An integrative model of enterprise architecture value: a grounded theory study to position its artifacts

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Abstract

Purpose – Despite the relevance of how enterprise architecture (EA) contributes to organizational performance in contemporary digital technology-driven strategic renewal, little is known about the position of EA artifacts. Therefore, this study aims to build an integrative model of EA artifact-enabled EA value supplemented with a research agenda to enhance our understanding further.

Design/methodology/approach – This study leveraged grounded theory techniques and a systematic review approach to develop the integrative model and research agenda.

Findings – We inductively build a model of the position of EA artifacts in EA value creation. Additionally, we elaborate a research agenda that proposes (1) an investigation of the role of an EA practice in successful strategic change, (2) an examination of how to manage EA practice value generation and (3) longitudinal research to gain insight into the evolution of value creation by EA practices.

Originality/value – This study presents a model of EA artifact-enabled EA value, thereby contributing to our understanding of the mechanisms, inhibitors and success factors associated with EA value. Following our model, the proposed research agenda contains future research areas to help us better understand the mechanisms and interrelatedness of EA practices in highly dynamic environments.

Keywords Enterprise architecture (EA), Value, Artifacts, Dynamic capabilities, Industry 4.0, Digital transformation, Strategic renewal, Grounded theory, Systematic review

Paper type Research paper

1. Introduction

Industry 4.0 technologies, an increased focus on the circular economy, and support for sustainable development goals catalyze digital transformations (Sahu *et al.*, 2022; Sharma *et al.*, 2022). Digital transformations create new value propositions enabled by new digital technologies (Wessel *et al.*, 2021). However, firms struggle to integrate and exploit new digital technologies in an increasingly turbulent and complex environment (Grave *et al.*, 2021; Sahu *et al.*, 2022; Sharma *et al.*, 2022; Wessel *et al.*, 2021; Van de Wetering, 2022). Furthermore, Yoshikuni and Dwivedi (2023) recently showed how enterprise information systems strategy (EISS) decision-making could positively influence organizational innovativeness. Enterprise architecture (EA) has an essential role in digital transformations and EISS, actively supporting decision-makers in improving their decisions concerning the (re)definition of a value proposition enabled by new digital technologies (Wessel *et al.*, 2021).

Researchers have used many methods to investigate the mechanisms of value creation by an EA capability. For example, previous research has shown that EA deployment practices

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contribute to organizational benefits (Van den Berg *et al.*, 2019; Foorthuis *et al.*, 2016; Pattij *et al.*, 2020; Shanks *et al.*, 2018; Tamm *et al.*, 2011). Moreover, the dimensions and extent of EA value depend on various factors, including a firm's size and age, the EA capability maturity, the EA quality, the use of EA services, and the social environment (Van den Berg *et al.*, 2019; Niemi and Pekkola, 2020; Shanks *et al.*, 2018; Tamm *et al.*, 2011). However, research also suggests that firms do not exploit all realizable value from EA. e.g. EA might be conceived as obligatory, focus too much on information technology (IT), or EA understanding is too low (Kotusev *et al.*, 2022a, b; Kurnia *et al.*, 2020). Additionally, to the best of our knowledge, no studies explicitly investigate EA artifacts' role in EA benefit realization in turbulent environments such as those encountered during digital transformations. Furthermore, although previous studies highlight several essential aspects of EA value (e.g. Shanks *et al.*, 2018), an integrative overview of its aspects and their coherence is a gap in current research. Thus, EA's artifacts' role in realizing EA's value is unclear, resulting in the undervaluation of EA.

Despite its interest among researchers and practitioners, several studies have reported a lack of common understanding concerning EA artifacts' role in EA value (Grave *et al.*, 2021; Kotusev *et al.*, 2022a). This research aims to add to knowledge accumulation and creation in the information systems (IS) discipline by using techniques borrowed from grounded theory and systematic reviews to investigate what is currently known about EA artifacts' role in EA value and suggest how we could gain knowledge on what we do not know. Specifically, this research aims to (1) develop a model of EA artifacts' role in EA value based on theory and informed by current research on EA artifacts and EA value; (2) guide future research by developing propositions and putting forward a research agenda. In addition, this research differs from others on EA value by touching upon the dynamic capabilities view to analyze how EA impacts organizational performance. Figure 1 illustrates how EA artifacts contribute to the realization of EA value through the EA capability (Van de Wetering, 2019). This approach enables the integration of research assessing both the efficiency implications of EA artifact application and its ability to provide a competitive advantage, heretofore separate research conversations.

The model presented in this paper offers valuable guidance for practitioners on how to effectively utilize EA artifacts to maximize their value. These insights can lead to a more efficient and effective EA capability and ultimately improve decision-making across the enterprise.

Moreover, the present research gathers a diverse and variegated corpus of studies pertaining to the field of EA and EA artifacts. Our approach encompasses studies employing different contexts, methods, and paradigms in order to encompass a broad range of challenges and phenomena. As a result, this research provides innovative insights and ideas

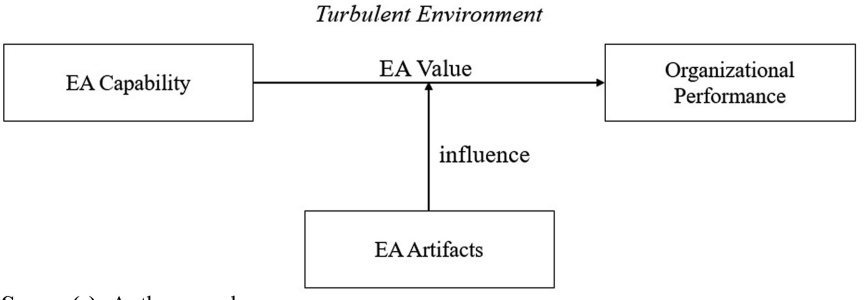

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Figure 1.
EA artifact's enabling role in EA value as an influencing factor in EA value realization from an EA capability in turbulent environments

that serve to complement existing theoretical perspectives through an integrative model of EA artifacts and their role in generating EA value. Additionally, our novel findings open up new avenues for future research, which help address important questions related to EA, thereby enhancing our understanding of this field.

This paper is structured as follows. First, in Section 2, we present the background of our research subject and deduce a definition of EA artifact-enabled EA value. Next, Section 3 describes the methodology for our study. We offer the results of our research in Section 4, and, finally, in Section 5, we present our agenda for future research on EA, the limitations of our work, and provide concluding notes.

2. Background on EA artifact-enabled EA value research

EA scholars are motivated by the ambition to determine how and to what extent EA practices can improve organizational performance. Therefore, researchers have adapted diverse theoretical and thematic approaches to EA (Dang and Pekkola, 2017; Kotusev and Kurnia, 2021). The literature includes contributions from several fields besides IS, including strategy, business, and government research.

Although such diverse perspectives have enhanced our knowledge, it has also led to separate research conversations, limiting the convergence of EA research in general and constraining the applicability and understanding of what we learned (Grave *et al.*, 2021; Kotusev, 2019; Kotusev *et al.*, 2022b; Saint-Louis *et al.*, 2017). Therefore, we lay the foundation for model development by analyzing how EA value researchers have conceptualized EA value and defining the research stream, thereby taking the first step toward convergence and unification of the accumulated knowledge.

