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INTEGRATION: AN OMITTED VARIABLE IN INFORMATION SYSTEMS RESEARCH

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Abstract

The widespread deployment of IT in the past decades has significantly increased the integration reach, breadth, and scope in organisations. Many of the associated socio-economic phenomena have been studied by IS researchers, for example, in the context of IT adoption, the business value of IT, and IS success. Surprisingly though, the concept of integration in itself has so far attracted only little interest on the part of researchers. According to our knowledge, no established theoretical framework seems to place integration-related constructs at the centre of scientific inquiry. The objective of the present study is to take a first step to fill this gap by reviewing the literature on integration in order to structure the existing body of knowledge and to derive an agenda for further research in this area. Our literature review reveals that, in spite of its importance for academia and practice, integration is still an under-researched topic, with a noticeable lack of theorization and synthesis of the different research strands into a more holistic model. As we argue, a to-be-developed 'Theory of Integration' would be highly valuable to increase our understanding of the different phenomena surrounding integration on the technological and the organisational level within the firm.

Keywords: Integration, Enterprise Systems, IS Research, Theory Development, Literature Review.

1 Introduction

Information systems (IS) have become omnipresent in today's organisations. Their ever-increasing use in the firm is reflected by unprecedented operational efficiency gains as well as fundamental strategic upheavals in several industries. It was particularly the development of Enterprise Resource Planning (ERP) systems in the 1980s and 1990s, which offered companies the possibility of introducing enterprise-wide integration of information and business processes. As a consequence, novel workflows could be implemented to create seamless end-to-end processes within the firm, linking distributed functional units (e.g., sales, production, finance), and thereby generating significant operational improvements (Fleisch & Österle 2000; Markus 2000). IS research has extensively investigated these technological developments and the surrounding socio-economic phenomena for many years. However, as we show in the following, a fundamental concept associated with the before-mentioned issues has thus far not received much attention from the IS community: the concept of *integration*.

Integration (derived from Latin *integrare* = 'to make a whole') encompasses a variety of technological, operational, and strategic issues. It also reflects a trajectory from intra- to inter-organizational integration. While each of these phenomena on its own has been the subject of past research, a more holistic view of the complex interplay between them in terms of a *Theory of Integration* is still missing in the existing body of literature. This gap is made even more evident by calls from several academics to further examine the topic. For example, Volkoff (2005) states that "a nuanced understanding of integration in the Enterprise Systems context would be valuable, yet the literature on ES, while invariably referring to integration of both processes and data as a core characteristic, rarely defines it". Similarly, Yu (2007) acknowledges that "because of the lack of accurate definition of essence of integration, it is always difficult to understand the exact meaning of integration", and Chen (2009) recognizes that "a simple but meaningful definition of integration is needed for more effective research and management efforts". Frank (2008) finds that "this may be contributed to the fact that integration is regarded as a core term, which does not need further explanation" – however, he also concedes that "such an implicit notion of integration is not sufficient for designing or evaluating information systems".

In this paper, we argue that the evolution of IT in the past decades has significantly increased the integration reach, breadth, and scope in organisations, but that integration in itself still poses an under-researched topic. Our objective is to take a first step to fill this gap by reviewing the literature on integration in order to establish a better understanding of the concept, and by deriving an agenda for further research in this area. The remainder of the paper is organized as follows: In the next section, we introduce our framework of analysis and the chosen review method. Section 3 presents and discusses the results of our review. The paper closes with a summary of the current state of academic research, delineating the prevailing gaps in the literature, and identifying challenges for future research.

2 Methodology

2.1 Framework of Analysis

Integration-related research is scattered across different disciplines, including IS, computer science, operations management, and organisation science. In these contexts, the term 'integration' is used to denote a variety of phenomena in the interplay of technologies and organisations, be it systems integration (i.e., the linking of different computing systems and software applications physically or logically), business process integration (i.e., the linking of activities across functional units), or inter-organisational integration (i.e., the linking of separate organisations). For reasons of scope, our review is limited to the organisation as the unit of analysis.

