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IS Antagonism: Explaining Negative Value Creation from IS Integration in M&A

Completed Research Paper

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Abstract

IS integration problems are often an important determinant of negative value creation in Mergers and Acquisitions. To date, these problems are commonly attributed to mis-aligned Business and IS Integration Strategies, flawed preparation or execution or negative synergies, but the role of IS itself is underemphasized. Based on a case study and expert interviews, we propose a theory addressing this issue. Our explanation focuses on the concept of IS Antagonism, referring to the destructive interaction between previously independent information systems, which occurs when these are operationally combined. This concept offers novel explanations beyond strategic misalignment and considers the nature of the information systems themselves in the integration phase. IS antagonism is omni present in M&A, which has the practical implication that we need to account for its value destructing characteristics in pre-merger synergy predictions and by securing necessary IS resources to mitigate during execution.

Keywords: Information Systems Integration, M&A, IS Antagonism,

Introduction

Mergers and Acquisitions (M&A) are common events in the lifecycle of organizations (Krishnan et al., 2007). The predominant motivation behind M&A is to create value through exploiting potential synergies, ultimately in the form of revenue growth or cost efficiencies (Chatterjee, 1986). Hitt et al. (2009) report that most M&A transactions, however, do not deliver the envisioned value. Previous research indicates that

problematic post-merger integration of Information Systems (IS) is an important factor in failure to create value in M&A. Post-merger IS integration is often associated with problems such as business process impairment, unexpected IS integration efforts and investments, a slowdown of business innovation and increased IS running costs (Henningsson & Kettinger, 2016; Sarrazin & West, 2011; Tanriverdi & Uysal, 2011; 2015).

A majority of studies on IS integration problems in M&A focus on strategic alignment, and attribute IS integration problems to "mis-alignment" between the Business Integration Strategy (BIS) and IS Integration Strategy (IIS) (Baker & Niederman, 2014; Busquets, 2015; Henningsson & Kettinger, 2016). However, only limited attention has been paid to the negative value creation that emerges during the *operational* phase of the integration (Graebner et al., 2017). Research indicates that such negative value creation manifests itself in terms of business impairment or disruption, excessive integration costs, increased risk exposure and slow-down of business innovation (Busquets, 2015; Chang & Cho, 2017; Henningsson & Kettinger, 2016; Jain & Ramesh, 2015), but offers only limited insight into how these manifestations emerge during the process.

We aim to address this gap by developing a theory explaining why and how the operational integration of previously independent and autonomous IS during an M&A leads to IS integration problems. Previous studies of IS integration show that in many cases, IS adequately supported business processes and functions in the individual firms pre-merger, but failed to do so following the operational integration (Johnston & Yetton, 1996; Sarrazin & West, 2011; Seddon et al., 2010). Recent research found that operational and technical differences between the IS of parties involved in M&A, such as different IT infrastructure standards and suppliers, appear to increase post-merger IS problems (Benitez et al., 2018; Henningsson et al., 2018; Henningsson & Øhrgaard, 2016; Lohrke et al., 2016; Murthy et al., 2020). We build on these insights by coining the concept of *IS antagonism* to explain this phenomenon. IS Antagonism is defined as "*the destructive interaction between previously independent information systems, which occurs when these are operationally combined, due to conflicts in the design and implementation of these systems*". Thus, antagonism refers to incompatibility between IS that were developed autonomously pre-merger in each firm, and is identified as a key mechanism that contributes to IS integration problems. Antagonism is triggered when systems are operationally integrated and consequently actively interact.

We will start by providing an overview of related research, representing current insights. Next, we describe the methodological details of our case study. Initial insights were built from an in-depth case study. These initial insights were validated in interviews with a broad group of M&A experts. We conclude by discussing the academic contribution and practical implications of the theory.