EA scholars have adopted diverse conceptualizations of EA value, extending beyond the connection of business and IT to include linking strategy with execution and enabling innovation and adaption (Lapalme, 2011). The precise specification of what we mean by EA artifact-enabled EA value depends on what we mean by EA value. Furthermore, we regard EA as a driver for dynamic capabilities in line with, e.g. Hazen *et al.* (2017) and Van de Wetering *et al.* (2021). These EA-driven dynamic capabilities produce and use EA artifacts to facilitate decision-making on the integration and standardization of processes, data, applications, and the IT infrastructure (Grave *et al.*, 2021; Ross *et al.*, 2006). Furthermore, the term EA artifact enabled EA value refers to the organizational performance effect of using EA artifacts, including complexity control, improved quality of IT solutions, and traceability between strategic goals and IT investment decisions (Van den Berg *et al.*, 2019; Foorthuis *et al.*, 2016; Grave *et al.*, 2021; Kotusev, 2019). Therefore, we define EA artifact-enabled EA value as the organizational performance effects of decisions based on the information documented in EA artifacts.

The EA artifact-enabled value is achieved through a combination of factors, including the artifacts themselves, the involvement of stakeholders, and their use by those stakeholders (Kotusev and Kurnia, 2021). For instance, Grave *et al.* (2023) discovered in their multiple case study that the value of EA artifacts can be found in fostering greater commitment. By sharing the artifact and engaging stakeholders in its creation, there was an increased willingness to embrace change. The artifacts served as a platform for dialogue and persuasion, ultimately enhancing the feasibility of implementing the desired change.

3. Research method

3.1 Research method design

This research is informed by the grounded theory method for reviewing the literature by Wolfswinkel *et al.* (2013), the PRISMA approach for systematic reviews outlined by Moher

et al. (2009), and recent literature reviews, e.g. Sahu *et al.* (2022) and Sharma *et al.* (2022). In the first phase, planning the review, we identified the need for our review, specified the research aims, defined inclusion and exclusion criteria, determined the appropriate resources, and decided on the specific search terms. In the second phase, we conducted the review, identifying relevant research, selecting primary studies, and assessing the quality of the studies. In the third phase, the analysis phase, we read the articles highlighting findings and results relevant to our research aims. Open, axial, and selective coding rounds followed these highlights. Finally, we represented the content structure and structured the article in stage four. The outcomes of these four phases provide the framework of EA artifact-enabled EA value creation.

This research aims to create a high-quality analysis. Therefore, we focused on high-quality sources appropriate for IS literature. Furthermore, we used three databases (AIS Library, Business Source Complete, and ScienceDirect) to ensure a workable size of our review sample. These three databases provide access to many journals and publications with high ratings in ranking lists and include essential articles from journals and proceedings. Besides, these databases include leading publishers such as Elsevier (www.sciencedirect.com) and Emerald (www.emeraldinsight.com).

Given the dynamic nature of the EA, digital transformation, and dynamic capabilities, we employed contemporary sources while conducting this research. Considering the rapid pace of change in these areas, it is imperative to ensure the relevance and accuracy of the findings. Moreover, digital transformation-enabling technologies, such as cloud and the Internet of Things, gained exponential adoption since 2010 (Sunyaev, 2020; Surbiryala and Rong, 2019). Therefore, we have only used results from 2010 onwards to ensure the most up-to-date information.

We split our search into two separate search strings because of the many concepts we want to combine. Prior knowledge of the topic and preliminary search results led us to define the following search queries, which we adapted to each database but summarized in SQL-like syntax for genericity:

(1) "(abstract LIKE "enterprise architect%") AND (abstract LIKE "artifact%" OR "artefact%" OR "document%" OR "product") AND (abstract LIKE "value%" OR "benefit%" OR "advantage%")"

(2) "(abstract LIKE "enterprise architect%") AND (abstract LIKE "dynamic capabilit%")"

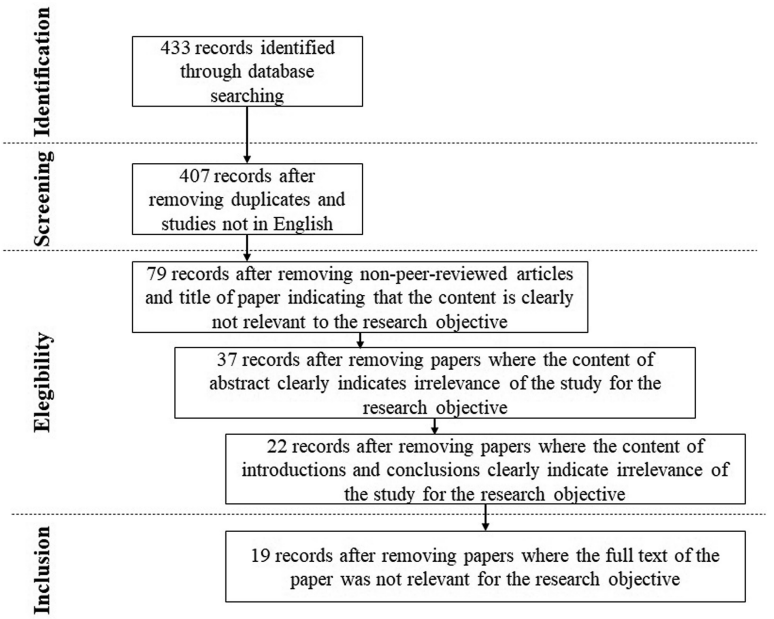
The search was conducted between December 23, 2021, and December 29, 2021, and studies were selected through the following processes. First, in line with the PRISMA approach (Moher *et al.*, 2009), we searched the databases to identify relevant studies, searching the title, keywords, and abstract fields. This search resulted in 433 articles for the next step in the process. Second, we screened the results and excluded duplicates and studies, not in English. Third, we assessed the eligibility of the studies based on the title, abstract, introduction, and conclusion by applying our inclusion and exclusion criteria, shown in Table 1. Finally, we evaluated the selected studies using a full-text read against our inclusion and exclusion criteria. We used the questions suggested by Mays and Pope (2000) to assess the quality of qualitative research. Each paper was evaluated by reviewing the clarity of the research aims and objectives, research design, research process, data display regarding interpretations and conclusions, and appropriateness of the method. Finally, 19 articles remained after the quality assessment, ten conceptual and nine empirical (see Figure 2 and Table 2).