In order to put results from the diverse research streams into the larger perspective, we propose a generic framework as depicted in Figure 1. On the upper level, we distinguish between two paradigmatic approaches: (i) research following the behaviorist / positivist paradigm and (ii) design-oriented / normative research. Since the focus of our study is on theory building for explanation rather than design, we concentrate on the former view and further distinguish between four types of theoretical constructs:

- *Integration construct(s)* refers to the entirety of theoretical constructs that help to capture the complex and multi-faceted notion of integration;
- *Antecedents* characterize the driving and inhibiting factors which exert an influence on integration efforts in the organisation;
- *Impacts* describe the different effects caused by integration within the firm and beyond, for example, on operational efficiency or competitive advantage;
- *Moderating factors* include any factor that positively or negatively influences the previous causal chain between antecedents, integration, and impacts.

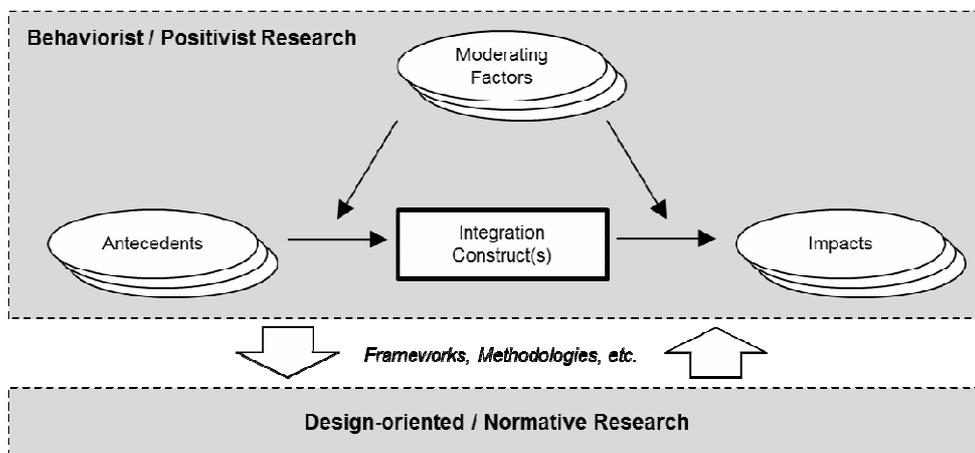


Figure 1: Framework of analysis

2.2 Literature Selection Process

Following Fettke's (2006) and vom Brocke et al.'s (2009) perception that many literature reviews suffer from a lack of rigour in documenting the literature search process, we paid special attention to validity and reliability in the review process. In a first step, we identified suitable journals and publication databases. As for journals, we relied on the basket of Top IS journals proposed by the Association for Information Systems. As for databases, we used the services of *ScienceDirect*, *EBSCOhost/Business Source Premier* and *ACM Digital Library*.

Due to the complexity and abstract nature of the notion of 'integration', querying databases with nothing more than this keyword usually yields a very large number of results. We therefore narrowed down the search with additional related keywords based on our aforementioned framework of analysis (i. e. 'integration + x'). As for the integration construct, we also searched for 'theory', 'framework' and 'concept'; for the antecedents, we also used 'drivers' and 'enablers'; for the moderating factors, we also included 'success factors' as well as 'problems'; and for impacts, we also considered 'outcomes' and 'effects'. Even with these additional keywords, a large number of results was still to be expected given the broad range of papers dealing with integration in some way. As said before, our scope was limited to intra-organisational integration, which led to the exclusion of studies on inter-organisational systems and supply chain management. However, some papers dealing with partly related subjects (e.g., enterprise systems or ERP, concerning intra- as well as inter-organisational integration) were included in our review if they provided helpful insights into one of our research issues.

Furthermore, the search in journals through databases was complemented by backward and forward search. Backward search refers to “reviewing the citations for the articles identified in step 1 to determine prior articles you should consider” (Webster & Watson 2002), whereas forward search means “to identify articles citing the key articles identified in the previous steps”. As for forward search, online services like the *Web of Science*, *Social Science Citation Index*, and *Google Scholar* proved to be particularly useful. Also, back-tracking citations in terms of backward search yielded a substantial number of useful resources that weren’t uncovered using normal keyword-based search. In order to cover the maximum possible number of relevant publications and to better understand the course of research over time, we didn’t set limits on the date of publication and tried to reach as far back in time as possible.

