IS Alignment in Dynamic Environments: A Comprehensive Framework

Lukas Grützner
Leibniz Universität Hannover
gruetzner@iwi.uni-hannover.de

Oliver Werth
Offis e.V.
oliver.werth@offis.de

Michael H. Breitner
Leibniz Universität Hannover
breitner@iwi.uni-hannover.de

Abstract

In increasingly volatile environments, organizations face unprecedented challenges from events such as the Covid-19 pandemic and the rising impacts of the climate crisis. Establishing effective alignment between Information Systems (IS) and the business is critical. Recognizing the substantial environment effect on alignment, we combine a literature review and expert interviews. Following design science research (DSR), we develop a conceptual framework to describe IS alignment as a dynamic process across strategic and structural levels in the context of pluralistic ecosystems affected by micro- and macro-environmental factors. We discuss our results and provide recommendations for further research. We enable insights both for researchers and practitioners to effectively address key environmental factors that affect IS alignment.

Keywords: Information systems alignment, dynamic environment, resilience, comprehensive framework

1. Introduction

The alignment of IS are critical for organizations to enhance resilience in a dynamic environment (Llamzon et al., 2022). Current exogenous shocks, i.e., the Covid 19 pandemic, the Russian-Ukrainian war, and accelerating impacts of the climate crisis form a turbulent external environment. Resilient IS support the adaption and recovery from major disruptions in supply chains, workflows, decision-making processes, and organizational agendas (Rai, 2020). IS alignment is a co-evolutionary process of orienting, integrating, and connecting business and IS within intra- and extra-organizational environments, covering strategic and structural dimensions (Llamzon et al., 2022). The strategic dimension focuses on how an IS strategy can be aligned with organizational business strategy to extract greater strategic value from information technology (IT) (Williams et al., 2018; Wu et al., 2015). The structural dimension comprises operational

and social components (Llamzon et al., 2022), examining the integration of IS infrastructures with an organization's business models and processes (Benbya et al., 2019; Schlosser et al., 2015). The overall objective of alignment is the optimization of processes and operations to maximize business value (Benbya et al., 2019; Luftman et al., 2017). The positive effect of IS alignment and IS investment on organizational performance increases with environmental complexity (Sabherwal et al., 2019). It is imperative for organizations to consider alignment as an opportunity in crisis, as ongoing digital transformation contributes to building resilience (Llamzon et al., 2022).

External environmental changes are forcing organizations to further drive digital transformation to improve resilience and sustainability, requiring business models and supply chains to be reassessed accordingly (Centobelli et al., 2020). This results in heightened IS requirements and the realignment of business and IS strategies (He, 2022), underscoring the critical role of organizational capabilities to respond to dynamic environments effectively using adaptable and agile IS (Tallon & Pinsonneault, 2011). Scientific literature has emphasized the significance of the external environment in aligning IS and business on the ability of organizations to respond to dynamic changes (e.g., Xue et al., 2012). However, organizations are struggling with the practical execution (Kappelman et al., 2020), as the complex and unpredictable nature of environments poses challenges to maintain successful alignment (Xue et al., 2012; Oh & Pinsonneault, 2007). Organizations often adopt green IS standards without fully considering external environmental factors and their compatibility with business strategies, leading to uncertain outcomes (Saldanha et al., 2022). Previous studies have provided valuable insights into various aspects of IS alignment, but so far, limited applicable results and findings describe external environmental factors and their effects on the alignment process across strategic and structural dimensions (Llamzon et al., 2022). There remains a significant gap in

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understanding the broad range of external environmental factors and their impact on IS alignment. As organizations become increasingly interconnected across stakeholders and ecosystems, failure to consider external influences hinders strategic decision-making and structural efficiency (Llamzon et al., 2022). By systematically identifying and analyzing the key external environmental factors and their impact on IS-business alignment, this research provides actionable insights to guide organizations in making informed strategic and structural alignment decisions within dynamic environments. We address this research need with our research question (RQ):

What are the key external environmental factors and how do they affect IS and business alignment?

Utilizing DSR as a structural guide (Baskerville et al., 2018) we examine the impact of external environmental factors on IS and business alignment. Synthesizing theoretical and practical insights, we identify the key dynamic environmental factors and aggregate them in a conceptual framework. We pre-test our interview guide and evaluate the results and findings. Our discussion includes findings, implications, and recommendations for both research and practice. Prior to conclusion, we outline further research directions and address limitations.

2. Research Design and Methodology

2.1 Design Science Research

Our research goal is to advance the theoretical knowledge of dynamic environmental factors in IS alignment and to develop a tangible concept to abstract and visualize the phenomenon under study (March & Smith, 1995) to provide actionable insights to practitioners. To address our research goal and answer our RQ, we select an appropriate DSR and entry point to provide a foundation for conducting research that ensures meaningful solution-oriented results with practical relevance (Baskerville et al. 2018). DSR is a problem-solving paradigm used to generate design knowledge and theoretical insights grounded in forming theory-based artifacts (Baskerville et al., 2018; vom Brocke, Hevner, & Maedche, 2020). For structural guidance, we rely on a high-level DSR model, consisting of four generic process steps (Doyle et al., 2019). To incorporate feedback into the development process, we pretest our approach and evaluate our artifact during development (vom Brocke, Winter, et al., 2020). Following the DSR steps outlined by Doyle et al. (2019), our first step is to identify the research gap and research need by addressing the research call of Llamzon et al. (2022) and Luftman et al. (2017) to investigate in detail the

influence of external dynamic environments on IS alignment. The second step is the design and construction of our artifact. We identify external environmental factors based on the analysis of 85 scientific papers. Furthermore, we conduct 8 expert interviews to examine their experiences regarding the influence of dynamic environments on IS alignment to verify and extend our theoretically derived set of key environmental factors. We synthesize the key environmental factors in a tangible construct, i.e., our conceptual framework. The factors and our construct are then evaluated through an independent focus group discussion (FGD) in step three. In step four, the key environmental factors and their interrelationship on IS alignment are presented in the results section.