3.2 Data analysis

Based on Wolfswinkel *et al.* (2013), we analyzed the remaining 19 articles in four main steps. First, we collected data about the type of paper (empirical, conceptual), the context of research

Criteria type	Criteria	Description
Inclusion	Journal and proceedings articles only	Reviewed articles only
	PRISMA funneling	PRISMA-based search (Moher *et al.*, 2009)
	Full-text analysis	The article's content should address one or more important aspects of EA value
Exclusion	Articles not in English	All articles not written in English are excluded
	Study relevance	Studies that are not relevant to the research objective are excluded
	Duplicate studies	Duplicate studies are removed
	Non-peer-reviewed articles	All results that are not peer-reviewed articles are excluded

Table 1. Inclusion and exclusion criteria



Source(s): Authors work

Figure 2. Flowchart of the literature review

Source type	Sources
Conceptual research papers	Aier *et al.* (2011), Bradley *et al.* (2011), Brosius *et al.* (2016), Hazen *et al.* (2017), Pattij *et al.* (2020), Radeke (2011), Shanks *et al.* (2018), Van de Wetering (2019), Van de Wetering (2020), Van den Berg *et al.* (2019)
Empirical research papers	Bachoo (2019), Frampton *et al.* (2015), Halén *et al.* (2014), Jusuf and Kurnia (2017), Kotusev and Kurnia (2019), Kotusev *et al.* (2020), Kurnia *et al.* (2021), Lange *et al.* (2016), Lux *et al.* (2010)

Table 2. The final set of included studies

(e.g. South African financial services), the theoretical foundation used or developed, and any definitions of concepts related to our research objective. Second, we performed a first coding cycle using initial coding (Saldaña, 2016). Specifically, motivated by the general components of EA artifact-enabled EA value mechanics, we coded mechanics throughout the articles regarding EA artifact-enabled EA value creation. We coded factors necessary for the emergence of EA artifact-enabled EA value (antecedent factors) and EA-artifacts' value contributions to outcomes. We also coded relationships among the elements when explicitly mentioned in the selected primary studies to increase the explanatory power of the results. Third, we performed a cycle of axial coding to refine our coding scheme into a more manageable set of related themes. Therefore, we linked codes from the previous coding cycle by systematically asking how codes are related. Fourth, we completed a cycle of selective coding to integrate and refine the categories we identified in the previous coding cycle (Saldaña, 2016; Wolfswinkel *et al.*, 2013). This resulted in a high-level framework that integrates the data from our analysis of the concepts and their central relationships within our selected primary studies.

4. Results

4.1 EA artifact-enabled EA value: an inductive framework

In Figure 3 and the sections below, we present our inductive framework summarizing current knowledge on EA artifact-enabled EA value. The EA artifact-enabled EA value framework builds upon relationships that emerged through our analysis of the six building blocks of EA value creation. The potential pre-decision-making EA value fuels the central concept of creating and using EA artifacts. EA practice success factors, EA practice assimilation, and EA practice inhibitors affect the creation and use of EA artifacts. Finally, creating and using EA artifacts leads to post-decision-making EA value.

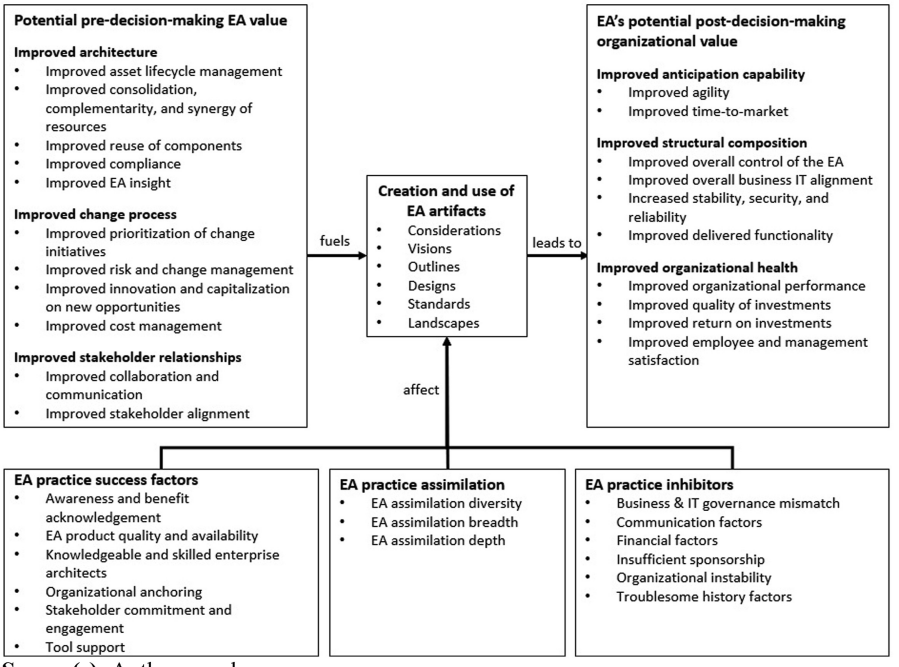


Figure 3.
Framework of EA artifact-enabled EA value creation

Source(s): Authors work

4.2 The creation and use of EA artifacts

The creation and use of EA artifacts lead to either of the six types of EA artifacts: considerations, standards, visions, landscapes, outlines, and designs (Kotusev *et al.*, 2020). Considerations are EA artifacts that provide general directions defining global architectural decisions, such as principles. Standards EA artifacts offer technical standards for designing new change initiatives, such as a technology reference model. Visions are EA artifacts that provide decisions regarding the organization's long-term future, agreed upon by business and IT stakeholders, such as reference architectures. Landscapes are EA artifacts that provide some objective view of the current organizing logic of business and IT, such as a context diagram. Outlines are EA artifacts providing conceptual decisions of proposed change initiatives that are understandable to business leaders, such as a solution overview. Finally, design EA artifacts offer detailed descriptions of change initiatives, actionable for developers, such as a complete solution architecture. Specifying the types of different artifacts offers guidance for the practical usage of EA artifacts (Kotusev *et al.*, 2020).

4.3 Potential pre-decision-making EA value

To discuss potential pre-decision-making EA value, we must clarify what we mean by decisions and what we aim to improve with EA. Decisions associated with EA-driven dynamic capabilities rely on the EA information content of EA artifacts. In line with Van den Berg *et al.* (2019), we refer to a decision as an unequivocal pledge to a particular action. Specifically, decisions associated with EA-driven dynamic capabilities are created and documented in EA artifacts. The extent to which EA artifacts and the EA value creation opportunities are used in decision-making concerning strategic change relies on active communication between architects and EA stakeholders (Kotusev and Kurnia, 2019; Shanks *et al.*, 2018). Therefore, a decision in the context of an EA-driven dynamic capability is a commitment to action aiming to integrate, build, and (re-)configure internal and external capabilities in turbulent environments. Hence, potential pre-decision-making EA value lies in improvement opportunities driven by EA that enable improved decision-making in the context of an EA-driven dynamic capability.

The literature describes demonstrating the value of EA as ambiguous and surrounded by little evidence (Van den Berg *et al.*, 2019; Frampton *et al.*, 2015; Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Lange *et al.*, 2016; Lux *et al.*, 2010; Pattij *et al.*, 2020; Radeke, 2011; Shanks *et al.*, 2018; Van de Wetering, 2019, 2020). Furthermore, realizing that these EA values are closely interconnected is essential. EA's value opportunities can be divided into three clusters: improved architecture, change process, and stakeholder relationships. This section presents the EA values that should be considered when creating EA artifacts.

