processes (e.g. to make use of agile methodologies to speed up processes) (Drechsler et al. 2020; Soluk and Kammerlander 2021; Warner and Wäger 2019). Further, socio-technical inertia has been investigated five times explicitly (Mehrizi and Mòdol 2012; Rowe et al. 2017; Schmid 2019; Schmid et al. 2017; Soto Setzke 2020), including, for example the rigidity of implemented IT artifacts and how employees dealt with these (Mehrizi and Mòdol 2012; Schmid et al. 2017). Other examples include an analysis of the view of senior management (Rowe et al. 2017), which resulted in a framework for multiple level research on a socio-technical lens of inertia being proposed (Schmid 2019), while several studies built on the concept of dynamic capabilities to investigate how to overcome socio-technical inertia (Rowe et al. 2017; Soto Setzke 2020). In contrast, cultural inertia was investigated explicitly only in one paper (Ertl et al. 2020) and implicitly mentioned in various other papers (e.g. Jammulamadaka 2020; Soluk and Kammerlander 2021). Ertl et al. (2020) focus on patterns between the manifestations of cultural inertia and the manifestation of the three dynamic capabilities of sensing, seizing and reconfiguring as well as centralized or participative governance agency. They find that decentralized governance is successful in avoiding inertia when combined with sensing and reconfiguration capabilities, and with a high level of participation (Ertl et al. 2020).

Individual levels of inertia caused by the affective, behavioral or cognitive actions of managers and employees was mentioned in several studies (Rowe et al. 2017; Tripsas 2009), but only explicitly in two (Jammulamadaka 2020; Tripsas 2009). Implicitly using a cognitive understanding of inertia, some papers use, variously, the terms insight inertia (Godkin 2008), psychological inertia (Huang et al. 2013), mental inertia (Liao et al. 2008) or negative psychology inertia (Besson and Rowe 2012), while some do not distinguish between individual level inertia and socio-technical inertia (Rowe et al. 2017). In digital transformation studies, both socio-technical inertia and economic inertia have been referenced implicitly (Soluk and Kammerlander 2021; Warner and Wäger 2019), but neither, so far, has been explored explicitly. Thus, despite its theoretical power, the notion of inertia has been overlooked, by and large, in theorizations on the emerging phenomenon of digital transformation. Thus, the potential to leverage inertia to better define and conceptualize the novel phenomenon of digital transformation remains untapped.

Understanding Inertia: Antecedents and Consequences

In this subchapter, we present antecedents and consequences of inertia.

Antecedents

Distinguishing between the micro, meso, and macro levels, following Appio et al. (2021), this section describes the antecedents and the related outcomes of inertia. Our review resulted in 12 relevant antecedents (Table 4).

Antecedents	Explanation and Exemplifying Papers of the Sample
Cognitive Flexibility*	A (fixed) mental model or certain cognitive structures of individuals have been identified as relevant. (Godkin 2008; Huang et al. 2013; Jammulamadaka 2020; Liao et al. 2008; Tripsas 2009)
Skills and Ability to Learn*	The (non-) availability of skills as well as the lack to learn new things have been mentioned as a potential source of inertia (Audzeyeva and Hudson 2016)
Organizational Routines**	Pre-existing organizational routines are commonly mentioned as a source for inertia (Liang et al. 2017; Pentland et al. 2020; Soluk and Kammerlander 2021; Tripsas 2009; Vial 2019)
Organizational Learning**	The existing/missing ability of the organization to learn and acquire new knowledge has been identified as a source of inertia (Liao et al. 2008)
Organizational Capabilities**	The lack of certain capabilities (including dynamic capabilities) on the organizational level has been mentioned as source for inertia (Töytäri et al. 2017; Tripsas 2009; Vial 2019)
Organizational Culture**	Specific cultural elements have also been identified as a source for inertia within the organization (Töytäri et al. 2017; Vial 2019)
Organizational Resources**	Pre-existing resources (e.g. supplied, production and sales networks) have been identified as sources for inertia (Liang et al. 2017; Vial 2019)
Information Technology**	The implemented technological infrastructure, their rigidity and interaction with employees are identified as sources of inertia (Hanelt et al. 2020; Schmid 2019; Venters et al. 2014)
Strategy **	An existing strategy that might conflict with the induced change has been mentioned as source for inertia (Hanelt et al. 2020)
Identity**	The existing internal and external identity has been identified as significant sources of inertia (Hanelt et al. 2020; Soluk and Kammerlander 2021; Töytäri et al. 2017; Utesheva et al. 2016)
Size of the Firm***	The size of the organization and corresponding implications have been identified as sources for inertia (Soto Setzke 2020; Zhu et al. 2004, 2006)
External Uncertainty and Complexity***	Considering inertia being externally triggered, the strength of the economic or environmental uncertainty/new threat and opportunities within the market can cause inertia (Cozzolino et al. 2018; Rowe et al. 2017)

Table 4. Antecedents of Inertia (Micro (Individual)*, Meso (Organizational) **, and Macro (Firm)*)**

In the context of digital transformation, preexisting mental models and cognitive biases of individuals, alongside existing skills and expertise, have been mentioned as individual-level antecedents of inertia. In one specific case, Soluk and Kammerlander (2021) provide the following example: "*The reason for this behaviour [resistance] was mostly uncertainty about how digital technologies would affect the individual employee, leading to feelings of fear and frustration"* (p. 22). The example given above shows that doubts and uncertainty about the outcome of digital transformation are identified as key antecedents for inertia.