2.2 Problem Identification and Solution Approach

Due to increasingly volatile environments, scientific literature calls for research on how IS are affected and how it can increase mitigation of these events (Boh et al., 2023; Watson et al., 2021). Researchers have stressed the theory-practice gap of IS alignment and call for a reconceptualization to a fast-evolving reality (Renaud et al., 2016). As processes and services increasingly depend on ecosystem collaborations and shared resources (Adner, 2012), the shift in organizational structures requires a reorientation from predominantly interorganizational perspectives to extra organizational ecosystem perspectives in dynamic environments (Adner, 2012; Llamzon et al., 2022). IS alignment results vary depending on environmental conditions (Sabherwal et al., 2019). Organizational IS strategies and structures are inextricable from their external dynamic surroundings (Llamzon et al., 2022). The external environment consists of the macro- and micro-environment. Micro-environment describes the structures of external partners and stakeholders, such as suppliers or competitors. Macro-environment describes the influence of political, environmental, social, and other exogenous forces that affect IS strategy and structure (Llamzon et al., 2022).

The positive impact of IS alignment on business performance increases with environmental complexity (Sabherwal et al., 2019), underscoring the significance of the external environment in the alignment process and emphasizing the need for research to identify relevant external environmental factors and their role in IS-business alignment. Most IS alignment studies are conducted only at the intra-organizational level within a one-dimensional approach, not considering external environmental influences and the possibility that alignment as a process can occur simultaneously

in both dimensions, i.e., strategic and structural (Benbya et al., 2019). Therefore, Llamzon et al. (2022) and Luftman et al., (2017) call for research to investigate in detail the influence of external dynamic environments on IS alignment, considering that future research should focus not only on the strategic dimension of IS alignment but more on the structural dimension, i.e., the social and operational factors.

Addressing the call of Llamzon et al. (2022) and Luftman et al. (2017), our research objective is to identify key external macro- and micro-environmental factors and explore their impact on the strategic and structural alignment dimensions from both a scientific and practitioner perspective. Using a concept-centric scientific literature analysis and conducting expert interviews with practitioners, we develop a conceptual framework of dynamic environmental factors in IS alignment. A conceptual framework provides clarity and contextual understanding. It assists in defining and organizing key concepts, variables and relationships within the business setting (Marshall & Rossman, 2016). We make the following contributions to research and practice: (1) we identify the most important external environmental factors and their relationship towards organizational alignment processes. (2) we propose a conceptual framework to foster understanding, which can provide researchers with a starting point for further in-depth analysis. (3) we provide practitioners with an overview of the key environmental factors and their interactions that must be considered when aligning IS with the business to ensure competitive advantage and achieve long-term organizational value growth.

2.3 Literature Review

To identify key environmental factors from theory, we conducted a systematic literature review following vom Brocke et al. (2015) and Watson and Webster (2020). Not all results are valuable for a literature review. Therefore, it is important to identify the most relevant papers (vom Brocke et al., 2015). Following Webster and Watson (2002) that seminal articles are more likely to be published in leading journals, we filtered the articles by restricting our initial results to leading journals, the Senior Scholar's Basket of 11. The scope of our review was structured according to our research question (Cooper, 1988). We focused on research and theories of IS alignment that incorporate environmental factors with the goal of synthesizing existing knowledge in a neutral representational framework. Our coverage is a combination of central and exhaustive reporting, as we limit ourselves to the Senior Scholar's Basket of 11.

The results are approached conceptually and address specialized IS researchers and managers.

We performed a comprehensive literature on environmental factors in IS alignment by conducting two iterations. In the first iteration, we identified the baseline articles on IS alignment research. We leveraged the stand-alone literature reviews on IS alignment papers in the Senior Scholar's Basket conducted by Benbya et al. (2019) and Llamzon et al. (2022) up 2018 and 2020, respectively, as an initial starting point. We updated these literature reviews on IS alignment using the search terms used by both author teams, i.e., alignment, misfit/fit, linkage/linking, gestalt, congruence, and harmony, up to 2023 in the Senior Scholar's Basket of 11. We used each journals database and applied the search string to a full text search. We scanned the title and the abstract for relevance. Aggregated, this leads to a total of 85 baseline papers on IS alignment, which consist of 29 papers (Benbya et al., 2019), additional 40 Paper (Llamzon et al., 2022) and 14 newly identified papers (see Online Appendix Table 1. here). The forward search did not return any new relevant results, which may be due to the fact that the time gap forward is too narrow. The backward search and the similarity search only returned us paper already identified from the two stand-alone literature reviews leveraged. Therefore, we consider our first iteration step to be exhaustive. For the forward and similarity search, we used the Google Scholar database.