4.3.1 Improved architecture. EA artifact creation and use should consider the life-cycle of assets so that decisions take the status of relevant EA components into account, leading to improved life-cycle management (Jusuf and Kurnia, 2017).

Additionally, improved consolidation, complementarity, and synergy of resources are noted as essential values enabled by EA (Halén *et al.*, 2014; Jusuf and Kurnia, 2017; Lux *et al.*, 2010; Radeke, 2011; Shanks *et al.*, 2018). EA artifacts support the guidance of building business, data, application, and technology components, improving EA efficiency, effectiveness, and control. EA enables resource complementarity by identifying opportunities for synergy between resources. Furthermore, insights facilitated by regular EA measurement and analysis of the EA evolution should lead to a more mature EA with reduced redundancy and resource optimization by reducing gaps between current and necessary resources and reducing technologies. Via this mechanism, EA artifacts can support managerial decision-making.

Moreover, analysis techniques, e.g. impact analysis, allow for identifying reusable components of the EA (Radeke, 2011). As such, an impact analysis is a diagnostic EA artifact affecting the reduction of technologies and costs.

And, since EA artifacts document planned changes and thus provide the transparency necessary to perform compliance assessments, they enable improved compliance (Jusuf and Kurnia, 2017; Kotusev *et al.*, 2020; Radeke, 2011; Shanks *et al.*, 2018).

Besides, improved EA insight is associated with many benefits (Van den Berg *et al.*, 2019). For example, EA insight enables analysis of consequences of change initiatives, analysis of different strategic or solution alternatives and their pros and cons, the feasibility of investments, fit with the future state architecture, relationships of investments with the EA, and risks of investments. Including EA insights into EA artifacts can be highly beneficial for decision-makers.

4.3.2 Improved change process. Information about interdependencies between change initiatives improves change initiative prioritization and can assist in avoiding duplication (Frampton *et al.*, 2015; Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Radeke, 2011). Reducing redundant efforts, processes, and operations will increase organizational performance because resources are allocated more effectively and efficiently, and the extent of control over resources improves (Jusuf and Kurnia, 2017). Additionally, assessing change initiatives leads to improved prioritization because change initiatives are prioritized in a holistic and strategy-aligned manner (Radeke, 2011). Besides, improved change initiative prioritization is strongly related to enhanced consolidation, complementarity, and synergy of resources. For example, EA information could identify consolidation opportunities for change initiatives. The roadmap EA artifact is a typical example of an opportunity for this specific EA value to be of great worth.

EA fosters the conscious allocation and control of resources, improving risk and change management (Jusuf and Kurnia, 2017). Furthermore, EA enables the creation of a transition plan to improve change management and reduce risks associated with change initiative implementation (Halén *et al.*, 2014). In other words, EA can assist with implementing changes from an integrated business and IT perspective, implementing IT systems and the respective process changes (Kotusev and Kurnia, 2019). Typically, transition architectures and roadmaps are EA artifacts with the potential to realize this value.

Furthermore, EA enables improved innovation and capitalization on new opportunities, which could eventually maintain or create a competitive advantage (Jusuf and Kurnia, 2017).

Besides, EA fosters improved resource utilization, reducing costs and enhancing cost management (Frampton *et al.*, 2015; Halén *et al.*, 2014; Hazen *et al.*, 2017; Jusuf and Kurnia, 2017). Improved resource utilization leads to more significant economies of scale and reduced IT licensing, maintenance, support, and project costs (Frampton *et al.*, 2015). Additionally, standardization, reduction of technologies, and shared IT services enabled by EA reduce IT costs (Halén *et al.*, 2014).

4.3.3 Improved stakeholder relationships. Collaboration and communication improvements can be achieved by creating a shared understanding of terminology and improving information availability facilitated by standard views and terminology to be documented in EA artifacts (Halén *et al.*, 2014; Jusuf and Kurnia, 2017; Kotusev and Kurnia, 2019).

Lastly, EA's value lies in enabling the alignment of stakeholders. EA artifacts facilitate the alignment and communication between stakeholders. They promote organizational learning by creating EA artifacts and engaging partners, customers, business managers, and other stakeholders. Striving for stakeholder alignment is generally related to maintaining and creating a competitive advantage (Jusuf and Kurnia, 2017). All EA artifacts aim for or assist in BITA, e.g. alignment among stakeholders of core drivers or alignment of solution designs among stakeholders.

In conclusion, the eleven types of EA value promote overall BITA and contribute to translating strategy into execution.

4.4 Factors affecting EA value

We established three groups of factors affecting the value creation potential of EA: EA practice assimilation, EA practice success factors, and EA practice inhibitors.

4.4.1 EA practice assimilation. An EA practice has a profound impact on an organization. However, the profoundness depends on the diversity, breadth, and depth of the assimilation of the EA practice (Halén *et al.*, 2014; Hazen *et al.*, 2017; Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Pattij *et al.*, 2020). First, the diversity aspect of assimilation "refers to the amount of differing IT and business processes and relationships that the EA affects" (Hazen *et al.*, 2017, p. 568). Next, the breadth aspect "describes how widely the EA is used over the entire organization, that is, how many functional areas, intra-organizational, and even inter-organizational teams and groups make use of the EA." (Hazen *et al.*, 2017, p. 568) Finally, the depth aspect of EA assimilation relates to "how many vertical levels the EA is communicated and utilized" (Hazen *et al.*, 2017, p. 568). Furthermore, Hazen *et al.* (2017) showed that a strategic orientation of EA helps EA practice assimilation.

4.4.2 EA practice success factors. Researchers have identified several success factors that affect the creation and use of EA artifacts (Van den Berg *et al.*, 2019; Brosius *et al.*, 2016; Halén *et al.*, 2014; Jusuf and Kurnia, 2017; Kotusev and Kurnia, 2019; Kurnia *et al.*, 2021; Lange *et al.*, 2016; Pattij *et al.*, 2020; Radeke, 2011; Van de Wetering, 2019). The first success factor is awareness and benefits acknowledgment of the EA practice. Enterprise architects should actively communicate with EA stakeholders who consciously participate in using and creating EA artifacts (Kotusev and Kurnia, 2019). Additionally, EA stakeholders must acknowledge the benefits of developing and applying EA. EA value delivery prospers with an understanding and awareness of the EA practice (Halén *et al.*, 2014; Lange *et al.*, 2016).

Secondly, EA products should be of sufficient quality, and the EA product should be readily available (Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Lange *et al.*, 2016). The EA products must be available and of sufficient quality to be usable and useful to apply the information in EA artifacts, such as roadmaps.

Thirdly, enterprise architects must be knowledgeable and skillful (Brosius *et al.*, 2016; Frampton *et al.*, 2015; Kurnia *et al.*, 2021; Radeke, 2011; Van de Wetering, 2019). Active participation in evaluating and selecting strategic or tactical options requires a unique combination of business and IT knowledge. Hence, enterprise architects must have practical communication skills and a shared interpretation of the EA to enable organizational learning and development. The knowledge and skills of enterprise architects are essential in achieving value from EA (Frampton *et al.*, 2015).