On the organizational level, the following antecedents of inertia have been identified: existing routines, learning, capabilities, culture, resources, strategy and identity. In the same vein, the review by Hanelt et al (2020) have pointed out that *"[t]his dynamic is also evident in our findings: in the contextual conditions part of our multi-dimensional framework we still identify established structures and processes as well as path dependency as antecedents"*. Thus, the organization's age and established structures and processes that are rearranged are evidently also a source of inertia in digital transformation. Moreover, in contrast with, for example, IS-/IT-enabled transformation, the relevance of identity in digital transformation seems to be much higher than in digital transformation. For instance, Wessel et al. (2020) stress that digital transformation results in a new organizational identity (e.g. from a car-manufacturer to a mobility provider) that needs to be accepted and adopted by organizational members. At the same time, research has pointed out the importance of a strong alignment between internal identity ('Who am I as a member of the organization?') and external identity ('What is the brand of the company?'), as their misalignment may cause inertia (Tripsas 2009; Utesheva et al. 2016). However, not much is known about exactly how organizational members adopt a new identity as part of digital transformation activities. On the industry level, an organization's size, the complexity and the uncertainty of the external environment all play a significant role in the development of inertia.

Consequences

While inertia is often directly understood as an outcome, we propose more specific consequences of inertia that we derive from our analysis on the macro, meso and micro levels. Our analysis revealed 12 consequences related to inertia (Table 5).

Consequences	Explanation and Exemplifying Papers of the Sample
Employee resistance*	Employees do not adopt induced change in the sense of that actively undermine implemented technologies by not using them and sticking to non-digital solutions (Soluk and Kammerlander 2021; Vial 2019; Warner and Wäger 2019)
Momentum*	Momentum refers to the phenomenon that employees actively undermine the induced change for example by developing workarounds for implemented changes (Schmid 2019)
Biased decision-making*	Due to inertia, individual members (in particular members of the management) ignore or suppress relevant information that turn out in misguided decisions (Jammulamadaka 2020; Steinhauser 2021; Tripsas 2009)
Reinforcement of status-quo**	The only rather positive outcome of inertia is that organizational members reinforce and preserve the status quo (Orlikowski 2000)
Institutional tensions**	Inertia results in institutional tensions of different organizational groups that share different opinion on the implemented change which creates conflict between different groups (Cozzolino et al. 2018)
Acceptance/Legitimacy of new services and products**	Organizational members undermine new change and diminish legitimacy of new services and products which can result in the inability to provide these products and services (Audzeyeva and Hudson 2016; Töytäri et al. 2017)
Project failure**	Digital transformation projects cannot be continued due to strong inertial forces (Ertl et al. 2020)
Failing resource allocation**	Organization does not allocate sufficient resources to new change due to inertia (Cozzolino et al. 2018; Fuentelsaz et al. 2015)
Undermining new organizational culture and structure**	Inertia undermines changes in the organizational setup such as the move towards more malleable organizational designs or intentions to change the organizational culture (Hanelt et al. 2020)
Limits Organizational learning/absorptive capacity**	Inertia limits the organization's ability for learning and decreases the ability to absorb new knowledge (Godkin 2008; Liao et al. 2008)
Adoption of (open) innovation***	Organizations with strong inertial forces are less able to adopt new (open) innovations and also struggle to adapt their business model (Cozzolino et al. 2018; Huang et al. 2013; Zhu et al. 2006)
Lack of strategic change and renewal***	Inertia caused the organizational inability to properly respond to external threats and opportunities thus embracing strategic change and renewal (Huang et al. 2013; Töytäri et al. 2017)

Table 5. Consequences of Inertia (Micro (Individual)*, Meso (Organizational) **, and Macro (Firm) *)**

Regarding the micro-level, resistance momentum of organizational members is mentioned several times as a key outcome. Orlikowski (2000) presents an example of how inertia unfolds at the micro level: "*Inertia is represented in my data with the limited-use technology in-practice, where users choose to use their new tool rarely and perfunctorily, and show little or no interest in integrating its use into their ongoing work practices (p.421)"*. From a psychology perspective, resistance is rooted in different behavioral, cognitive and affective elements on the individual level (Polites and Karahanna 2012) and through preexisting structures, including cultural values and IT infrastructure (Piderit 2000). While current studies on digital transformation often present cases of resistance and mention different attitudes (Schmid 2019; Soluk and Kammerlander 2021; Warner and Wäger 2019), their explanatory value for understanding resistance and momentum in the context of digital transformation activities is limited. Misguided decision making by organizational members, such as management teams, can also be a consequence of inertia (Jammulamadaka 2020; Rowe et al. 2017; Tripsas 2009). Nevertheless, there is little cognitive research so far linking inertia to decision-making by managers and employees. Yet, this could help to better understand any underlying cognitive structures that may explain inertia.