Literature Review

Foundational concepts identified in the IS literature on IS integration in M&A are the Business Integration Strategy (BIS) and the IS Integration Strategy (IIS). The BIS defines how previously independent organizations will be integrated to realize the M&A value objective (Haspeslagh & Jemison, 1991). The IIS defines how the IS resources from both firms will be combined and integrated in alignment with the BIS (Baker & Niederman, 2014; Henningsson & Kettinger, 2016; Wijnhoven et al., 2006). Previous research has found that the integration of merging firms' IS plays a critical role in M&A value creation, both positively and negatively. However, according to Henningsson et al. (2018), this literature so far provides fragmented, non-cumulative, and diverging insights into the nature of this contribution and the conditions that impact it.

IS Integration and Negative Value Contribution

Our analysis of the literature provides an overview of the direct and indirect IS value contributions associated with IS integration in M&A. As a foundation for understanding the IS value contribution in M&A, we build on Broadbent and Weill's (1997) distinction between (1) firm-specific <u>IS for business functions and processes</u>, making use of (2) generic <u>IS infrastructures</u>. Based on this distinction, we conceptualize the value contribution from IS by improving <u>IS for business</u> as the *indirect IS value contribution* in M&A. Based on Tanriverdi (2006), this indirect value contribution usually takes the form of super-additive value in terms of business performance. The value contribution from improving <u>IS infrastructure</u> as defined by Broadbent and Weill (1997) is conceptualized as the *direct IS value contribution* in M&A. The direct IS value

contribution usually takes the form of sub-additive costs to be achieved through IS cost reductions exploiting economies of scale and scope or IS efficiency gains (Tanriverdi & Uysal 2011; 2015).

Both the direct and the indirect value contribution of IS integration in M&A can be *positive* and *negative*. *Positive indirect value contributions* refers to the value contribution from IS through the improvement of IS for business, for instance through more efficient operations, business innovation, improved decision making, and economies of scope. *Positive direct value contributions* refer to IS integration's contribution to improving the IS infrastructure. This contribution could be IS cost reductions or IS economies of scale.

In this paper, we focus on the *negative* IS value contribution, both direct and indirect. In the following sections, we discuss manifestations of negative IS value contributions as found in the literature.

Negative Indirect Value Contribution

The negative indirect IS value contribution is associated with firm-specific IS integration problems, and consists of business process impairment or disruption, failure to deliver according to pre-M&A predictions and slowdown of business innovation. Among the first documented examples of business process impairment caused by problematic IS integration is an Australian banking merger that was executed from 1992 to 1994 (Johnston & Yetton 1996), where the incompatibility of systems and data definitions between acquirer and acquired caused significant delays in the envisioned business integration. Yoo et al. (2007) found that knowledge management systems developed from different backgrounds and different value systems were impossible to combine, because of inherent differences. Brown et al. (2016) documented a case where negative end-user response was caused by moving to a new system post-merger. The "new" system was presented as an innovative improvement, but was experienced as a degradation in functionality and an impairment of the way of working by the users.

In other cases, business impairment is related to the business-specificity of IS. Tanriverdi and Uysal (2015) find that IS capabilities are not always transferable from one firm to another, post M&A. The destruction of business-specific IS capabilities in acquired firms represents an additional cause for a negative IS value contribution. Business impairment as a consequence of this destruction has been observed in multiple cases (Johnston & Yetton, 1996; Mehta & Hirschheim, 2007; Seddon et al., 2010). Tanriverdi and Uysal (2015) show that redeploying supposedly superior IT resources and capabilities from the acquirer to the acquired firm, according to "common market knowledge" destroys rather than creates value. This appears to confirm that the destruction of acquired firm-specific IS capabilities is associated with business impairment or disruption.

Robertson and Powell (2001) show how delayed IS integration and lack of innovation in an insurance merger resulted in delayed and lower than expected benefits from the M&A. The lack of IS innovation triggered competition between branches and resulted in loss of customers and increased IS costs. Additionally, lack of innovation post-merger is associated with the business-specificity of IS capabilities. Henningsson and Øhrgaard (2016) found that if the specificity of IS for business functions is high, IS resources are required for a longer time to execute the IIS. As these IS resources are taken away from their innovation tasks, the speed of innovation is impaired.