Fourthly, how the EA practice is positioned in the organization plays an important role (Halén *et al.*, 2014; Kurnia *et al.*, 2021; Lange *et al.*, 2016; Pattij *et al.*, 2020; Radeke, 2011; Shanks *et al.*, 2018). The correct organizational anchoring positively influences using and creating EA artifacts for change initiatives by enabling proper governance mechanisms.

Fifthly, stakeholder commitment and engagement are essential for the success of an EA practice (Van den Berg *et al.*, 2019; Halén *et al.*, 2014; Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Radeke, 2011). The stakeholders include, among others, the EA team, senior business and IT management, and project management. Good quality of trust among stakeholders promotes engagement and commitment and brings the architecture up to speed to enable EA practice success.

EA stakeholder inclusion and commitment empower the creation and use of EA artifacts. EA stakeholder inclusion refers to stakeholder engagement in EA decision-making (Pattij *et al.*, 2020). Engagement is the active communication between enterprise architects and EA stakeholders, conscious participation of stakeholders in decision-making processes, collaborative decision-making, and mutual commitment to EA decision-making (Kotusev and Kurnia, 2019). Furthermore, engagement is divided into strategic and tactical engagement. Strategic engagement represents the self-evident partnership between enterprise architects, senior business leaders, and managers at the level of organization-wide planning (Kotusev and Kurnia, 2019). Thus, business leaders should discuss strategic questions and future plans with enterprise architects and feel comfortable doing so (Kotusev and Kurnia, 2019; Kurnia *et al.*, 2021; Radeke, 2011).

Additionally, tactical engagement represents the close cooperation of enterprise architects with various change initiative stakeholders at the level of change implementation (Kotusev and Kurnia, 2019). Moreover, a sufficient level of trust between enterprise architects and EA stakeholders promotes engagement and partnership (Kotusev and Kurnia, 2019). The organizational structure must provide an adequate level of stability. The business and IT governance structures must be aligned so that the enterprise architect can take responsibility for managing the EA (Kotusev and Kurnia, 2019). Thus, EA governance is how organizational processes and directives ensure that change initiatives conform and comply with EA artifacts, such as solution architectures (Shanks *et al.*, 2018). EA governance and the formal mandate of enterprise architects, with the support of senior leadership, should enable enterprise architects to enforce compliance with established EA artifacts, such as standards and principles (Kurnia *et al.*, 2021; Lange *et al.*, 2016; Pattij *et al.*, 2020; Radeke, 2011). Having support from leaders and proper governance mechanisms in place should help with disposing of resistance by teams working on change initiatives to restrictions imposed by architecture (Kurnia *et al.*, 2021) and foster a culture where there is an active intention to create and use EA artifacts through promoting EA artifact user satisfaction (Lange *et al.*, 2016). Thus, business leaders must pose a positive attitude towards IS/IT, IS/IT initiatives, and change initiatives in general to enhance the commitment necessary to complete change initiatives (Bradley *et al.*, 2011). EAM has been positively associated with strategic BITA, positively impacting organizational agility (Pattij *et al.*, 2020). In addition, there is a positive relationship between the strategic insights provided by enterprise architects and their EA artifacts and the maturity of engagement and collaboration (Van den Berg *et al.*, 2019). Therefore, a continuous positive attitude and commitment to creating and using EA artifacts helps achieve success and contributes to ongoing value creation in the future (Lange *et al.*, 2016).

EA helps to communicate organizational information by creating alignment through a shared understanding and improving the information available for all relevant stakeholders (Halén *et al.*, 2014). Alignment concerns the consistent link between business strategies and goals and IT strategies and goals. Furthermore, alignment can be dissected into social and intellectual alignment. Social alignment refers to alignment in the areas such as shared values and mutual understanding, while intellectual alignment concerns the level of harmonization between goals, strategies, processes, and infrastructure (Pattij *et al.*, 2020). EA facilitates social and intellectual alignment through a learning process in which individuals conjointly learn to consider enterprise-wide goals in their local design decisions. This cooperative learning process is realized by interacting with EA stakeholders learning about the interdependence between stakeholders, and reflecting on shared and applied knowledge about expected outcomes (Brosius *et al.*, 2016). Thereby clarifying, for example, priority conflicts of different stakeholders and balancing long-term and short-term planning (Kotusev and Kurnia, 2019). In other words, EA paves the way for more effective use of IS/IT in supporting business needs through inter-organizational communication and collaboration (Bradley *et al.*, 2011; Jusuf and Kurnia, 2017).

The use and creation of EA artifacts involve extensive communication with business and IT stakeholders (Frampton *et al.*, 2015). Hence, a prerequisite for inclusion, commitment, and alignment is the capability of enterprise architects to communicate with the business in a language they can understand (Kotusev and Kurnia, 2019). Architects must have good communication skills to achieve mutual understanding between all stakeholders, especially senior business leaders (Kurnia *et al.*, 2021).[43] The creation and use of EA artifacts and, eventually, EA decision-making enable improved communication and collaboration (Halén *et al.*, 2014). Thus, EA services include general communication with all EA stakeholders, management support and advice for EA-related topics, and active support of strategic change initiatives and other projects (Lange *et al.*, 2016). In addition, EA provides information about an organization's roles and responsibilities, processes, and IT to help make better, more evidence-based decisions for change initiatives (Van den Berg *et al.*, 2019; Frampton *et al.*, 2015). EA stakeholders' awareness and understanding of EA, e.g. gaps between current and future state architecture, improve productive communication (Kurnia *et al.*, 2021; Lange *et al.*, 2016). Eventually, the creation and use of EA artifacts will yield benefits at the organizational and change initiative level, promoting the continuous engagement of architects in strategic and tactical decision-making (Lange *et al.*, 2016).

Finally, sufficient tool support for creating and using EA artifacts fosters EA practice success (Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Lange *et al.*, 2016). Tooling, e.g. to support EA documentation and framework availability, can facilitate the understanding, creation, and use of EA artifacts.

4.4.3 EA practice inhibitors. Next to success factors, researchers have also identified inhibitors for EA artifact creation and use success (Kotusev and Kurnia, 2019; Kurnia *et al.*, 2021). First, a business and IT governance mismatch inhibits proper strategic engagement (Kotusev and Kurnia, 2019). This inhibitor of effective and efficient creation and use of EA artifacts is partially caused by hierarchical stratification (Kotusev and Kurnia, 2019). Hierarchical stratification involves employees of different hierarchical levels, raising communication barriers between EA architects and other stakeholders. For example, architects might not have access to senior business executives (Kurnia *et al.*, 2021), or business leaders might be unwilling to treat architects as partners for strategic dialogs (Kotusev and Kurnia, 2019). Furthermore, a conflict between the centralized structure of IS/IT and a decentralized structure of the business complicates strategic engagement. Besides, architects might focus too much on the technical side of strategic initiatives and pursue IT objectives set by the CIO, thereby losing sight of achieving the business objectives (Kurnia *et al.*, 2021). Another aspect that might play a role in the business and IT governance mismatch is the conflicting priorities of stakeholders. Finally, disagreements regarding the most critical goals for the organization influence the EA practice because it complicates strategic engagement (Kotusev and Kurnia, 2019).