In a second iteration, we read the full text of each of the 85 papers, scanning for micro- and macro-environmental factors, yielding in a dataset of 19 papers. We classified them using a matrix approach (Webster & Watson, 2002) (see Online Appendix Table 2. here).

2.4 Expert Interviews

To gather relevant interviewees, we sought experts according to the defined stakeholder groups, i.e., practitioners from various business sectors with diverse experience levels, and roles. To ensure credibility and comprehensiveness, we focused on experts with a profound knowledge of IT and business strategy management. Potential interview partners were identified through LinkedIn and the researchers' networks in January 2023. We invited the identified experts to a possible interview by message, e-mail or telephone. This resulted in 8 semi-structured interviews with experts ranging from operative IT strategy architects to highest level management, e.g., Chief Executive Officer for an in-house IT subsidiary company, distributed over six industrial areas.

Table 3. Profiles of the Interviewees

ID	Job description	Company description	Company employees
Exp01	Data warehouses strategy architect	Insurance	1000+
Exp02	Managing director/ CEO	Automation	1.000+
Exp03	IT project manager	Banking	1.000+
Exp04	Senior manager finance and IT	Consulting	10.000+
Exp05	Partner consultant IT finance and sustainability	Consulting	10.000+
Exp06	Head of IT competence center research and development	Automotive supplier	100.000+
Exp07	Head of corporate department sustainability/ CTO	Automotive supplier and Automation	100.000+
Exp08	IT Strategy and innovation architect	Hardware and Software	100.000+

Based on our initial RQ and our literature review, we developed a semi-structured interview guide to navigate the interview process and maintain an appropriate level of comparability (Helfferich, 2022; Silverman, 2022). We initiated a pretest to assess the comprehensibility and robustness of our interview guideline. Validation of the guide involved a preliminary round with postdocs (1) and PhD students (4), leading to adaptations based on their feedback. The interview guide consisted of six sections. First, the topic is introduced and important terms, such as IS alignment, are defined, followed by an inquiry into the interviewee's role and responsibilities. The main part featured three sections that explore the influence and consequent changes of external environmental shocks on IS alignment regarding its strategic dimension, as well as its structural, i.e., its operational application and its social communication. Macro-environmental factors, such as regulatory and societal pressures, are examined to determine whether an organization considers these factors when aligning its business and IS strategy, how they affect the integration of IT into business processes, or how communication and understanding of goals and business values change between IT and business managers. Next, we explore the micro-environment. We examine the extent to which the alignment of IS and business strategies requires consultation and information sharing across organizational boundaries with other relevant stakeholders. Lastly, we inquire about overlooked influencing factors and changes in IS alignment. For data analyses, the software MAXQDA 2020 Analytics

Pro was used. We analyzed the primary data with qualitative content-analytical methodologies (Corbin & Strauss, 2015). First, we reviewed all available data, including the interview transcripts, to identify specific content sections. We constantly compared them for similarities in contents and labeled them with first-order themes, i.e., „Micro-environment" and „Macro-environment". These areas were then broken down into more specific elements, i.e., second-order codes, e.g., „Structural Alignment – Operational Aspect." The identified results were discussed to obtain a meaningful set of external environmental IS alignment factors in an exploratory manner without ranking them. Exemplary first-order themes and second-order codes for competence can be found in the Online Appendix Table 4. here.

2.5 Development of an Initial Framework, Evaluation and Adjustment

In the second step of our DSR, we relied on a literature review and expert interviews to identify micro- and macro-environmental factors that affect IS alignment in organizations and synthesized them into a conceptual framework. By analyzing the 85 most relevant academic articles on IS alignment, we identified 19 articles that explicitly addressed external environmental influences on alignment as part of their research. The prevailing focus of the papers lies on the micro-environment, with limited attention given to the influences of the macro-environment. There is a notable absence of explicit mention of individual factors within the respective environment; instead, the holistic perspective of the environmental space is predominantly considered (see Online Appendix Table 2. here). This confirms the call for papers by Llamzon et al. (2022) and Luftman et al. (2017) that external environmental conditions are underrepresented in current IS alignment research. The findings of the literature review are validated by the insights from the experts, albeit with notable divergences in their focal points. Notably, the experts place considerable emphasis on the macro-environmental impact on the social facet of the structural dimension, deviating from the predominant strategic focus within the micro-environment of previous research. The external environmental factors identified in our literature review (step 2.4) and practical insights from the expert interviews (step 2.5) were structured by their relation on the strategic and structural dimension of IS alignment and combined into a first conceptual framework.