On the organizational level, the reinforcement of the status-quo has been identified as a consequence of inertia. Beyond this, institutional tensions may result from inertia. For instance, in an organization that introduces structural adjustments, transformation activities may result in different organizational groups

that either favor or undermine the implemented structural adjustment. As a result, tension can arise between different actors competing for control over the interpretation of these adjustments. Another potential consequence of inertia is the acceptance and legitimacy of a newly developed product or service, which often forms part of a company's digital transformation endeavors (Dremel et al. 2017). Inertial forces may undermine their acceptance and lead to the withdrawal of their perceived legitimacy. Further, cultural inertia in some cases has been identified as a reason for the failure of projects or programs in the context of digital transformation (Ertl et al. 2020; Forth et al. 2020). Additionally, failing resource allocations, something that Besson and Rowe (2012) have termed economic inertia, is often mentioned in digital transformation (Hanelt et al. 2020). The conflict arising from balancing the investment of resources between exploitive or exploratory activities has been discussed under the dynamic capability of ambidexterity within the digital transformation discussion (Drechsler et al. 2020). Further, digital transformation triggers a need for more flexible, agile and malleable organizational designs and cultures (Drechsler et al. 2020; Hanelt et al. 2020). Inertia, and in particular structural and cultural inertia, often undermines these intentions and leads to the failure of such cultural transformation programs. Other identified consequences of inertial forces in organizations include reluctance to adapting a business model, adopting innovation, and a negative effect on open innovation (Huang et al. 2013; Zhu et al. 2006).

Understanding Inertia: Moderators

As part of this section, we introduce factors that moderate between inertia as an independent variable and the identified consequences as the dependent variable mentioned in the previous chapter.

Moderators

Our analysis revealed 15 moderators (see Table 6) that we introduce and if possible, their related effects.

Moderator	Explanation and Exemplifying Papers of the Sample
Managerial Cognition*	The different mental models and cognitive structures of employees and managers have an effect on inertia and its identified consequences (Hanelt et al. 2020; Jammulamadaka 2020; Liao et al. 2008).
Level of Expertise*	The level of expertise (industry experience) of employees and managers have an effect on the development of inertia and its outcomes (Audzeyeva and Hudson 2016; Jammulamadaka 2020).
Rigidity of Processes**	The rigidity of existing organizational processes and practices that should be changed can act as a moderator for the development of inertia and its consequences (Tripsas 2009).
Learning Ability**	The organization's ability to learn moderates the development of inertia and outcomes (Liao et al. 2008).
Organizational Design/Structure**	The organizational design, its structure and malleability influences the relationship between inertia and the identified consequences (Hanelt et al. 2020).
Team Diversity**	Diversity of teams and their intellectual and social alignment acts as a moderator for the development of inertia and corresponding outcomes (Jammulamadaka 2020; Liang et al. 2017).
New IT-related Investments **	Investment decisions of management members into new technologies act as a moderator for the development of inertia and consequences (Fuentelsaz et al. 2015; Hanelt et al. 2020; Schmid 2019).
Complementarity of Assets**	The complementarity of existing assets within the organization has been found to influence the level of inertia and its outcomes (Fuentelsaz et al. 2015).
Agentic Behavior**	Agentic behavior of individuals has been stated as a moderator for influencing the development of inertia and related consequences (Hanelt et al. 2020).
Absorptive Capacity**	The firm's absorptive capacity, that is the ability to acquire new knowledge from outside of the organization acts as moderator on the development of inertia and its manifestations (Godkin 2008).
(Dynamic) Capabilities**	The manifestations of specific (dynamic) capabilities influences the existence of inertia as well as its different outcomes (Mikalef et al. 2020; Rowe et al. 2017; Soto Setzke 2020).
Agility**	The agility of the organization moderators the development of inertia and its outcomes (Liang et al. 2017; Rowe et al. 2017; Warner and Wäger 2019).
Amount of Employees ***	The amount of employees moderates the existence of inertia and consequences (Zhu et al. 2004, 2006).
External Threat***	The intensity of the external threat influences the level of inertia and its outcomes (Rowe et al. 2017).
Age ***	The organizational age has an impact on the existence of inertia (Soto Setzke 2020; Venters et al. 2014).

Table 6. Moderators of Inertia
Key to Levels: *Micro (Individual); **Meso (Organizational) ; ***and Macro (Firm)