Second, some communication factors might inhibit the effectiveness of an EA practice. A lack of common terminology and understanding significantly inhibits EA practices (Halén *et al.*, 2014; Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Radeke, 2011). Architects need to understand and have sufficient knowledge of the business and must be capable of communicating in a language that the business understands, especially senior business leaders. Moreover, they must possess sufficient IT knowledge and combine business and IT knowledge, making their role unique (Radeke, 2011). Architects must find the appropriate language suitable for conversations with EA stakeholders (Kotusev and Kurnia, 2019; Kurnia *et al.*, 2021). Poor communication skills of architects prevents a collective awareness and perception among EA stakeholders. Hence, EA stakeholders could perceive the EA artifacts and solutions presented by architects as over-complicated. However, a multitude of potential EA stakeholders complicates engagement due to the amount of time and money it costs to identify, involve, and build trusting relationships with all stakeholders (Kotusev and Kurnia,

2019). Thus, an EA practice requires a balanced, well-thought-out approach, not letting communication be an inhibiting factor.

Third, cultural factors influence an EA practice's effectiveness (Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Lux *et al.*, 2010). For example, when the use of EA is mandated legislatively, the genuine value of EA in strategic initiatives might not be recognized. Additionally, employees, including business leaders, might pose resistance to the standards, principles, and other restrictions imposed by architects. Moreover, business managers might be reluctant to speak with architects and avoid discussing their future plans and needs with them. Business leaders and managers might not feel comfortable negotiating with architects, which harms the quality of the dialog between business and IT (Kurnia *et al.*, 2021).

Fourth, financial factors could inhibit the realization of EA value (Kotusev and Kurnia, 2019; Lange *et al.*, 2016). For example, when annual budgets shift, the investment prospects in strategic change initiatives become unclear. Additionally, unclarity arises when the funding process lacks transparency. This leads to vagueness into which strategic change initiatives might be approved for what reason. Furthermore, these factors might undermine strategic engagement (Kotusev and Kurnia, 2019).

Fifth, insufficient business and IT leaders' sponsorship negatively affects the EA practice (Kotusev and Kurnia, 2019; Kurnia *et al.*, 2021). A lack of support from senior IT leaders, such as the CIO, results in an inability of architects to enforce compliance with established standards and principles (Kurnia *et al.*, 2021; Radeke, 2011). Thereby increasing the likelihood of susceptibility to urgent needs and deviating from planned steps toward the future state architecture (Kotusev and Kurnia, 2019).

Sixth, organizational stability factors are relevant for getting value from EA. For example, insufficient sponsorship could be caused or worsened by frequent leadership rotation undermining architects' engagement. Furthermore, a dynamic structure of the whole organization negatively affects the creation and use of EA artifacts because the organization is in a continuous state of flux (Kotusev and Kurnia, 2019; Lux *et al.*, 2010).

Finally, a troublesome history with EA might disturb EA practices (Van den Berg *et al.*, 2019; Kotusev and Kurnia, 2019; Kurnia *et al.*, 2021). A reputation or perception of an EA practice as a factor that slows down or inhibits change initiatives impairs its efficacy (Van den Berg *et al.*, 2019; Kurnia *et al.*, 2021). Moreover, this reputation could disappoint and demotivate the EA practice employees (Kotusev and Kurnia, 2019). Therefore, it is essential to prove value to the stakeholders of the EA practice (Kurnia *et al.*, 2021).

4.5 EA's potential post-decision-making organizational value

Post-decision-making EA value concerns the long-term value generated by practicing EA and consists of improved anticipation capability, structural composition, and organizational health. This section provides an in-depth insight into these long-term values enabled by EA. However, similarly to pre-decision-making EA values, realizing they are closely interconnected is essential.

4.5.1 Improved anticipation capability. A dynamic capability requires implementing changes and the ability to anticipate and respond to environmental forces. The organization must be prepared for future strategic changes (Radeke, 2011). Consequently, an EA-driven dynamic capability improves the operating platform and standardization and modularization of the EA, improving the organization's overall agility (Frampton *et al.*, 2015; Radeke, 2011).

An improved time-to-market of strategic changes is another benefit of the practice of EA (Jusuf and Kurnia, 2017; Radeke, 2011). Modularization is a crucial architectural aspect that enables an improved time-to-market, which leads to a set of readily available and proven components (Radeke, 2011).

4.5.2 Improved structural composition. The risks associated with strategic change are reduced by having a less complicated, more transparent, and thus more manageable IS/IT environment. The EA is documented in landscape EA artifacts, and elaboration, discussion, and evaluation of different strategic options are documented in EA artifacts, providing transparency and traceability of decisions (Kotusev *et al.*, 2020; Radeke, 2011). Hence, the effects of strategic changes become more apparent (Halén *et al.*, 2014; Jusuf and Kurnia, 2017).

Additionally, the more precise impact of strategic changes can improve the return on investment of future and existing investments (Halén *et al.*, 2014; Hazen *et al.*, 2017; Shanks *et al.*, 2018). It is essential to realize that an EA practice is a long-term commitment, and the return on investment is not realized immediately (Halén *et al.*, 2014). Also, it is relevant to be aware of the interconnectedness of the EA value types. For example, the return on investment depends on delivering the proper functionality and making the correct investment decisions.

Moreover, post-decision-making EA value lies in improved strategic BITA. BITA concerns alignment between business strategies and goals and IS/IT strategies and goals. The EA practice enables an organization's business strategy alignment with the IS/IT strategy with organization-wide EA plans. Hence, the EA practice supports maintaining and creating a competitive advantage (Jusuf and Kurnia, 2017; Pattij *et al.*, 2020; Shanks *et al.*, 2018).

Additionally, using and creating EA artifacts improves delivered functionality (Frampton *et al.*, 2015; Jusuf and Kurnia, 2017). For instance, by reusing and using solution architecture examples and applying standards and guidelines (Frampton *et al.*, 2015). EA artifacts enable improved delivered functionality by explicating the required adaptations and installations of business and IT structures and processes in line with strategic goals (Radeke, 2011). Hence, the organization evolves to the desired future state guided by EA artifacts (Pattij *et al.*, 2020).

Furthermore, the post-decision-making value of EA lies in increased stability, security, and reliability of the IS/IT landscape (Frampton *et al.*, 2015; Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Lange *et al.*, 2016). For example, process optimizations could improve reliability (Frampton *et al.*, 2015; Lange *et al.*, 2016; Shanks *et al.*, 2018).

4.5.3 Improved organizational health. Business processes can be renewed, or new business processes can be enabled by applying IS/IT-based resources. New or renewed business operations and processes impact business performance, benefiting full-scale organizational performance. Operational efficiency enhancements can improve business process performance or denote aggregated IS/IT-performance impacts such as cost reduction, productivity enrichment, or reduced time to deliver solutions (Jusuf and Kurnia, 2017; Lux *et al.*, 2010).