In the third step of our DSR, we conducted an evaluation, which is deemed a critical phase within the context of DSR (vom Brocke, Winter, et al., 2020), to

ascertain comprehensibility, clarity, and utility of our artifact, i.e., our conceptual framework pertaining to the relationship between the environment and strategic and structural alignment of organizational IS. To evaluate our DSR artefact, we conducted a FGD, with five individuals, a postdocs (1) and PhD students (4) with a digitization background and/or knowledge of DSR. The five evaluation partners were consulted in the pre-testing of the interview guide, but were not further involved in the research process and therefore considered unbiased. First, the authors explained the research question, provided an overview of DSR, the results of our literature review, and the expert interviews, before introducing the conceptual framework. Issues of process understanding and definitions of terms such as structural and strategic alignment were clarified. Overall, our DSR to identify dynamic environmental factors and their interrelationship with strategic and structural IS alignment was found to be both understandable and coherent. However, it was noted that the expert interviews suffered from selection bias due to their limited number, as well as a lack of generalizability due to the subjectivity of the interviewees. All participants in the evaluation acknowledged an increasingly volatile external environment and the resulting changes in both IT and business in recent years. The identified micro- and macro-environmental factors were perceived by the participants as comprehensible and comprehensive. Using the example of the asset administration shell, which falls into the domain of digital twins, one expert pointed out that in the alignment of business and IT, the interaction with external partners, e.g., in the form of common IT standards and interfaces, is becoming increasingly important. In contrast, the initial conceptual framework was found to be overloaded and confusing. It was pointed out that rather than addressing all factors individually in one framework, micro and macro environmental aspects should be combined and visually presented in a more abstract way. We used the results of the evaluation to redesign our IT artefact, i.e., our construct in form of a conceptual framework.

3. Results and Findings

To answer our RQ, What are the key external environmental factors and how do they affect IS and business alignment, we identified 6 micro and macro environmental factors and how they affect organizational alignment on both the strategic and structural dimension. Through an extensive literature review of 85 (19) papers, we identified four micro-environmental factors and two macro-environmental factors, which were subsequently verified and extended through our eight expert interviews. The identified factors and their interaction with organizational IS alignment were then synthesized into a comprehensive framework that serves as our DSR artefact (see Figure 1). Our framework encompasses the six factors and their complex interplay in shaping organizational IS alignment. The micro-environment and macro-environment are two distinct levels of the external environment that influence an organization's operations and strategic decisions. The micro-environment refers to the immediate factors that shape the business environment and have a direct impact on the organization's operations and performance. The macro-environment encompasses the broader societal, economic, technological, political, and legal forces in which an organization operates (Llamzon et al., 2022).

Within the micro-environment, four distinct factors significantly influence IS alignment. **Market Setting.** It describes the context in which organizations operate and make strategic decisions, such as market conditions, competition, or technological advances. Effective IS alignment depends on adjusting the organizational structure to the market environment (Henderson & Venkatraman, 1999). IS alignment enhances agility in response to volatile market conditions (Tallon & Pinsonneault, 2011). However, dynamic markets pose challenges to IS alignment. Exp08 describes the consequence of strategic misalignment as follows: „We have decreased costs to death, we have standardized ourselves to death, and now we are actually no longer flexible to this digitization pressure." Misalignment between IS and business strategy can lead to loss of value when market positioning and organizational strategies are incongruent (Liang et al., 2017). In stable and favorable environments, traditional business and IT planning methods have proven effective. However, in dynamic markets, success requires embracing speed and agility, as rigid planning and alignment efforts can hinder growth (Street et al., 2018). Pursuing alignment that enables to actively lead change is critical in dynamic environments. „By being part of the solution, I am not always just driven, but I can also benefit from the change" (Exp08). Alignment is a continuous process that involves exploration and expansion of IS alignment, acknowledging dynamic market settings (Yeow et al., 2018). IS alignment cycle lengths vary based on market dynamics, with shorter cycles suitable for highly dynamic environments (Baker & Singh, 2019). The market setting primarily impacts the strategic dimension of IS alignment, ensuring that organizations remain agile and responsive to dynamic market demands. **Industry Sector.** It defines a particular economic segment with similar products,

services or business activities. The effective level of IT centralization across business units depends on the stability of the industry environment (Brown, 1997), the level of complexity within the industry (Xue et al., 2012), and the level of uncertainty of the specific industry sector (Reynolds & Yetton, 2015). Organizational performance is closely tied to an IT-business alignment strategy that is adapted to the specific industry sector (Pesce & Neirotti, 2023). Achieving strategic IS alignment depends on the fit between the competitive strategy and the strategic role of IT within the industry (Yin et al., 2020). „The importance of strategic alignment always really depends on the industry, so how dependent you are on your IT" (Exp08). Industry complexity affects alignment, favoring an efficiency alignment strategy in low-complexity industries and an innovation alignment strategy in high-complexity industries (Xue et al., 2012). The effect of IS alignment and investment on organizational performance is also influenced by the complexity of the industry environment, with greater complexity leading to a stronger positive effect (Sabherwal et al., 2019). In volatile industry environments with high IT intensity, C-level IT professionals add knowledge on IS to the top management and help to align operational IT and business to improve financial performance (Bandodkar & Grover, 2022). The industry sector factor significantly affects both the strategic and structural dimensions of IS alignment, as organizations must tailor their approaches to industry-specific requirements and challenges. **Customer Communication.** Shared understanding of mission and values is an important aspect of the social aspect of the structural alignment dimension. The interaction of organizations with customers and other external partners is essential for learning and adaptation (Jenkin & Chan, 2010). The alignment of digital strategies is influenced by customer pressure, which varies depending on the alignment phase of an organization, i.e., five distinctive levels of technology adoption and technology use (Canhoto et al., 2021). This factor predominantly influences the structural dimension of IS alignment, fostering shared values and effective communication with external stakeholders. **External Partners.** Alignment must consider both intra- and inter-organizational perspectives. „That means not just looking at the whole thing in the sense of I have my own in-house system and everything around me is black. But that one tries to link IS globally with each other" (Exp08). To achieve economies of scale in terms of efficiency and cost, and to ensure transparency in terms of increasing legal and financial metrics, different trade associations and stakeholders need to establish