On the micro level, we identify managerial cognition and the expertise of individuals as moderators. For instance, the cognitive mental model of specific managers can influence the organization's ability to take certain actions, some of which (or their non-execution), might result in the identified consequences (Jammulamadaka 2020; Rowe et al. 2017). On the meso level, organizational processes, the organization's ability to learn as well as their structure and design can act as moderators for the appearance of inertia and the manifested consequences. Other moderators include an organization's IT infrastructure and its investments in new IT, the complementarity of assets, its absorptive capacity, its dynamic capabilities and its agility. Warner and Wäger (2019), for example, explain: *"To overcome such inertia, incumbents in traditional industries are starting to experiment with agility originally a software methodology"* (p.332). Similarly, research on dynamic capabilities has shown that some capabilities might act as moderators. As Soto Setzke (2020) states: "*Preliminary results show that reconfiguration and, to some degree, sensing capabilities have a positive influence on the reduction of ST inertia (p.1).* Similarly, Ertl et al (2020) and Rowe et al. (2017) confirm the finding that sensing and reconfiguration capabilities reduce socio-cognitive inertia. On the macro level, the firm's size, the external threat and the organization's age can also moderate the development of inertia. As Zhu et al. (2006) explain, *"size is often associated with inertia; that is, large firms tend to be less agile and less flexible than small firms* (p.605)". By contrast, recent studies also report inertia in rather young entrepreneurial setups (Zuzul and Tripsas 2020), challenging the oversimplified assumption that organizational age is a main source of inertia.

Framework for Investigating Inertia in Digital Transformation

Based on the subdimensions that we derived from Whetten's building blocks of theory, we propose a framework (Figure 1) for investigating inertia in digital transformation. The goal of the framework is to provide an overview of the antecedents of inertia, core assumptions, attributes and dimensions. We introduce additional factors that moderate the relationship between inertia and the corresponding key consequences. Currently, inertia is seen both as a source and as a consequence. We overcome this oversimplified view of inertia and replace it with a multidimensional concept. The introduced framework does not claim to be an exhaustive overview regarding inertia. We rather see it as a starting point.

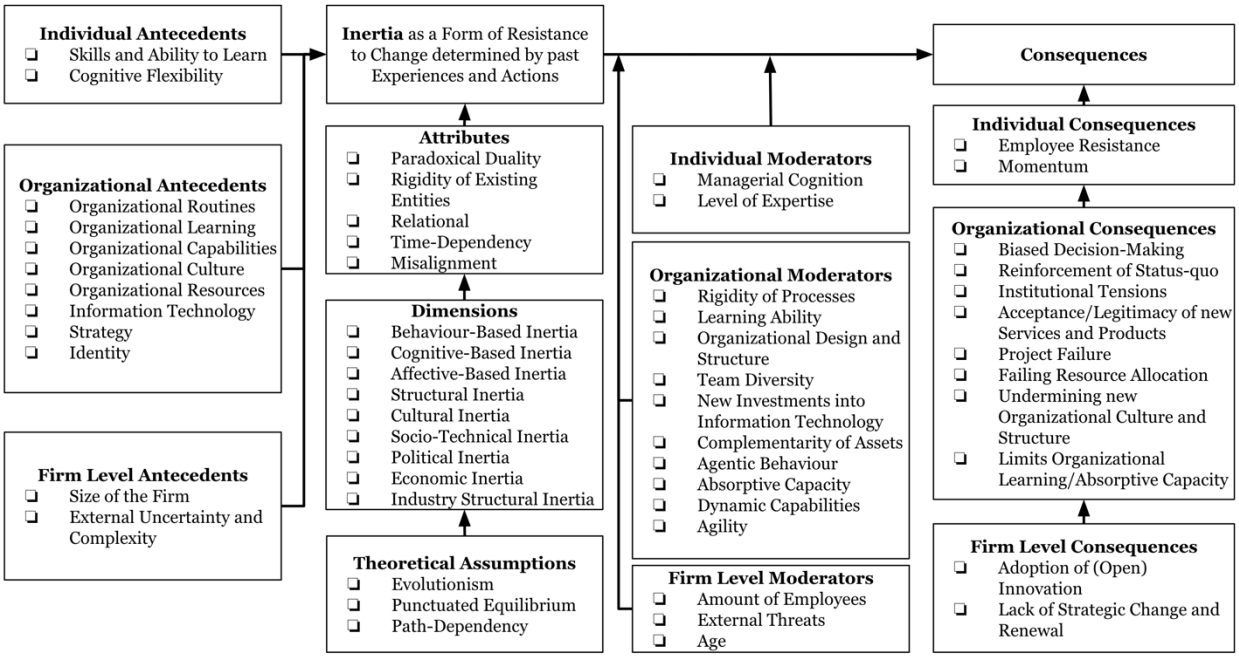

Figure 2. Research Framework for Inertia in Digital Transformation

Research Agenda: Understanding Inertia in Digital Transformation

Based on the framework, we propose four research avenues and corresponding questions (see Table 7).

Future Research Avenues	Example Research Question
Theoretical Underpinnings: - Critical Realist Lens on Organizational Inertia	Which generative mechanisms give rise to inertia on different levels? How does inertia unfold in different levels of an organization? How can inertia be explained from different theories of transformation?
Micro Foundations of Inertia: - Affective, Behavioral and Cognitive Sources of Inertia in Digital Transformation - Mitigation Strategies	How does affective, behavioral and cognitive inertia appear in digital transformation activities? What skills are required to deal with individual level inertia from a managerial perspective? How do mitigation strategies for inertia look like?
Meso Foundations of Inertia: - Effects of Organizational Parameters - Positive side of inertia	What are the effects of different digital transformation approaches (top-down vs bottom-up) on inertia? Which effect does inertia have on the success of digital transformation in organizations?
Macro Foundations of Inertia: - Industry/Age - Intensity of Threats	Is there a (negative) relationship between the digital maturity of industries and their age? How does the existence of external threats relate to inertia?