Moreover, using EA artifacts to prepare decisions is positively related to the quality of investments. The overall quality of investment decisions improves as indicated by, e.g. achievement of desired outcomes of investments, stakeholder satisfaction of these outcomes, and contribution to strategic goals of outcomes (Van den Berg *et al.*, 2019). These outcomes are preceded by transparency in priorities and conflicts between business and IT and the evaluation of long-term goals against urgent needs[41] that have been considered in the use, creation, and decision-making phase. The explicit elaboration, discussion, and evaluation of different strategic and tactical options (Radeke, 2011) and the positive contribution of individuals and groups improve decision-making quality (Lange *et al.*, 2016). Furthermore, understanding the EA, gaps, and relations with customers and partners facilitates improved decision-making quality, eventually maintaining or creating a competitive advantage (Jusuf and Kurnia, 2017).

Moreover, organizational health improves with long-term investments that maintain or create a competitive advantage (Jusuf and Kurnia, 2017). EA planning is related to improved long-term investments through its goal-oriented process of developing future state architectures based on long-term organization-wide requirements (Pattij *et al.*, 2020).

Accordingly, the outcomes of investments based on EA-driven decision-making contribute to strategic goals (Van den Berg *et al.*, 2019) and leads to improved ROI (Kotusev *et al.*, 2020; Van de Wetering, 2020).

Improving delivered functionality and engaging the necessary stakeholders improves employee and management satisfaction (Jusuf and Kurnia, 2017). This implies that stakeholders are more satisfied using the information, the IS, and related services (Lange *et al.*, 2016).

5. Discussion

After conducting a thorough review of the literature on EA artifact-enabled EA value, it has been found that significant and noteworthy contributions have been made to the literature on EA artifacts and EA value. These contributions have been valuable to the broader EAM literature and have aimed to develop an integrative model of EA artifacts' role in EA value. According to this study, EA artifacts play a crucial role in realizing EA value. While existing views on EA value focus on, e.g. projects and organizational benefits (Shanks *et al.*, 2018) or process events (Radeke, 2011), the potential pre- and post-decision-making views related to EA artifacts add to these perspectives by emphasizing their significance in EA value creation.

Moreover, we take a more comprehensive approach to analyzing the use of EA artifacts than previous research, which has examined success factors, assimilation, and inhibitors of EA practices separately (e.g. Halén *et al.*, 2014; Kotusev and Kurnia, 2019; Kurnia *et al.*, 2021). By considering all these factors together, we offer a more complete understanding of how EA artifacts can enable EA value creation. As a result, our findings provide valuable insights for EAM literature on optimizing the creation and use of EA artifacts for maximum value.

This research indicates that using EA artifacts facilitates achieving EA values. In order to navigate the challenges of digital transformation in constantly changing environments, it is important to strike a balance between EA planning and EA emergence (Shanks *et al.*, 2018). This balance can be achieved through the use of EA artifacts and by considering potential EA values before making decisions. For instance, developing an EA outline for a project with a tight deadline may require sacrificing component reuse to save time on coordination. Unfortunately, this trade-off could lead to reduced anticipation capability, weakened structural composition, or decreased organizational health. Overall, the framework highlights the interdependence between pre-decision-making and post-decision-making phases, with EA artifacts as vehicles for orchestration.

When creating or using EA artifacts, it's important to consider several factors related to EA practice. Firms must carefully evaluate success factors, assimilation, and inhibitors to fully realize the value of these artifacts. For instance, conflicts of interest may arise when the business side of a firm is decentralized while the IT side is centralized (Kotusev and Kurnia, 2019). Enterprise architects who are aware of these potential conflicts can document design decisions and their relation to different stakeholders to provide insight and improve stakeholder relationships. The framework includes pointers for enterprise architects to enhance their value through EA artifacts.

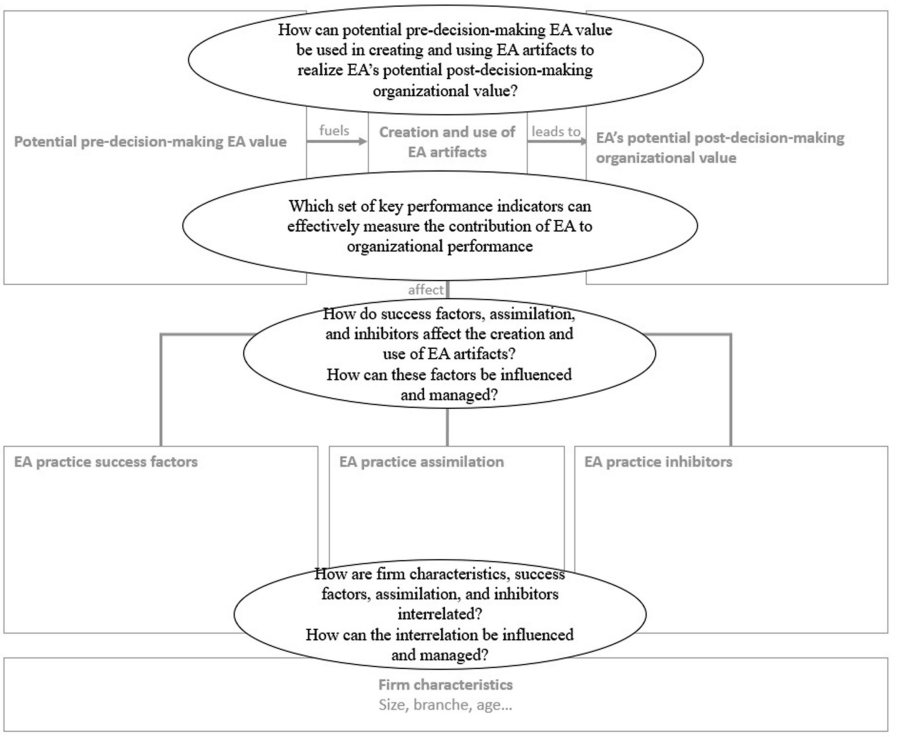
6. Future research, limitations, and conclusions

6.1 EA artifact-enabled EA value: a research agenda

We argue that all streams of the literature provide an essential yet partial understanding of the issues at hand. However, the results of this research are limited to a selected number of primary studies and should be validated by further studies, e.g. surveys or case studies. The following section outlines the key challenges: more clarity on the role of an EA practice in

successful strategic change, a better understanding of how to realize value with an EA practice, and an increase in longitudinal research. Figure 4 shows proposed questions to guide future research.