Negative Direct Value Contribution

The negative direct IS value contribution is associated with generic IS infrastructure integration problems and consists of one-time costs and recurring costs related to this infrastructure. The one-time costs are mainly associated with the IS integration efforts. The recurring costs are associated with running a larger and more complex IS portfolio post integration, requiring significant efforts and investments, which negatively impact the value created in the M&A. Seddon et al. (2010) found that the costs of systems consolidation in a banking merger in Australia were prohibitive because the significant efforts were not offset by business benefits. Henningsson and Carlsson (2011) report an integration effort of over 1,000 days for a horizontal merger and, as an explanation, indicate that business processes and IS were tightly intertwined and could not be changed independently. Increasing IS complexity over a series of M&As and increasing integration problems over a series of acquisitions, leads to increasing time to value and recurring costs (Yetton et al., 2013). Besides an increase in complexity and running costs, an increase in risk exposure is observed as well. Unaligned security policies were found to lead to an increase in security breaches post-

merger, in a study by Lohrke et al., (2016). Chang and Cho (2017) find that a larger post-merger IS portfolio leads to increased risk exposure and causes additional IS security related recurring (operating) costs.

Understanding Negative Value Contribution

In previous studies, negative IS value contribution has mainly been attributed to misalignment between BIS and IIS, negative synergy, and poor preparation or execution and ineffective decisions (Johnston & Yetton, 1996; Mehta & Hirschheim, 2007; Seddon et al., 2010). Although the examples of problems caused by the differences in IS between the acquirer and acquired are abundant, these differences are considered as context rather than the cause of integration problems in Henningsson and Kettinger's (2016) reanalysis of 37 published case studies. A recent paper by Lee et al. (2022) identifies higher (technical) distance and non-fit as key factors contributing to or causing post-merger IS problems. Other studies also address the importance of technical differences in M&A and found that lower levels of differences, like using the same ERP, appears to reduce the negative IS value contribution (Gao & Iyer, 2006; Johnston & Yetton, 1996; Mehta & Hirschheim, 2007; Seddon et al., 2010).

Schweiger and Very (2003) introduce the concept of negative synergy in M&A to describe why interventions in the merged firm cause value leakage. It is important to note that negative synergies do not represent the mirror image of the generally accepted synergies such as economies of scope and scale and increased efficiency (Chatterjee, 1986; Lubatkin, 1983). For instance, negative synergies are not negative economies of scale, which would reflect super-additive purchasing costs - nor are they negative economies of scope, which would reflect sub-additive business value from serving a larger customer base with a larger portfolio of products and services. Although previous studies do provide insight into the economic effects of negative synergy, they do not address the mechanisms through which these integration problems emerge.

IS developed independently pre-merger in different firms in many cases exhibit value destructing interference when combined or integrated post-merger (in terms of both direct and indirect negative value contributions). In our literature review, we did not identify any cases where significant IS problems existed in one of the firms involved before they engaged in the merger. Therefore, our leading assumption is that IS integration problems are a direct result of operationally combining IS. As extant research, to our knowledge, provides only scant insight into how the operational integration of IS in M&A leads to negative value contributions, our aim with this study is to provide a theory explaining why the act of operationally integrating IS in an M&A coincides with business disruptions, slowdown of innovation and unexpected one-time and recurring costs.

Method

As our ambition with this study was to explore how negative value contributions emerge during the operational integration of IS during M&A, an in-depth exploration of an IS integration process was required. The nature of the value contribution from IS and the role of IS in M&A is an emerging topic, where according to Henningsson and colleagues we have just scratched the surface (Henningsson et al., 2018; Henningsson & Kettinger, 2016). Qualitative research is an accepted research approach for this type of research question (Benbasat & Zmud, 1999; Klein & Myers, 1999; Mingers, 2001; Shanks, 2002). A case study research approach has been chosen to capture the practical experiences of the actors and the relevance of the context of action (Gregor, 2006; Shanks, 2002). To validate the findings obtained from this case study across different contexts, these findings served as input for validation interviews with various M&A experts. This setup aims to assure maximum validity by following the approach and guidelines as proposed by Yin (2012). We identified our case studies together with a large Dutch consultancy firm engaged in many M&A-related IS integration projects focusing on IS-intensive organizations. The consultancy organization provided us access to an extensive archive of relevant information and artefacts covering the whole process of integration, from the preparation stages of the M&A up until the realized integration. Working with the consultancy organization additionally allowed us to conduct of interviews with a large variety of people involved in the cases in different roles. This allowed us to collect multiple perspectives, contributing to the validity of our research through triangulation of our findings.