Table 7. Research Avenues: Inertia in Digital Transformation

Theoretical Underpinnings: A Critical Realist Lens on Inertia

Most studies adopt either a post-positivist or a constructivist approach towards studying digital transformation (Kutzner et al. 2018). We encourage research taking a critical realist stance on studying inertia in digital transformation (Vega and Chiasson 2019). We believe ideas from critical realism such as Archers Morphogenetic Approach and its stance on structure and agency (Archer 1995) may help to shed a new light on inertia. Further critical realism may be suitable to contribute due to its ability for multi-level analysis (Vega and Chiasson 2019). Further, its generative mechanisms can be a valuable approach to developing explanatory theory on how inertia emerges (Vega and Chiasson 2019).

Micro Foundations of Inertia: A Cognitive Lens on Inertia

Recent research on digital transformation often mentions the importance of individual inertia an the affective, behavioral and cognitive elements, such as decision-making in top management teams (Tripsas and Gavetti 2000) or employee resistance to new digital technology (Schmid 2019; Soluk and Kammerlander 2021). However, current knowledge on how individual level inertia unfolds and what skills are necessary to cope with inertia remain unknown. Why do some employees actively engage in digital transformation activities while others try to undermine them? What is the role played by their way of thinking and which biases come into play that result in these contrasting reactions to such actions? Pursuing a cognitive path can help us to better understand the individual level of inertia and may pave the way for developing more suitable interventions to deal with inertia and resistance in digital transformation.

Meso Foundations of Inertia: Identity and a Positive Side?

On the organization level, inertia is often strongly associated with existing routines, capabilities and organizational learning (Liao et al. 2008; Schmid 2019; Tripsas 2009). Further, digital transformation can frequently trigger a new internal and external identity (Wessel et al. 2020). As Tripsas (2009) has argued, *"the inertia associated with identity raises the question of how managers should best accomplish identity changes associated with new technology"*. In the context of digital transformation, such questions appear highly relevant (Wessel et al. 2020). Other approaches to digital transformation may also determine the level of inertia, which opens up yet another area of research. Beyond this, one may also assume that inertia will always part be of the transformation process. The question that arises, however, is whether a certain level of inertia has to be overcome first before a company can transform successfully. Furthermore, research has started to discuss whether inertia could be mitigated through instruments of participation (Ertl et al.

2020). As digital transformation leads to more decentralized and network-based organizational structures (Hanelt et al. 2020), one could also assume that inertial forces might be less pronounced within these more malleable organizational design structures.

Macro Foundations of Inertia: Industry, Age and External Pressure

On a macro level, not much evidence is available on the strength of inertial forces and the behavior of entire ecosystems or industries. While some have put forward the notion that with the increasing age of incumbent companies or industries, inertia is increasing, more empirical evidence on such propositions in the context of digital transformation would be helpful. Further, recent papers have found inertial forces even in young entrepreneurial firms (Zuzul and Tripsas 2020), which suggests that comparative studies between incumbents and young start-ups could also add value to identifying patterns of inertia linked to age.

Conclusion and Limitations

Coming back to our first research question, our review intended to investigate the phenomenon of inertia in digital transformation in current research. Based on our literature review we present a framework for research on inertia including antecedents, dimensions, attributes, moderators and consequences answering the second research question. While inertia is mentioned as a core barrier for digital transformation (Soluk and Kammerlander 2021; Vial 2019), current research has only started to better understand the phenomena in the context of information systems and digital transformation (Schmid 2019).

Our work has to be seen in light of several limitations. First, while we are aware of the broad range of research on inertia, we followed a rather narrow conceptualization of digital transformation which might have led to the exclusion of articles that may be relevant. Second, the non-exhaustiveness of our sample might limit our findings and their generalizability. Third, we have argued that there is a difference between IS/IT-enabled transformation and digital transformation (Wessel et al. 2020), from which we derive the argument that due to these differences, different manifestations of inertia may appear in digital transformation. Yet, we are aware that there is an ongoing debate about whether and how digital transformation presents a new phenomenon and that the concept of digital transformation is currently not very well conceptualized (Markus and Rowe 2021). Forth, while our developed framework provides an overview of what has been done in the past on inertia in digital transformation, it does not entail details on specific relationships between concepts. Additionally, the notion of inertia is discussed in the management literature under the term 'resistance to change', which might present another stream of research that could be incorporated into our framework. Nevertheless, we see our proposed framework and its identified avenues for future research as a starting point to enhance the understanding of inertia in the context of digital transformation. By presenting this framework, we hope to inform future IS research to acknowledge the role of inertia in digital transformation endeavors.

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References

Allen, D. K., Brown, A., Karanasios, S., and Norman, A. 2013. "How Should Technology-Mediated Organizational Change Be Explained? A Comparison of the Contributions of Critical Realism and Activity Theory," *Management Information Systems Quarterly* (37:3), pp. 835–854.