2.3 Review and Classification Process

In the review and classification process, we analysed and coded the selected publications by focusing on three aspects. First, we analysed general data such as publication type (e.g., journal vs. conference), year of publication and content. Given the multi-faceted nature of ‘integration’, a number of articles outside our focus had to be excluded from further analysis during this initial phase. Furthermore, we excluded any kind of “grey literature” and focused on (peer-reviewed) journal publications and conference proceedings in the database queries, supplemented by book chapters during forward and backward search. Second, the research methodologies were examined using the taxonomy proposed by Palvia et al. (2004); theory types were classified following the taxonomy proposed by Gregor (2006). Third, an open test coding scheme was developed based on Zhang & Wildemuth’s (2009) guidelines for qualitative analysis of content and Weber’s (2006) eight steps of creating and testing a coding scheme. Based on our framework of analysis, a number of sub-codes were derived from established literature models and enriched by additional sub-codes that we deemed fit after thorough examination of each paper:

- Since no appropriate source was found for the construct dimensions, we developed a model incorporating what we think to be the three main dimensions constituting the construct: First, we distinguish between integration (i) as a process or (ii) as an outcome. Second, we propose to distinguish between integration as (i) an observed phenomenon or (ii) as a designed artefact. Third, we consider integration from (i) a technological and (ii) an organisational perspective.
- Sub-codes for the ‘antecedents’ perspective are based on the TOE framework (Technology, Organisation, Environment) of technology adoption by Tornatzky & Fleischer (1990), extended by an additional ‘business’ category, which we felt would better reflect the business rationale behind integration than the organisation category.
- The sub-codes for ‘impacts’ were taken from the well-known Enterprise Systems benefit framework by Shang & Seddon (2002) with no modifications.
- The ‘moderating factors’ were derived from the BOTP model of critical success factors (Lam 2005), which we adapted for our context and added an additional ‘environment’ category.

This initial coding scheme was then discussed and refined among the authors. Subsequently, all papers were coded by two authors. Multiple classifications were necessary in most cases, since most papers cover more than one of our research perspectives.

3 Findings

3.1 Analysis of Research Methods and Theory Types

Drawing from our database query, forward and backward searching efforts, we identified 50 articles within the scope of our review. Tables 1 and 2 illustrate the research methods and theory types employed in the publications under review. As for qualitative methods, case studies ($n = 11$) turned out to

be a popular choice. This approach was usually chosen when authors wanted to analyse integration on a fine-granular level in single or multiple organisations. An equal number of authors chose to employ the survey method in order to collect data for statistical hypotheses testing ($n = 12$). Frameworks and conceptual models amount to another large group which is particularly interesting given our study objectives, as they are “especially useful for a discipline that generally lacks and defies attempts to develop theory” (Palvia et al. 2003). Some methods were not found in our review at all, namely lab and field experiments as well as mathematical models. Tutorials or research commentaries which didn’t fit into other categories were classified as “commentary”.

Classification by research methodology (adapted from Palvia et al. 2004)	Frequencies	
	n	%
Survey	12	24,0%
Frameworks and conceptual models	11	22,0%
Laboratory experiment	0	0,0%
Case study	11	22,0%
Mathematical model	0	0,0%
Commentary	10	26,0%
Literature analysis	2	4,0%
Field study	1	2,0%
Field experiment	0	0,0%

Table 1: Classification according to research method employed

With regard to their theoretical contribution, the majority of papers in our sample develop ‘theories of analysis’, that is, descriptive theories where no causal relationships among phenomena are specified and no predictions are made (Gregor 2006). A smaller number of papers present explanatory or predictive theories. However, no paper was identified that would combine the latter two in terms of a theory for explanation and prediction. Still, we found a number of papers with ‘design and action’-type theories, which correspond to the field of design-oriented/normative research in our analysis framework.