Case Study

The case concerns a high-profile merger which suffered from multiple business impairments and received a rich press coverage. Because of confidentiality reasons the names of the firms will be anonymized. The merger concerned two large telecommunication firms. Telecommunication firm "Alpha" acquired the telecommunication firm "Beta" (which was nearly twice the size of Alpha). The case was selected because of the richness of the available data and the importance of IS integration to realize the envisioned business and IS synergies. The data covers a period of nearly 3 years, covering the phases from pre-merger strategic analysis to the formal end of the integration, with the start of the next M&A. An overview of the key characteristics and relative size of both firms prior to the merger is presented in Table 1 below:

	Alpha & Beta combined	**Alpha / Beta ratio**
Number of employees in full-time equivalents (FTE)	5,000	0.55
Total revenue in €	2.5 billion	0.60
Number of TV customers	4.4 million	0.58
Number of internet customers	3.1 million	0.56
Number of telephone customers	2.6 million	0.61
Number of mobile customers	87,000	0.03
Number of Wifi-spots	1.7 million	0.42

Table 1. Key figures of Alpha and Beta in the year prior to the M&A

Our collaboration with one of the main consultancies involved in this integration provided access to various sources of data, allowing the retrieval of archival records and access to key personnel involved in the execution of the merger. The latter allowed us to conduct semi-structured interviews with people involved in the process, providing diverse and in-depth perspectives on the merger, its process and the positive and negative outcomes.

Alpha is a daughter company of "Parent Company Alpha" (PCA), a global telecom giant that is known for their strategy of growth through M&A. Both firms served non-overlapping geographic areas in terms of customers and physical network. By combining customers and integrating physical telecommunication networks, the merged firm could form a sizeable match for the largest incumbent player in the market. "Alpha" acquired "Beta" with the objective to add the "Beta" customer base onto their own, as well as to connect and integrate both physical networks to reach more potential customers. The value of the M&A consisted of a combination of exploiting economies of scale and scope, and efficiency, for both business and IS. The merger represents an *absorption* BIS (Wijnhoven et al., 2006), because by combining products, services, customer bases, and resources, into a single integrated firm, Alpha and Beta aimed to strengthen their market position. The decision to move to Alpha systems while retaining the Beta brand and services for commercial reasons represents a notable exception to the common absorption BIS, where the acquirer's name, brand, products, and services are retained. For the execution of the IS integration, an explicit *consolidation* IIS was defined (Baker & Niederman 2014): all Beta IS had to transform to the Alpha standards, unless customers were deeply impacted.

After the deal was cleared by the authorities, the two companies formed one legal entity. The integration program started before the clearance, facilitated by a convenient legal construction, to ensure a speedy start. Five months after the clearance, the newly formed merger rebranded itself to the outside world, taking on the name (and associated brand value) of Beta. To avoid confusion with the name before the merger, this newly formed compound will be referred to as NewBeta.

To achieve the expected IS synergies, the following IS integration efforts were planned:

1. Integration of Alpha and Beta physical networks and consolidating their operating and control centers.

2. Migration of customer data from Beta customer relation management (CRM) systems to Alpha CRM systems.
3. Harmonization of all applications that would support customers and employees of NewBeta including harmonization of all former Alpha and Beta processes.
4. Changing Beta products and services to meet Alpha standards and creation of functional interactions with Alpha systems for Beta systems that would not be consolidated.