Appio, F. P., Frattini, F., Petruzzelli, A. M., and Neirotti, P. 2021. "Digital Transformation and Innovation Management: A Synthesis of Existing Research and an Agenda for Future Studies," *The Journal of Product Innovation Management* (38:1), pp. 4–20.

Archer, M. S. 1995. *Realist Social Theory: The Morphogenetic Approach*, Cambridge University Press.

Audzeyeva, A., and Hudson, R. 2016. "How to Get the Most from a Business Intelligence Application during the Post Implementation Phase? Deep Structure Transformation at a U.K. Retail Bank," *European Journal of Information Systems* (25:1), pp. 29–46.

Baiyere, A., Salmela, H., and Tapanainen, T. 2020. "Digital Transformation and the New Logics of Business Process Management," *European Journal of Information Systems* (29:3), Taylor & Francis, pp. 238–259.

Barnes, W., Gartland, M., and Stack, M. 2004. "Old Habits Die Hard:Path Dependency and Behavioral Lock-In," *Journal of Economic Issues* (38:2), Routledge, pp. 371–377.

Besson, P., and Rowe, F. 2012. "Strategizing Information Systems-Enabled Organizational Transformation: A Transdisciplinary Review and New Directions," *The Journal of Strategic Information Systems* (21:2), pp. 103–124.

vom Brocke, J., Simons, A., Niehaves, Bjoern, Niehaves, Bjorn, Reimer, K., Plattfaut, R., and Cleven, A. 2009. "Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process," in *Proceedings ECIS 2009*.

Chanias, S., Myers, M. D., and Hess, T. 2019. "Digital Transformation Strategy Making in Pre-Digital Organizations: The Case of a Financial Services Provider," *The Journal of Strategic Information Systems* (28:1), pp. 17–33.

Cozzolino, A., Verona, G., and Rothaermel, F. T. 2018. "Unpacking the Disruption Process: New Technology, Business Models, and Incumbent Adaptation: Unpacking the Disruption Process," *The Journal of Management Studies* (55:7), pp. 1166–1202.

Drechsler, K., Gregory, R. W., Wagner, H.-T., and Tumbas, S. 2020. "At the Crossroads between Digital Innovation and Digital Transformation," *Communications of the Association for Information Systems* (47 (1):23).

Dremel, C., Wulf, J., Herterich, M. M., Waizmann, J.-C., and Brenner, W. 2017. "How AUDI AG Established Big Data Analytics in Its Digital Transformation," *MIS Quarterly Executive* (16:2).

Ertl, J., Soto Setzke, D., Böhm, M., and Krcmar, H. 2020. "The Role of Dynamic Capabilities in Overcoming Socio-Cognitive Inertia During Digital Transformation--A Configurational Perspective," in *Proceedings of the 15th International Conference on Wirtschaftsinformatik*.

Forth, P., Reichert, T., de Laubier, R., and Chakraborty, S. 2020. "Flipping the Odds of Digital Transformation Success," *BCG*, , October 29. (https://www.bcg.com/de-de/publications/2020/increasing-odds-of-success-in-digital-transformation, accessed February 1, 2021).

Fuentelsaz, L., Garrido, E., and Maicas, J. P. 2015. "Incumbents, Technological Change and Institutions: How the Value of Complementary Resources Varies across Markets," *Strategic Management Journal* (36:12), pp. 1778–1801.

Godkin, L. 2008. "Institutional Change, Absorptive Capacity, and the Organizational Zone of Inertia," *Human Resource Development Review* (7:2), pp. 184–197.

Hanelt, A., Bohnsack, R., Marz, D., and Antunes Marante, C. 2020. "A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change," *Journal of Management Studies* (43), p. 39.

Hannan, M. T., and Freeman, J. 1984. "Structural Inertia and Organizational Change," *American Sociological Review* (49:2), p. 149.

Hartl, E., and Hess, T. 2017. *The Role of Cultural Values for Digital Transformation: Insights from a Delphi Study*, Boston, MA.

Haskamp, T., Mayer, S., Annalena, L., and Uebernickel, F. 2021. "Performance Measurement in Digital Innovation Units - An Information Asymmetry Perspective," in *ECIS 2021 Proceedings*.

Hinings, B., Gegenhuber, T., and Greenwood, R. 2018. "Digital Innovation and Transformation: An Institutional Perspective," *Information and Organization* (28:1), pp. 52–61.

Huang, H.-C., Lai, M.-C., Lin, L.-H., and Chen, C.-T. 2013. "Overcoming Organizational Inertia to Strengthen Business Model Innovation," *Journal of Organizational Change Management* (26:6), pp. 977–1002.

Jammulamadaka, N. 2020. "Enabling Processes as Routines That Facilitate Cognitive Change," *Management Decision* (59:13).

Kim, H.-W., and Kankanhalli, A. 2009. "Investigating User Resistance to Information Systems Implementation: A Status Quo Bias Perspective," *The Mississippi Quarterly* (33:3), Management Information Systems Research Center, University of Minnesota, pp. 567–582.

Kutzner, K., Schoormann, T., and Knackstedt, R. 2018. "Digital Transformation in Information Systems Research: A Taxonomy-Based Approach to Structure the Field," in *ECIS 2018 Proceedings*.