Classification by types of theory (adapted from Gregor 2006)	Frequencies	
	n	%
Theory for analysis	19	50,0%
Theory for explanation	4	10,5%
Theory for prediction	0	0,0%
Theory for explanation and prediction (EP)	7	18,4%
Theory for design and action	8	21,1%

Table 2: Classification according to type of theory

3.2 Content Classification

The very first source on integration traces date back as far as 50 years, but significant research activities revolving around the notion of integration only started in the late 1990s. Studies discussing moderating factors constitute the second biggest group in this review ($n = 10$). Early works are primarily related to ERP implementation projects, while more recent publications take on a broader perspective by analysing organisational as well as technological integration across the enterprise. Integration impacts amount to the third biggest group in our analysis ($n = 9$). Significant numbers of publications started to appear in the early 2000s, most of which are largely associated to the “business value of IT”

research stream of that time, until this topic reached saturation. Antecedents and drivers of integration account for a relatively small number of articles in this review ($n = 5$).

Classification by content (based on the perspectives on integration)		<i>n</i>
1. Construct		50
<i>Concept</i>	Integration as a process	7
	Integration as an outcome	41
<i>Perspective</i>	Integration as a phenomenon	24
	Integration as an artefact	23
<i>Domain</i>	Integration on a technological level	34
	Integration on an organisational level	29
2. Antecedents (adapted from Tornatzky & Fleischer, 1990)		5
<i>Technology</i>	Technological characteristics and developments	5
<i>Organisation</i>	Organisational characteristics	4
<i>Business</i>	The driving forces inside the organisation	3
<i>Environment</i>	Environmental forces (e.g., customers, competitors, government)	2
3. Moderating factors (adapted from Lam, 2005)		10
<i>Environment</i>	Environmental factors in the action system surrounding the organisation	4
<i>Business</i>	Strategic enterprise-level factors (e.g. strong business case and integration strategy)	3
<i>Organisation</i>	Intra-organisational factors such as top management support and cultural fit	8
<i>Technology</i>	Technological factors such as legacy systems and common data standards	7
<i>Project</i>	Project mgmt. factors such as realistic schedules/budgets and good communication	3
4. Impacts (adapted from Shang & Seddon, 2002)		9
<i>Operational</i>	Impacts on day-to-day activities that involve acquiring & consuming resources	5
<i>Managerial</i>	Impacts on activities involving allocation and control of the firm's resources	5
<i>Strategic</i>	Impacts on long-range planning regarding high-level decisions such as M&A's	5
<i>IT Infrastructure</i>	Impacts on IT resources providing a foundation for present and future applications	1
<i>Organisational</i>	Impacts on the focus, cohesion, learning and execution of the chosen strategies	0

Table 3: Content classification

3.2.1 Integration Construct(s)

The roots of 'integration' as a distinct unit of analysis in the IS literature date back to the late 1950s, when Leavitt & Whistler (1958) gave some early predictions on how to use the back-then revolutionary possibilities of information technology to the advantage of the business, but without explicitly referring to 'integration'. Among the first appearances of the term is an article by Kettner (1959), who described the critical role of integration in electronic data processing defined as "practicable pooling of objects or subjects". Other authors define integration as the "alignment, coordination and consolidation of different components of information systems" (Heilmann 1989), the "reconstitution of an integrated whole", or the "incorporation of elements into a comprehensive whole" (Mertens 2004).

The number of different conceptualizations is equalled by the number of integration-related phenomena and contexts. M&A, Enterprise Application Integration (EAI), data integration, inter-organisational (B2B) process design, or the coupling of information systems and organisational structures (IT-Business-Alignment) are just a few examples of the diversity of the integration construct. Research in these areas finds that integration is a socio-technical phenomenon encompassing not only technical, but also a variety of organisational, economical, and even social aspects (Barki & Pinsonneault 2005).

Over the years, several proposals have been made to establish taxonomies and classifications of integration-related phenomena. The overview given in Table 4 indicates that substantial efforts have been made to structure the complex domain of integration concepts. However, it also shows that, while many authors have provided contributions to different integration-related phenomena, most of them are limited to specific problems or perspectives. In contrast to the evident relevance of the topic, a sustainable theoretical foundation to the pivotal terms and their interrelationships is still missing.