Data Collection and Analysis

The primary source of data in our case analysis consisted of semi-structured interviews. Twelve interviews were conducted with enterprise architects involved in the Alpha/Beta integration to investigate which synergies were expected and which events led to value destruction during integration activities. Two additional interviews were conducted with an Alpha employee and a Beta employee to gain additional context to pre- and post-merger differences in doing business. An overview of the interviews is presented in Table 2.

Interview	Job function	Role during integration	Mode
1,2,3 (group)	1: EA senior manager 2: Post-merger Architecture 3: Integration program	1: Consultancy representation 2: Lead NewBeta integration 3: Lead NewBeta integration	Face-to-face / Skype
2	Post-merger architect	Lead NewBeta integration	Face-to-face
4	EA project management and organization telco consultant	Safeguard planning and finances	Face-to-face
5	EA telco consultant	Design EA solutions for system customer migration	Face-to-face
6	EA telco consultant	Consolidate Pan European network operating centers	Skype
7	Former IT telco consultant	Network Operating Center Monitoring consolidation	Face-to-face
8	EA process telco consultant	Process harmonization	Face-to-face
9	EA telco consultant	Safeguarding planning process	Face-to-face
10	Business requirements manager telco consultant	Business requirement architecture	Face-to-face
11	Data migration telco consultant	Customer data migration	Face-to-face
12	IT & Strategy telco consultant	Consolidate Dutch network operating centers	Face-to-face
13	Beta architect	Supporting NewBeta integration projects start up.	Face-to-face
14	Alpha architect	Supporting NewBeta integration projects start up	Face-to-face

Table 2. Overview of the profiles for the initial interviews

Next to these interviews, we analyzed relevant documents such as architecture diagrams, project and resource planning, test results and archival records that were created in the context of this merger. Furthermore we coded and analyzed press articles and social media posts about the merger.

Open coding was used to categorize findings, while keeping track of thoughts using a notebook, as suggested by Corbin and Strauss (1990). As a next step, we applied axial coding. Categories, events, and loci were iteratively regrouped and reconnected, as is common in axial coding (Strauss and Corbin 1994). We introduce the term *IS antagonism* as an aggregate dimension to capture the negative interference, which surfaces when these systems are operationally integrated and actively interact. The idea of antagonism goes beyond the idea of "negative synergies"; the manifestations of antagonism do not appear to reflect the mirror image of positive synergies. In our findings, we did not identify negative economies of scale

(represented by super-additive costs), nor did we observe negative economies of scope (which would reflect a smaller portfolio of products and services). What we did observe was the degradation of service, post-integration, triggered by the operational interaction between information systems while these were functioning well, independently, pre-merger. Our analysis of publications in both the traditional media and social media indicates that Alpha and Beta customers experienced disruptions in their services immediately after the first operational integration of Alpha and Beta networks. In addition former Beta customers experienced the termination of specific services. Based on the above, we searched for a term that reflects negative interaction, between two entities that individually have a positive effect. We found *antagonism* to be an appropriate term here, as it refers to the interaction between entities that negatively influences the outcomes of either of these entities' actions. Whereas unlocking synergies has the effect of creating economic value, unlocking antagonism has the opposite effect, destroying economic value. We propose the following definition of *IS antagonism*:

IS Antagonism is the destructive interaction between previously independent information systems, which occurs when these are operationally combined, due to conflicts in the design and implementation of these systems.

In our analysis, we identified four sub-categories of IS antagonism: (1) Application antagonism, (2) Application chain antagonism, (3) Data antagonism and (4) Identity and access management antagonism. In further analyzing the differences between these types of antagonism, we found it helpful to use Thompson's (1967) work on different forms of interdependencies, and on how to shape coordination in relation to these interdependencies. In our findings section, we will further elaborate on this.