Liang, H., Wang, N., Xue, Y., and Ge, S. 2017. "Unraveling the Alignment Paradox: How Does Business—IT Alignment Shape Organizational Agility?," *Information Systems Research* (28:4), pp. 863–879.

Liao, S.-H., Fei, W.-C., and Liu, C.-T. 2008. "Relationships between Knowledge Inertia, Organizational Learning and Organization Innovation," *Technovation* (28:4), pp. 183–195.

Markus, M. L., Benjamin, R. I., and Others. 1997. "The Magic Bullet Theory in IT-Enabled Transformation," *Sloan Management Review* (38:2), pp. 55–68.

Markus, M. L., and Rowe, F. 2021. "Guest Editorial: Theories of Digital Transformation: A Progress Report," *Journal of the Association for Information Systems* (22:2), p. 11.

Mehrizi, M. H. R., and Mòdol, J. R. 2012. "Socio-Technical Attachments and It Change: A Case of Unsuccessful Software Replacement," in *ICIS 2012*.

Mikalef, P., van de Wetering, R., and Krogstie, J. 2020. "Building Dynamic Capabilities by Leveraging Big Data Analytics: The Role of Organizational Inertia," *Information & Management*, p. 103412.

Nambisan, S., Lyytinen, K., Majchrzak, A., and Song, M. 2017. "Digital Innovation Management: Reinventing Innovation Management Research in a Digital World," *Management Information Systems Quarterly* (41:1), pp. 223–238.

Newton, I., and Chittenden, N. W. 1850. *Newton's Principia: The Mathematical Principles of Natural Philosophy*, Geo. P. Putnam.

Orlikowski, W. J. 2000. "Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations," *Organization Science* (11:4), pp. 404–428.

Paré, G., Trudel, M.-C., Jaana, M., and Kitsiou, S. 2015. "Synthesizing Information Systems Knowledge: A Typology of Literature Reviews," *Information & Management* (52:2), pp. 183–199.

Pentland, B. T., Liu, P., Kremser, W., and Haerem, T. 2020. "The Dynamics of Drift in Digitized Processes," *The Mississippi Quarterly* (44:1), pp. 19–47.

Piderit, S. K. 2000. "Rethinking Resistance and Recognizing Ambivalence: A Multidimensional View of Attitudes Toward an Organizational Change," *AMRO* (25:4), Academy of Management, pp. 783–794.

Polites, G. L., and Karahanna, E. 2012. "Shackled to the Status Quo: The Inhibiting Effects of Incumbent System Habit, Switching Costs, and Inertia on New System Acceptance," *Management Information Systems Quarterly* (36:1), pp. 21–42.

Rolland, K.-H., and Hanseth, O. 2021. "Managing Path Dependency in Digital Transformation Processes: A Longitudinal Case Study of an Enterprise Document Management Platform," *Procedia Computer Science* (181), pp. 765–774.

Romanelli, E., and Tushman, M. L. 1994. "Organizational Transformation as Punctuated Equilibrium: An Empirical Test," *Academy of Management Journal* (37:5), pp. 1141–1166.

Rowe, F. 2014. "What Literature Review Is Not: Diversity, Boundaries and Recommendations," *European Journal of Information Systems* (23:3), pp. 241–255.

Rowe, F., Besson, P., and Hemon, A. 2017. "Socio-Technical Inertia, Dynamic Capabilities and Environmental Uncertainty: Senior Management Views and Implications for Organizational Transformation," in *Proceedings of the 25th European Conference on Information Systems (ECIS)*.

Rumelt, R. P. 1995. "Inertia and Transformation," in *Resource-Based and Evolutionary Theories of the Firm: Towards a Synthesis.*, Springer, Boston, MA., pp. 101–132.

Schilke, O., Hu, S., and Helfat, C. E. 2018. "Quo Vadis, Dynamic Capabilities? A Content-Analytic Review of the Current State of Knowledge and Recommendations for Future Research," *Annals* (12:1), Academy of Management, pp. 390–439.

Schmid, A. M. 2019. "Beyond Resistance: Toward a Multilevel Perspective on Socio-Technical Inertia in Digital Transformation," in *Proceedings of the 27th European Conference on Information Systems*.

Schmid, A. M., Recker, J., and vom Brocke, J. 2017. "The Socio-Technical Dimension of Inertia in Digital Transformations," in *Proceedings of the 50th Hawaii International Conference on System Sciences (2017)*, Hawaii International Conference on System Sciences.

Singh, A., Klarner, P., and Hess, T. 2020. "How Do Chief Digital Officers Pursue Digital Transformation Activities? The Role of Organization Design Parameters," *Long Range Planning*, p. 101890. (https://doi.org/10.1016/j.lrp.2019.07.001).

Soluk, J., and Kammerlander, N. 2021. "Digital Transformation in Family-Owned Mittelstand Firms: A Dynamic Capabilities Perspective," *European Journal of Information Systems*, Taylor & Francis, pp. 1–36.

Soto Setzke, D. 2020. "Reducing Socio-Technical Inertia During Digital Transformation-The Role of Dynamic Capabilities," in *Proceedings of the 28th European Conference on Information Systems*.