Reference	Dimensions of Integration							
<i>Heilmann (1989)</i>	Data Integration				Function Integration			User Interface Integration
	Integration Direction (horizontal, vertical, temporal)							
	Integration Reach: intra-organisational, intra-organisational							
<i>Linß (1995)</i>	Domain			Reach			Direction	
	Data	Func.	Progr.	Inter-org.	Intra-org.	Horizontal	Vertical	
<i>Rosemann (1999)</i>	Domain				Direction			Reach
	Data	Fun.	Pro.	Obj.	Horizontal	Vertical	Intra-org.	Interorg.
<i>Scheer (2001)</i>	Hierarchical Information Integration					Process Information Integration		
	Strategic		Management		Operational	Sales, Manufact., Finance, HR		
<i>Picot et al. (2003)</i>	Ex-ante Integration					Ex-post-Integration		
<i>Giachetti (2004)</i>	Network			Data		Application	Process	
<i>Mertens (2004)</i>	Domain			Direction		Reach	Automation degree	
<i>Wainwright & Waring (2004)</i>	Technical			Systems		Strategic	Organisational	
<i>Volkoff et al. (2005)</i>	Pooled			Sequential			Reciprocal	
<i>Frank (2008)</i>	Static			Functional		Dynamic	Organisational	
<i>Fuchs-Kittowski (2009)</i>	Ex-ante Integration					Ex-post Integration		
	Re-engineering			Integrated Components		Data	Function	Presentation
<i>Kien, Lian (2009)</i>	Enterprise Integration							
	Strategic Integration				Business Integration		Systems Integration	
<i>Winter et al. (2009)</i>	Alignment			Derivation		Binding	Merging	

Table 4: Historical overview of proposed dimensions of integration

3.2.2 Integration Antecedents

Beyond the concept of integration itself, prior research exists that sets the focus on the antecedents of integration efforts. For example, Winter (2009) describes several internal and external triggers. On the one hand, external triggers usually result from changes in the competitive environment or technological innovations. On the other hand, internally triggered integration projects often stem from problems induced by external triggers. Because business units mainly focus on their own goals and interests, the interplay with and side-effects on the information system as a whole often are less of a priority. Disadvantages for following integration projects are neglected, and complex interfaces between heterogeneous systems are the consequence. Looking at the long-term costs of these outcomes, the need for internally triggered integration projects becomes obvious. Hagen (2007) differentiates between periodical “housekeeping” and “consolidation” projects. By housekeeping, he refers to the periodical search for and elimination of inconsistencies and redundancies resulting from former isolated projects. Consolidation projects usually are bigger in scale and aim to resolve more severe problems between heterogeneous systems due to legacy applications, proprietary interfaces and increasing complexity.

Antecedents also include the goals which are being pursued by integration efforts. Although being dependent on the specific characteristics of individual enterprises, long-term goals usually revolve around increasing profitability, cutting costs, or improving quality. In order to accomplish these long-term goals, firms have established different measures like mass customization, reduction of lead times, lean production, and agile process management (Puschmann & Alt 2004). Today, IS integration not only enables the accomplishment of such projects, but is a necessity for their success. Recent studies describe the most frequently mentioned strategic integration goals rather vaguely in terms of speed, flexibility and costs (Klesse 2005). While some insights have been developed into technological and organisational antecedents, there is an evident lack of research in terms of environmental and social factors.

3.2.3 Integration Impacts

The majority of publications finds that integration generates operational and strategic benefits, investigating into classical 'business value of IT'-related research questions. Still, with a closer focus on integration, the causal link between the level of integration and its impact on a company's overall performance is yet to be answered. Over a decade ago, Nagarajan et al. (1999) acknowledged that while integration does offer benefits in theory, its exact monetary and non-monetary costs and benefits still have to be quantified. Almost a decade later, Frank (2008) still states that actual economic benefits of integration projects are neither guaranteed nor easily measurable and points to a prevailing lack of appropriate models or frameworks. He concludes that an increase in the degree of integration bears no reliable relation to an increase in firm performance.