Validation Interviews

The in-depth case study was used to build an initial theory. The theory identified different categories of IS antagonism as the underlying causes for a negative IS value contribution in M&A. To contextualize, validate and enrich this initial theory, we executed a series of semi-structured interviews outside of the initial case study context. We identified and interviewed thirteen experts with multi-year and multi-case practical experience in post-merger integration. These experts represent a wide range of practical experience in over 50 M&As, from diverse backgrounds and roles. Each expert profile was represented at least twice, to mitigate the potential impact of a single expert personal bias. Only the expert who combines a lecturer position with a consulting position has a unique profile, but overlaps with the profiles of other interviewees. An overview of the expert profiles is presented in Table 3.

Specialist profile	**Number of interviewees**	**Means of interview**
Consultant specialized in post-merger systems consolidation and data migration	2	Face-to-Face
Consultant representing over 10 cases of pre- and post-merger practical experience	2	Face-to-Face
Consultant with in-depth experience in the post-merger integration in banking mergers	2	Face-to-Face
VP representing multiyear experience in global M&As	2	1 Face-2-Face 1 Skype
Academic researcher and lecturer	2	Face-2-Face
Academic lecturer combining academic work with active consulting	1	Face-2Face
CIO involved in multiple international M&As	2	1 Face-2-Face 1 Skype

Table 3. Overview of expert profiles for the validation interviews

The interviews were conducted in a semi-structured way to make the maximum use of the interviewees' experience and expertise, followed roughly the same sequence of questions and topics, and lasted between

60 and 90 minutes. As a first step, the involvement and experience of the interviewee in M&As was established. The interview continued with discussing the merger value objectives and the expected IS synergy. Next, we focused on IS-related problems experienced during the post-merger integration. The interviews were concluded by asking for other influences that the interviewees perceived or recalled as being important in their M&As. The M&As discussed were executed in a variety of industries. As the importance of IS varies per industry, we expanded the code structure to reflect the expected IS value contribution from the IS integration in the different M&As. The code structure was further expanded to capture factors that reinforce antagonism. All interviews were recorded and transcribed in full, and subsequently coded using Atlas.ti.

Findings

Four sub-categories of Antagonism

In the Alpha-Beta M&A, the consolidation IIS (replacing most of Beta's IS with Alpha's IS) was expected to deliver a major positive direct IS value contribution through realizing operational synergies such as economies of scale, economies of scope and efficiency. During the case study, most interviewees could easily identify the synergies resulting from their efforts, but found identifying and sharing decisions, actions or events contributing to the negative outcomes more difficult. Both former Alpha and Beta employees became visibly agitated and frustrated when asked about the negative outcomes associated with the integration efforts. The observation that integrating and replacing applications and technology according to the consolidation strategy did not go as well as expected, both financially and operationally, at least partly explains these sentiments. From the interviews it became clear that the problems they experienced were caused by incompatibilities between Alpha and Beta IS and processes, which contradicted the pre-merger strategic assumption that Alpha and Beta's processes and IS landscapes were remarkably similar. During the integration, it was found that IS and processes developed and implemented pre-merger, autonomously in each of the firms, differed in many ways. What we observed is that these applications and processes functioned well in each of the firms individually before they were combined. Immediately after being operationally integrated, processes and supporting IS started to fail.

Antagonism, as introduced in the methodology section, appears to drive this negative interference. Four specific (sub) categories of antagonism emerged from the interviews, (1) *application* antagonism, (2) *application chain* antagonism, (3) *data* antagonism and (4) *Identity and Access Management* antagonism. All four reduce and delay achieving synergies. We will discuss all four in detail.

In elaborating the different types of antagonism, we use Thompson's (1967) seminal work on interdependencies to provide insight into the mechanisms underlying each type. Thompson (1967) distinguishes between (1) *pooled* interdependencies (where actors / tasks share common resources but are otherwise independent), (2) *sequential* interdependencies (where the outputs of actors/tasks become the inputs of others) and (3) *reciprocal* interdependence (which is similar to sequential interdependence, with the addition of being cyclical – each receives inputs from and provides outputs to others). As both Thompson (1967) and Mintzberg (1979) make clear, these different interdependencies require different forms of coordination. As we discuss below, the different categories of antagonism are related to different interdependencies, and have different effects on coordination.