Steinhauser, S. 2021. "Enabling the Utilization of Potentially Disruptive Innovations by Incumbents: The Impact of Contextual, Organizational and Individual Factors in Regulated Contexts," *International Journal of Innovation Management* (25:02), p. 2150015.

Suddaby, R. 2010. "Editor's Comments: Construct Clarity in Theories of Management and Organization," *AMRO* (35:3), Academy of Management, pp. 346–357.

Sydow, J., Schreyögg, G., and Koch, J. 2009. "Organizational Path Dependence: Opening the Black Box," *AMRO* (34:4), Academy of Management, pp. 689–709.

Töytäri, P., Turunen, T., Klein, M., Eloranta, V., Biehl, S., Rajala, R., and Hakanen, E. 2017. "Overcoming Institutional and Capability Barriers to Smart Services," in *Hawaii International Conference on System Sciences 2017 (HICSS-50)*.

Tripsas, M. 2009. "Technology, Identity, and Inertia Through the Lens of 'The Digital Photography Company,'" *Organization Science* (20:2), pp. 441–460.

Tripsas, M., and Gavetti, G. 2000. "Capabilities, Cognition, and Inertia: Evidence from Digital Imaging," *Strategic Management Journal* (21:10–11), pp. 1147–1161.

Tumbas, S., Berente, N., and vom Brocke, J. 2017. "Three Types of Chief Digital Officers and the Reasons Organizations Adopt the Role," *MIS Quarterly Executive* (16:2).

Tushman, M. L., and O'Reilly, C. A. 1996. "Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change," *California Management Review* (38:4), SAGE Publications Inc, pp. 8–29.

Utesheva, A., Simpson, J. R., and Cecez-Kecmanovic, D. 2016. "Identity Metamorphoses in Digital Disruption: A Relational Theory of Identity," *European Journal of Information Systems* (25:4), pp. 344–363.

Vega, A., and Chiasson, M. 2019. "A Comprehensive Framework to Research Digital Innovation: The Joint Use of the Systems of Innovation and Critical Realism," *The Journal of Strategic Information Systems* (28:3), pp. 242–256.

Venkatraman, N. 1994. "IT-Enabled Business Transformation: From Automation to Business Scope Redefinition," *Sloan Management Review* (35), pp. 73–73.

Venters, W., Oborn, E., and Barrett, M. 2014. "A Trichordal Temporal Approach to Digital Coordination: The Sociomaterial Mangling of the CERN Grid," *The Mississippi Quarterly* (38:3), pp. 927–949.

Vial, G. 2019. "Understanding Digital Transformation: A Review and a Research Agenda," *The Journal of Strategic Information Systems* (28:2), pp. 118–144.

Volkoff, O., and Strong, D. M. 2013. "Critical Realism and Affordances: Theorizing It-Associated Organizational Change Processes," *The Mississippi Quarterly* (37:3), Management Information Systems Research Center, University of Minnesota, pp. 819–834.

Warner, K. S. R., and Wäger, M. 2019. "Building Dynamic Capabilities for Digital Transformation: An Ongoing Process of Strategic Renewal," *Long Range Planning* (52:3), pp. 326–349.

Webster, J., and Watson, R. T. 2002. "Analyzing the Past to Prepare for the Future: Writing a Literature Review," *Management Information Systems Quarterly* (26:2), xiii–xxiii.

Weick, K. E., and Quinn, R. E. 1999. "Organizational Change and Development," *Annual Review of Psychology* (50), pp. 361–386.

Weill, P., and Woerner, S. L. 2018. "Is Your Company Ready for a Digital Future?," *MIT Sloan Management Review; Cambridge* (59:2), United States--US, United States, Cambridge: Massachusetts Institute of Technology, Cambridge, MA, pp. 21–25.

Wessel, L., Baiyere, A., Ologeanu-Taddei, R., Cha, J., and Jensen, T. 2020. "Unpacking the Difference between Digital Transformation and IT-Enabled Organizational Transformation," *Journal of Association of Information Systems*.

Whetten, D. A. 1989. "What Constitutes a Theoretical Contribution?," *AMRO* (14:4), Academy of Management, pp. 490–495.

Yoo, Y., Henfridsson, O., and Lyytinen, K. 2010. "Research Commentary—The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research," *Information Systems Research* (21:4), pp. 724–735.

Zhu, K., Dong, S., Xu, S. X., and Kraemer, K. L. 2006. "Innovation Diffusion in Global Contexts: Determinants of Post-Adoption Digital Transformation of European Companies," *European Journal of Information Systems* (15:6), pp. 601–616.

Zhu, K., Kraemer, K. L., and Dedrick, J. 2004. "Information Technology Payoff in E-Business Environments: An International Perspective on Value Creation of E-Business in the Financial Services Industry," *Journal of Management Information Systems* (21:1), pp. 17–54.

Zuzul, T., and Tripsas, M. 2020. "Start-up Inertia versus Flexibility: The Role of Founder Identity in a Nascent Industry," *Administrative Science Quarterly* (65:2), pp. 395–433.