Apart from the problems in estimating and measuring the impact of integration efforts, it is nevertheless agreed upon that successful integration projects (e.g., through the implementation of ERP systems) can have a tremendous impact on firm performance. For example, the study by Volkoff et al. (2005) illustrates the organisational effects of process and data integration in the context of information systems, notably on integrating similar units, integrating the different stages of a business process and integrating different functional areas. Other studies cite tangible benefits, such as reductions in inventory, personnel, procurement and transportation costs, as well as intangible benefits, such as increased visibility of corporate data, new or improved business processes and improved responsiveness to customers. Still, these results remain vague and lack any quantifiable measures.

More insight into integration impacts was given by Velcu (2005), who explains these positive influences by the effect that integration projects have on business processes. For example, modern ERP systems are equipped with a set of best-practice processes which are based on industry experience and are pre-configured by the software vendor. Following the implementation framework by Dehning & Richardson (2002), the subsequent changes to business processes are the main reason behind productivity gains after integration projects. In contrast, distinctive financial advantages are rather difficult to relate to integration efforts.

3.2.4 Integration Moderating Factors

The amount of publications specifically focusing on moderating factors in terms of integration is very limited. Useful sources are mainly found in papers based on case studies which describe moderating factors in integration-related contexts. For example, because of the cost and complexity of integration projects, it is agreed upon that using appropriate frameworks and models is key to success (Nagarajan et al. 1999; Frank 2006). Lam (2005) proposes a framework of critical factors on the business, organisation, technology, and project level which – although originating from the EAI domain – provides a sound classification of key elements. Most studies employ a combination of these factors, and underline the importance of considering the inter-relationship of organisational and technical aspects.

The majority of papers pertain to the organisational category with factors such as management and leadership commitment, process management, and cultural changes. The business category includes

factors like clear understanding and communication of strategic goals, a clearly defined vision as well as environmental uncertainty and market development (Koufteros et al. 2005). Technology-wise, most factors relate to the quality and sophistication of the existing IT landscape, including legacy systems, the degree of customization, standardization, and data quality (Khoubati et al. 2006; Niederman & Baker 2009). Lastly, on the project level, mentioned key factors include realistic budgets and schedules, communication with all affected parties and to all the key project people as well as monitoring and feedback at each stage (Klesse 2005).

Based on information processing theory (Gattiker & Goodhue 2005), Volkoff et al. (2005) identify two important prerequisites which constitute an *integration capability*: First, process and data standardization are crucial in eliminating inconsistencies and the need for translation. In the information system as well as in its surrounding action system, everyone involved must have the same understanding of shared concepts and artefacts in order to avoid misunderstandings and redundancies. Second, the level of interdependence between units or systems to be integrated is crucial for the effort needed to establish integration with other units. High levels of communication and coordination are a good sign of interdependence, whereas the absence of those conditions might lead to integration costs that could exceed the benefits. Therefore, high levels of interdependence between units to be integrated as well as standardized processes bode well for the success of integration projects.

4 Summary and Conclusions

The purpose of this study was to profile the existing IS research literature with regards to the integration construct, antecedents, impacts, and moderating factors. Our analysis of 50 publications reveals that, in spite of its importance to academia and practice, integration is still an under-researched topic. In particular, there still is a noticeable lack of theorization and synthesis of the different research strands into a more holistic model. Table 5 summarizes the current state of discussion and limitations.