common platforms for sharing IS strategies to create synergies (Exp02). „Association work is becoming more and more important, and it's not about lobbying and cartels, about breaking the law, but it's really about saying, with what data are we faster, are we more efficient, are we compatible" (Exp06). Operational IS alignment in interorganizational relationships, like shared digital ecosystems, enhances relationship performance through IT integration, information sharing, and coordinated processes (Trang et al., 2022). Exp06 emphasizes the influence of external partners on the operational alignment of IS and business processes: „We sit on various committees with competitors or customers or suppliers to agree on data exchange formats". Exp01 underscores the value of cross-boundary operational alignment: „We have to react to this internationalization by enabling other companies to be supplied or […] to integrate foreign IS that are created for international companies into certain processes". Collaboration with external partner requires alignment on several levels. The structural dimension is particularly affected, as inter-organizational partnerships require excessive communication on alignment to effectively integrate and synergize shared digital ecosystems.

Within the macro-environment, two distinct factors significantly influence IS alignment. **Legal Regulations.** External regulations impact digital strategy alignment, varying in influence based on a firms specific alignment phase (Canhoto et al., 2021). Alignment in specific industries, such as banking and insurance, is strongly guided by regulatory intervention to set „minimum requirements for risk management and [...] supervisory requirements for IT" (Exp05), i.e., to ensure resilience. „Alignment is strongly driven by the [...] regulatory authority, [...] because we simply get guidelines there. We want to see what your concepts are. What do you do if […] Webservices fails? What options do you have to counteract this, etc.?" (Exp01). „At the strategic level, specifications are made as to what must be standardized, […] and at the social level, the communication of values and goals takes place intra- and inter-organizational" (Exp03). Indirect effects of the climate crisis through stricter regulations for more environmental sustainability and social equity also highlighting the need for effective IS alignment (Exp07). The right fit of central standardization and local independence of IS and business on a strategic level ensures cost effectiveness and agility at the same time, as international organizations must consider an increase in different local government regulations on social and environmental sustainability standards and regulations (Exp04, Exp06, Exp07). „The alignment process of IS and business remains iterative, it remains

in this interplay, but it becomes more complex because the data diversity becomes more complex and because the spectrum of requirements towards circular economy and towards minimum criteria becomes broader. In this respect, in case of doubt, it becomes even stronger in the interaction, and you will possibly have circular reasoning somewhere or contradictions somewhere" (Exp05). Legal regulations affect both the strategic and structural dimensions, as organizations must adapt their IS strategies and structures to comply with legal requirements and ensure effective governance. **Institutional Influence.** This factor significantly shapes social IS structures, driving transformative changes in organizational social structures, e.g., changes in communication or shared value understanding (Davidson & Chismar, 2007). The experts see a fundamental change in terms of structural alignment, due to a generally more volatile external environment. The institutional pressure from various public stakeholders as a result of, e.g., Covid-19 and the climate crisis, in the form of organizational norms, practices and social demands, is leading to a realignment of business and IT strategies and operational processes (Exp02, Exp07, Exp08). This affects especially the social aspect of IS alignment, as IT and business grow even closer together and a misalignment can quickly lead to high value losses. „In this respect, communication must change because power relationships are changing in the direction of IT. [...] It is also a huge pressure that is on the IT side because it has to understand the business much more" (Exp05). Institutional influence drives changes in communication and values, primarily affecting the structural dimension, as organizations must align their internal structures and practices with external norms and expectations.
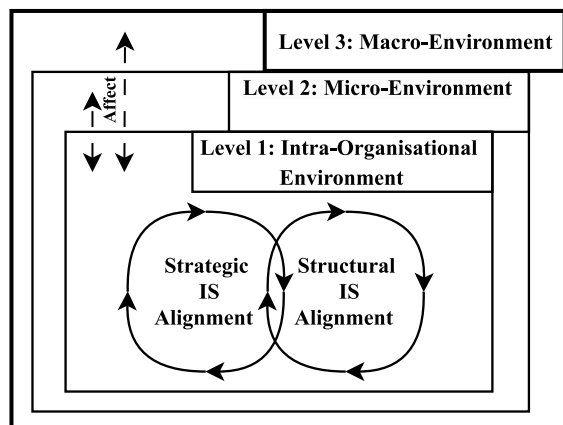

Figure 1. Comprehensive IS Alignment Framework

Integrating the six factors, we construct a conceptual framework, that abstracts and illustrates the complex interplay of alignment in dynamic environments. We characterized IS alignment in our framework as a bidirectional, iterative process that operates on strategic and structural dimensions across three distinct environmental levels: intra-organizational, micro-environmental, and macro-environmental. Alignment as an ongoing, cyclical process involving multiple dimensions and environmental levels demonstrates its multifaceted nature and the risks of misalignment. A comprehensive IS alignment approach is critical for increasing resilience and value creation.