6.1.1 The role of an EA practice in successful strategic change. Dynamic capabilities are necessary to deal with a turbulent environment and contribute to the explanation of how to build and sustain competitive advantage (Frampton *et al.*, 2015; Hazen *et al.*, 2017; Lux *et al.*, 2010; Pattij *et al.*, 2020; Shanks *et al.*, 2018; Van de Wetering, 2019, 2020). The dynamic capabilities view extends the RBV by focusing on the ability to change a firm's resource base purposefully (Bachoo, 2019; Frampton *et al.*, 2015; Hazen *et al.*, 2017; Lux *et al.*, 2010; Pattij *et al.*, 2020; Shanks *et al.*, 2018; Van de Wetering, 2019, 2020). An EA practice facilitates resource-based changes by engaging the appropriate stakeholders and documenting the EA in EA artifacts. Enterprise architects use pre-decision-making EA value creation opportunities and thus improve the quality of decisions. However, EA research still lacks an appropriate depth of knowledge on the building blocks of EA value creation and how the building blocks interrelate. In cases where an EA capability lacks adequate support from top-level management or has faced challenges in the past within the organization, it becomes crucial for the EA capability to identify and implement strategies that can mitigate or eliminate these obstacles. Research on EA could benefit from investigating how EA practice success factors, EA practice inhibitors, and EA practice assimilation affect the creation and use of EA artifacts in turbulent environments and how these factors can be influenced to gain more value from EAM.



Source(s): Authors work

Figure 4.
Proposed questions to guide future research

Furthermore, several researchers have conceptualized EA value or specific elements of EA value (Van den Berg *et al.*, 2019; Foorthuis *et al.*, 2016; Frampton *et al.*, 2015; Halén *et al.*, 2014; Jusuf and Kurnia, 2017; Kurnia *et al.*, 2021; Lange *et al.*, 2016; Lux *et al.*, 2010; Radeke, 2011; Shanks *et al.*, 2018). However, IS scholars generally do not consider EA artifacts an essential element of EA value creation. Therefore, scholars could provide more in-depth insight into the relationship between EA value and EA artifact creation and use. It is important to note that reusing components like data objects or application services is helpful in creating EA artifacts. Therefore, it is crucial to identify such reusable components and understand how to establish a relationship between their creation and use in EA artifacts. Researching how pre-decision-making EA value can effectively and efficiently be used to prepare specific EA artifacts would allow the EA practice knowledge to become more granular and concrete, making it easier, for example, to convince business leaders to invest in an EA practice.

In contrast to traditional strategic planning, dynamic capabilities help understand how to deal with a turbulent environment. It would be helpful to gain insight into how a dynamic capabilities perspective influences the EA artifact creation process. The dynamics may differ considerably depending on which information is considered part of an EA artifact. In the case of sensing opportunities and threats, EA artifacts would presumably be of a strategic and relatively high abstraction level, containing information related to the business model. While in the case of mobilizing, EA artifacts would assumably have more concrete and tactical knowledge. Moreover, sensing opportunities and threats might require a different engagement and stakeholder group than mobilizing an organization's resources. Therefore, understanding the necessary level of abstraction in EA artifacts for sensing, mobilizing, and transforming will help provide just enough, just-in-time information for strategic changes.

The exploration of the measurement of enhanced decision-making, which can be attributed to the improved information provided through EA artifacts, can significantly contribute to a better understanding of EA value and the control of EA practice. In order to achieve this, future research endeavors could focus on the development of a dashboard with a set of generic key performance indicators that effectively measure the contribution of EA to firm agility. Additionally, research could be conducted on more abstract aspects of EA, such as its role in improving communication, which can provide valuable insights into the role of EA in driving strategic change. These research opportunities have the potential to shed light on the critical role of EAM in successfully creating strategic change.

6.1.2 Realizing an EA practice. The building blocks presented in Figure 2 represent our findings of EA artifact-enabled EA value. Nevertheless, as Aier *et al.* (2011) indicate, significant differences exist in realizing EA value in practice. Therefore, building an EA practice for EA-driven dynamic capabilities could differ from organization to organization. E.g. how IT operations or business and IT managers are supported by the EA practice. We argue that it would guide practitioners who want to manage an EA practice to understand the control options for variables influencing EA practice value generation. The organization's size, branch, and age are obvious variables that play a role in an EA practice's design and maturity management. However, the EA practice success factors, inhibitors, and assimilation are also crucial for the value-creation potential of an EA practice. Numerous factors that impact the practice of Enterprise Architecture (EA) have been revealed, and these factors are believed to be interconnected. For instance, having knowledgeable and skilled enterprise architects is a key success factor in realizing the value of EA. However, it would be interesting to explore whether the required knowledge and skills vary among firms of different sizes, industries, or ages. Therefore, it would greatly benefit the EA community to understand how these factors can be managed in a cohesive manner to positively influence the creation of value through EA in various settings.

6.1.3 Longitudinal research. Finally, as we typically study EA practices as a snapshot in time, an understanding of EA artifact creation and use is generally lacking. The EA artifact creation and use dynamic can only be observed within a sufficiently long time horizon. In line with many other researchers, e.g. Shanks *et al.* (2018), Van de Wetering (2020), and Lange *et al.* (2016), we argue that longitudinal research would benefit EA research. Longitudinal research would help us understand how EA practices evolve over time, reflecting EA maturity (Shanks *et al.*, 2018; Van Steenbergen *et al.*, 2010). Specifically, collecting longitudinal data from EA practices would allow us to examine how the value creation of EA practices evolves. For example, does an EA practice focus on improved EA insight first, or is there a combination of specific value creation mechanisms most likely to start with when setting up an EA practice? Although we are familiar with EA practice maturity models, e.g. Vallerand *et al.* (2017), they are not grounded in longitudinal empirical data.

6.2 Limitations

This study has three limitations. First, although the research process was performed taking rigor and systematicity into account (Wolfswinkel *et al.*, 2013), the review process was performed by a single researcher. However, the second and third researchers, who are also highly knowledgeable in EA, have thoroughly reviewed the research and assessed the validity of the findings. Second, we used three databases, AIS Library, Business Source Complete, and ScienceDirect, that provide access to more than an adequate number of journals and publications. Additionally, EA is a very active research area. Therefore, some of the areas of future research may already be or have been under investigation by other researchers. Nevertheless, that would only confirm the importance of our acknowledged research opportunities. Finally, our objective to develop a model of EA artifact-enabled EA value and put forward a research agenda implies the conceptual nature of our results. Future research, specifically case studies, could provide more in-depth knowledge of different parts of the model.

6.3 Conclusion

Our review of research on the phenomenon of the position of EA artifacts in EA value contributes to our understanding of its mechanisms, inhibitors, and success factors. The value potential enabled through EA artifacts delineated in our inductive framework aligned with an EA-driven dynamic capability explains the mechanisms behind EA artifact's position in EA value creation. As EA stakeholders create and use EA artifacts and enterprise architects apply the pre-decision-making value opportunities, they enable improved decision-making. This renders the organization's ability to maintain and create a competitive advantage and provides long-term benefits, such as higher agility, improved BITA, and a better manageable IS/IT environment.

Although our research agenda is not exhaustive, we believe that our proposed future research areas will help us better understand the mechanisms and interrelatedness of EA practices and dynamic capabilities. Beyond these research areas, future research may use our framework to examine specific relationships between concepts or gain more in-depth knowledge of certain concepts of our inductive framework.

Overall, we hope this study contributes to a deeper understanding of the EA value creation mechanisms and encourages future research to explore the nature and implications of EA practices.

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