	State of Discussion	Limitations
Construct	<ul style="list-style-type: none"> Four decades of discussion focussing on integration dimensions and definitions, resulting in various taxonomies characterizing integration reach, breadth, and scope in organisations; Agreement that integration comprises interrelated organisational and technical phenomena. 	<ul style="list-style-type: none"> The interplay between organisational and technical integration is not well understood. Integration is mostly studied by referring to specific functions (e.g. purchasing or product development) or systems (e.g. ERP or EAI) Lacking measurement instruments for assessing integration (breadth and scope) at the enterprise level.
Antecedents	<ul style="list-style-type: none"> Antecedents are mostly of technical or organisational nature Many of the general antecedents of IT projects apply 	<ul style="list-style-type: none"> Lacking consideration of environmental factors No discussion of the similarities and differences between integration and general IT projects
Moderating Factors	<ul style="list-style-type: none"> Specific moderators include integration capabilities (standardization) and interdependence 	<ul style="list-style-type: none"> Little research on moderating factors, mostly drawing on case studies
Impacts	<ul style="list-style-type: none"> Integration is often associated with benefits, but actual economic benefits of integration projects are neither guaranteed nor easily measurable 	<ul style="list-style-type: none"> Lack of appropriate models or frameworks for measuring the impact of integration
Research Methodology	<ul style="list-style-type: none"> Different streams of research with different research goals and methodologies (behaviourist vs. design-oriented research) 	<ul style="list-style-type: none"> Isolated research streams which have not been connected

Table 5: Research on Integration – Status and Future Research Challenges

Most of the existing research suggests taxonomies and frameworks characterizing integration reach, breadth, and scope in organisations. Besides design-oriented and normative research, the majority of related works can be characterized as interpretive studies based on case research. In contrast, there is an apparent lack of positivist research aiming at theory development and testing for explanation and prediction using larger sets of quantitative data. We also found that integration is often studied in the context of specific technologies, which limits the generalization of results in view of the manifold technology options. Moreover, existing research tends to consider integration rather statically as a project outcome or a technological feature. Hence, the role of the time dimension (i.e., the emergence and development of integration phenomena over time) has usually been ignored in the reviewed publications. In sum, we find that a more holistic view in terms of a *Theory of Integration* is still missing in IS research, but would be of high value to increase our understanding of the different phenomena surrounding integration. The corresponding research challenges ahead include the following:

1. **Understanding the interplay between technical and organisational integration - Integration as multi-dimensional construct.** Whereas prior research has come up with many different taxonomies for integration, we are still lacking theoretically founded models that explain the complex interplay between different forms of integration on a technological and an organisational level.
2. **Defining integration as enterprise-level coordination – The enterprise as unit of analysis.** Most authors agree that integration is about interdependence and coordination, but do not clearly focus on integration of either two or more systems or organisational units. We suggest studying integration at the enterprise level, thereby making the enterprise the unit of analysis. This would allow for studying coordination and interdependence in different organisational contexts.
3. **Investigating path-dependency in technological and organisational integration – Integration as process.** The existing literature mostly considers integration as a given state, but in reality, integration is a trajectory with significant path-dependency. The emergence and development of integration phenomena over time should therefore be explored by means of process theory.
4. **Investigating the existence and the role of a distinctive integration capability – Integration as capability.** Some authors have suggested perceiving integration as a capability. More research is needed to investigate the nature of this capability and its interaction with technological and organisational resources.
5. **Creating a theory base for integration – Positioning integration in the context of kernel theories.** So far, integration research does not link up with the existing IS theory base. In order to establish a sustainable theory-based foundation, integration should be (re-)conceptualized by referring to established kernel theories in IS (e.g., transaction cost economics or contingency theory).
6. **Creating measurement instruments as basis for investigating** the causal relationships between the antecedents, outcomes and success factors of integration.
7. **Linking “Theory for Design and Action” to “Theory for Explanation and Prediction”.** Linking propositions of how design decisions (e.g., related to the different levels or forms of integration) impact the integration outcomes. This would also allow for quantifying a ‘degree of integration’ or determining an optimal degree which is economically feasible.

We expect a broad impact from this research given the relevance and fundamental significance of integration. From an academic perspective, it holds the potential to provide novel theoretical insights by adding an explanatory approach to one of the pivotal issues in the IS discipline. Our results might also add fresh perspectives to some of the classical theoretical frameworks of the field, such as IT adoption & diffusion, the business value of IT, and IS success. From a practical perspective, the benefits and risks of integration projects have all too often been discussed in trade journals and at practitioner events on the basis of anecdotal evidence, whereas sound data from empirical research is scarce. Against this backdrop, empirical results can be expected that demystify some of the real-world issues surrounding integration, clarify the selling propositions of ERP software vendors, and ultimately provide valuable recommendations on how to address integration issues in corporate practice.

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