4. Discussion, Implications, Further Research

To address the call for research of of Llamzon et al. (2022) and Luftman et al. (2017), we answer our RQ: *What are the key external environmental factors and how do they affect IS and business alignment*? In our DSR, we analyzed 85 papers, conducted eight expert interviews and evaluated our results through a FGD, resulting in a comprehensive IS alignment framework. We identified six micro (4) and macro (2) environmental factors: market setting, industry characteristics, customer communication, external partnerships, legal regulations and institutional influence. These factors have specific, but distinct impacts on the strategic and structural dimensions of IS alignment, thereby influencing the level of value creation through their effects on strategy alignment, operational flexibility and adaptation of IS, and communication with internal and external stakeholders. Organizations must effectively manage these dynamic environmental factors to optimize IT-business alignment, adapting strategies and operational and social structures to foster best practices while meeting domain-specific requirements and regulatory mandates. Understanding the impact of alignment on organizational agility in dynamic environments is challenged by an alignment paradox in research. Previous research by Tallon & Pinsonneault (2011) highlight the positive value of IS alignment in enabling organizations to respond flexibly to volatile market conditions. In contrast, Liang et al. (2017) indicate a negative link between IS alignment dynamic external market environments. Notably, these studies solely focus on intra-organizational factors. Alignment of business and IS enhances resilience and fosters entrepreneurial value creation (Sabherwal et al., 2019), but it requires a proper fit of IS and business in the strategic and structural dimensions, considering both micro- and macro-environmental variables (e.g., Xue et al., 2012; Pesce & Neirotti, 2023). Interaction with the external

environment is therefore crucial for organizations (Jenkin & Chan, 2010). External pressures from the macro-environment and the bidirectional interaction with the micro-environment shape the alignment process (Exp02, Exp07).

While the factors identified in our literature review are consistent with the expert insights, research and practice differ in their foci on which dimension of alignment, i.e., strategic, or structural, is affected and to what extent. Scientific research predominantly emphasizes the strategic dimension within the micro-environment. For example, stable market environments favor established business planning methods, while dynamic markets require agility to succeed. Extensive strategic and IT planning may not always be advantageous to organization's prosperity. (Street et al., 2018). The experts emphasize the significant role of the social aspect of structural alignment within the macro-environment. The heightened emphasis on sustainability metrics and the integration of sustainable business processes, driven by institutional influence and legal regulations, are accelerating a new understanding of goals and values within organizations (Exp07, Exp08). Traditional division thinking and hierarchical structures are being supplanted by end-to-end process orientation needing cross-functional teams comprising both business and IT expertise. „If you now have end-to-end processes, but then you have departmental thinking in between, then in principle you only ever have knowledge silos" (Exp02). This shift is facilitating organizational transformation towards end-to-end process orientation envisioning long-term economic, ecological, and social sustainability, and leads to a transformation of requirement profiles and power structures between IT and business (Exp02, Exp05). Consequently, the importance of the social component is becoming more and more relevant for successful IS alignment. This difference between our literature findings and expert insights confirms the claim of Llamzon et al. (2022) and Luftman et al. (2017) that future research needs to focus on the structural dimension, i.e., the social and operational factors.

Our study advances both theoretical and practical knowledge of IS alignment. (1) we describe and recognizes the specific effects of six critical micro- and macro-environmental factors on IS alignment. Ensuring a proper fit is critical, as effective alignment promotes resilience and adds value (Sabherwal et al., 2019). Conversely, misalignment can have detrimental effects on organizational outcomes. (2) we expand the alignment triad proposed by Llamzon et al. (2022) by further specifying IS alignment as a co-evolutionary process that spans strategic and structural dimensions operating in a three level dynamic environment, i.e.,

intra-organizational-, micro-, and macro-environment. (3) our research confirms a noteworthy gap between scientific literature and expert knowledge concerning the impact of micro- and macro-environmental factors on the strategic and structural dimension of IS alignment. By highlighting this gap, we shed light on the complex interplay between external environmental factors and alignment requirements across strategic, operational, and social levels. Overall, we enhance understanding of IS alignment and provide theoretical and practical implications on how to achieve effective alignment given environmental complexity. While the study of organizational IS alignment is widespread, it tends to focus on individual organizations, disregarding the complex interconnection with the micro- and macro-environment. Our comprehensive framework provides researchers and managers with a tangible abstraction and visualization of the complex interplay of IS alignment across three environmental levels. It highlights the need to consider not only the intra-organizational environment, but also two higher environmental levels. The six key factors identified allow researchers and managers to delineate the specific elements of significance within the micro and macro environments and their discernible impact on strategic and/or structural IS alignment. As organizations increasingly draw on external influences and collaborative efforts to co-create and deliver value, it is critical to understand the broader environment (Llamzon et al., Exp02).

Drawing on insights from practitioner interviews and existing literature, our study identifies further research directions. (1) how can we determine appropriate IS and business alignment strategies given the interactions of micro- and macro-environmental factors? What are typical archetypes? (2) given the increase of shared digital ecosystems, to what extent do the IS and business strategies of different organizations mutually impact each other, and what are the relevant alignment mechanisms? (3) how do various legal regulations and institutional pressures shape the local and global structures of the digital economy? By addressing these research directions, we can deepen our understanding of the complex dynamics between IS and business alignment, providing valuable insights for organizations navigating the evolving digital landscape.

5. Limitations and Conclusions

IS alignment is a strategic decision-making process that takes place primarily at the top management level. To gain insight into this process, we carefully selected interviewees who were actively involved in such decisions. Nevertheless, we

acknowledge limitations of our research including selection bias, a limited number of participants, and a potential subjective response bias of our respondents. We recruited participants from a wide range of companies and industries, but we do not claim to have captured the full range of opinions and perspectives within specific business sectors, such as manufacturing. Therefore, the generalizability of our findings to tailored statements for specific sectors is limited. Given the scope of our literature review, which focused on papers in the Senior Scholars' Basket of 11, our literature search may not be exhaustive in encompassing all relevant sources.

Micro-environment and macro-environment play a crucial role in shaping IS alignment. Understanding and effectively managing these external influences is essential for organizations to adapt, thrive, and sustain their competitiveness in dynamic environments. Bridging the gap between theory and practice, we provide a comprehensive three level perspective on IS alignment. Following DSR, we developed a conceptual framework and gain insights into the role of micro- and macro-environmental factors on IS alignment. We show the importance of environmental factors in IS alignment and discuss a set of directions for further research to facilitate more targeted investigations.

6. References

Adner, R. (2012). *The wide lens: A new strategy for innovation*. Portfolio/Penguin. http://www.loc.gov/catdir/enhancements/fy1211/2011041760-b.html

Baker, J., & Singh, H. (2019). The roots of misalignment: Insights on strategy implementation from a system dynamics perspective. *The Journal of Strategic Information Systems*, 28(4), 101576.

Bandodkar, N. R., & Grover, V. (2022). Does it Pay to Have CIOs on the Board? Creating Value by Appointing C-Level IT Executives to the Board of Directors. *Journal of the Association for Information Systems*, 23(4), 838–888.

Baskerville, R., Baiyere, A., Gergor, S., Hevner, A., & Rossi, M. (2018). Design Science Research Contributions: Finding a Balance between Artifact and Theory. *Journal of the Association for Information Systems*, 19(5), 358–376.

Benbya, H., Leidner, D. E., & Preston, D. (2019). *Information systems alingment: Research curation*. https://www.misqresearchcurations.org/blog/2019/3/14/information-systems-alignment

Boh, W., Constantinides, P., Padmanabhan, B., & Viswanathan, S. (2023). Special Issue Introduction: Building Digital Resilience against Major Shocks. *MIS Quarterly*, 47(1), 343–360.

Brown, C. V. (1997). Examining the Emergence of Hybrid IS Governance Solutions: Evidence From a Single Case Site. *Information Systems Research*, 8(1), 69–94.

Canhoto, A. I., Quinton, S., Pera, R., Molinillo, S., & Simkin, L. (2021). Digital strategy aligning in SMEs: A dynamic capabilities perspective. *The Journal of Strategic Information Systems*, 30(3), 101682.

Centobelli, P., Cerchione, R., Chiaroni, D., Del Vecchio, P., & Urbinati, A. (2020). Designing business models in circular economy: A systematic literature review and research agenda. *Business Strategy and the Environment*, 29(4), 1734–1749.

Cooper, H. M. (1988). Organizing knowledge syntheses: A taxonomy of literature reviews. *Knowledge in Society*, 1(1), 104–126.

Corbin, J. M., & Strauss, A. L. (2015). *Basics of qualitative research: Techniques and procedures for developing Grounded Theory* (4. ed.). Sage.

Davidson, & Chismar (2007). The Interaction of Institutionally Triggered and Technology-Triggered Social Structure Change: An Investigation of Computerized Physician Order Entry. *MIS Quarterly*, 31(4), 739.

Doyle, C., Luczak-Roesch, M., & Mittal, A. (2019). We Need the Open Artefact: Design Science as a Pathway to Open Science in Information Systems Research. In B. Tulu, S. Djamasbi, & G. Leroy (Eds.), *Lecture Notes in Computer Science. Extending the Boundaries of Design Science Theory and Practice* (Vol. 11491, pp. 46–60). Springer International Publishing.

He, X. (2022). Sustainability reporting: A nuanced view of challenges. *Social and Environmental Accountability Journal*, 42(3), 240–243.

Helfferich, C. (2022). Guided and Expert Interviews (Leitfaden- und Experteninterviews). In N. Baur & J. Blasius (Eds.), *Handbook Methods of Empirical Social Research (Handbuch Methoden der empirischen Sozialforschung)* (pp. 875–892). Springer.

Henderson, J. C., & Venkatraman, H. (1999). Strategic alignment: Leveraging information technology for transforming organizations. *IBM Systems Journal*, 38(2.3), 472–484.

Jenkin, T. A., & Chan, Y. E. (2010). Is Project Alignment – a Process Perspective. *Journal of Information Technology*, 25(1), 35–55.

Kappelman, L., Johnson, V. L., Maurer, C., Guerra, K., MCLean, E., Torres, R., Snyder, M., & Kim, K. (2020). The 2019 SIM IT Issues and Trends Study. *MIS Quarterly Executive*, 19(1), 69–104.

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

Llamzon, R. B., Chian Tan, F. ter, & Carter, L. (2022). Toward an information systems alignment framework in the wake of exogenous shocks:

Insights from a literature review. *International Journal of Information Management*, *63*.

Luftman, J., Lyytinen, K., & Zvi, T. b. (2017). Enhancing the measurement of information technology (IT) business alignment and its influence on company performance. *Journal of Information Technology*, *32*(1), 26–46.

March, S. T., Smith, G. F. (1995). Design and natural science research on information technology. *Decision Support Systems, 15(4)*, 251–266.

Marshall, C., & Rossman, G. B. (2016). *Designing qualitative research* (Sixth edition). Sage. https://permalink.obvsg.at/AC13007204

Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and Organization*, *17*(1), 2–26.

Oh, & Pinsonneault (2007). On the Assessment of the Strategic Value of Information Technologies: Conceptual and Analytical Approaches. *MIS Quarterly*, *31*(2), 239.

Pesce, D., & Neirotti, P. (2023). The impact of IT–business strategic alignment on firm performance: The evolving role of IT in industries. *Information & Management*, *60*(5), 103800.

Rai, A. (2020). The COVID-19 pandemic: Building resilience with IS research. *MIS Quarterly*, *44*(2), iii-vii.

Renaud, A., Walsh, I., & Kalika, M. (2016). Is SAM still alive? A bibliometric and interpretive mapping of the strategic alignment research field. *The Journal of Strategic Information Systems*, *25*(2), 75–103.

Reynolds, P., & Yetton, P. (2015). Aligning Business and IT Strategies in Multi-business Organizations. *Journal of Information Technology*, *30*(2), 101–118.

Sabherwal, R., Sabherwal, S., Havaknor, T., & Steelman, Z. (2019). How does strategic alignment affect firm performance? The roles of information technology investment and environmental uncertainty. *MIS Quarterly*, *43*(2), 453–474.

Saldanha, T. J. V., Mithas, S., Khuntia, J., Whitaker, J., & Melville, N. P. (2022). How green Information Technology standards and strategies influence performance. *MIS Quarterly*, *46*(4), 2367–2386.

Schlosser, F., Beimborn, D., Weitzel, T., & Wagner, H.-T. (2015). Achieving social alignment between business and IT – An empirical evaluation of the efficacy of IT governance mechanisms. *Journal of Information Technology*, *30*(2), 119–135.

Silverman, D. (2022). *Doing qualitative research* (6 ed.). Sage.

Street, C., Gallupe, B., & Baker, J. (2018). The influence of entrepreneurial action on strategic alignment in new ventures: Searching for the genesis of alignment. *The Journal of Strategic Information Systems*, *27*(1), 59–81.

Tallon, & Pinsonneault (2011). Competing Perspectives on the Link Between Strategic Information Technology Alignment and Organizational Agility: Insights from a Mediation Model. *MIS Quarterly*, *35*(2), 463.

Trang, S., Mandrella, M., Marrone, M., & Kolbe, L. M. (2022). Co-creating business value through IT-business operational alignment in inter-organisational relationships: empirical evidence from regional networks. *European Journal of Information Systems*, *31*(2), 166–187.

vom Brocke, J., Hevner, A., & Maedche, A. (2020). Introduction to Design Science Research. In J. vom Brocke, A. Hevner, & A. Maedche (Eds.), *Progress in IS. Design Science Research. Cases* (pp. 1–13). Springer International Publishing.

vom Brocke, J., Simons, A., Riemer, K., Niehaves, B., Plattfaut, R., & Cleven, A. (2015). Standing on the Shoulders of Giants: Challenges and Recommendations of Literature Search in Information Systems Research. *Communications of the Association for Information Systems*, *37*.

vom Brocke, J., Winter, R., Hevner, A., & Maedche, A. (2020). Special Issue Editorial –Accumulation and Evolution of Design Knowledge in Design Science Research: A Journey Through Time and Space. *Journal of the Association for Information Systems*, *21*(3), 520–544.

Watson, R. T., Elliot, S., Corbett, J., Farkas, D., Feizabadi, A., Gupta, A., Iyer, L., Sen, S., Sharda, R., Shin, N., Thapa, D., & Webster, J. (2021). How the AIS can improve its contributions to the UN's sustainability development goals: Towards a framework for scaling collaborations and evaluating impact. *Communications of the Association for Information Systems*, *48*(1), 476–502.

Watson, R. T., & Webster, J. (2020). Analysing the past to prepare for the future: Writing a literature review a roadmap for release 2.0. *Journal of Decision Systems*, *29*(3), 129–147.

Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Quarterly*, *26*(2), xiii–xxiii.

Williams, J. A., Torres, H. G., & Carte, T. (2018). A review of the IS strategic alignment literature: A replication study. In *Proceedings of the 24th Americas Conference on Information Systems*.

Wu, S. P.-J., Straub, D. W., & Liang, T.-P. (2015). How information technology governance mechanisms and strategic alignment influence organizational performance. *MIS Quarterly*, *39*(2), 497–518.

Xue, Ray, & Sambamurthy (2012). Efficiency or Innovation: How Do Industry Environments Moderate the Effects of Firms' IT Asset Portfolios? *MIS Quarterly*, *36*(2), 509.

Yeow, A., Soh, C., & Hansen, R. (2018). Aligning with new digital strategy: A dynamic capabilities approach. *The Journal of Strategic Information Systems*, *27*(1), 43–58.

Yin, J., Wei, S., Chen, X., & Wei, J. (2020). Does it pay to align a firm's competitive strategy with its industry IT strategic role? *Information & Management*, *57*(8), 103391.