Application Antagonism

Application antagonism is observed when a Beta application is replaced by an Alpha application that is considered to be its equivalent based on strategic level considerations, but at the operational level turns out to have multiple differences and incompatibilities. At a basic level, application antagonism primarily concerns pooled interdependencies. When we consider an application as a common resource for different processes, tasks and actors, the effects of changes in this common resource (through the replacement of one system with another, for instance) affect each of these different processes, tasks and actors in a particular way. Of course, this will in turn also affect the sequential and reciprocal relations between these processes, tasks and actors, but the fundamental incompatibility here is found in the common resource. As Thompson (1967) explains, pooled interdependencies require coordination by standardization, and it is exactly this standardization that seems to be negatively affected by application antagonism in our case: where a consolidation strategy is aimed at standardizing the IS landscape based on the applications of one of the

organizations, in practice we see that such standardization becomes very difficult to achieve during the operational integration.

For instance, in the integration strategy, Beta and Alpha's CRM systems were considered equivalent – leading to an approach of a full replacement of Beta's system. However, during the execution of the IIS, it was found that multiple major changes to the Alpha CRM application were required to prevent disrupting NewBeta business processes due to these differences and incompatibilities. When discussing the CRM consolidation an interviewee replied:

"When a Beta customer calls and says "Well, I've ordered a TV and I want it delivered at my office, I want it delivered at a different address". How difficult can it be right? Well, very difficult. That's [a Beta process] that was actually pushed forward personally by someone high up the tree. But so much had to be done within the [Alpha] systems to accommodate for that one little wish".

This quote illustrates that both standardization of processes and standardization of products are negatively impacted. It further illustrates multiple foundational aspects of the nature of application antagonism and its negative impact on the IS value contribution. First, application antagonism is an operational phenomenon. The Alpha CRM is unable to support the operational execution of a Beta specific process. Second, this quote illustrates the value-destroying nature of antagonism. The process is assumed to provide (New)Beta a commercial advantage. However, both of the options considered - either no longer supporting the process, or adapting the Alpha application - led to a negative value contribution. The first option negatively impacts the commercial advantage, whereas the second option requires additional financial and IS resources for execution, negatively impacting the financial business case. Finally, this quote shows that IS antagonism mitigation may require deviation from the IIS. In this specific example, the first option - changing the Alpha systems, representing a combination IIS - was chosen as that most closely aligned with the M&A objective, deviating from the consolidation IIS.

Application antagonism resulting in a negative IS value contribution through business impairment was confirmed as a common experience in the validation interviews. To quote one of the VP level interviewees:

"I'm not revealing company secrets if I tell you that some of our (application) deployments have disrupted our market presence and performance."

The existence of application antagonism and its operational impact on the execution of business process was generally validated in the expert interviews, as illustrated in the following quotes.

"Combining these different worlds, it is difficult, <u>it will break</u>... - it may look simple in the diagram, but as they say: the devil is in the details."

"Pre-merger, the decision was made to move all processes to one of the environments. That was even in the contract, but it proved to be <u>practically impossible</u>. You can write these things down pre-merger with a strategic hat on, in practice it could not be done and both portfolios remained in existence for years."

Based on our findings, we identify the following characteristics and impacts of application antagonism:

- It is triggered by replacing an application supporting a specific process with an equivalent, but not identical application;
- It is operational in nature and impairs or disrupts a business process, causing a negative indirect IS value contribution;
- Addressing application antagonism requires efforts from the IS workforce, resulting in a negative direct IS value contribution;
- Application antagonism may continue for a long time, if not actively addressed, causing a recurring negative direct IS value contribution.

Application Chain Antagonism

The second category of antagonism manifests itself in cases where an end to end business process is supported by a chain of interconnected applications. Application chain antagonism is different from application antagonism in one key aspect: it manifests itself not in the changed application itself but in one of the connected unchanged applications or interfaces, thus affecting the way outputs from one application are translated into inputs for the next one. In other words, application chain antagonism is primarily about

sequential interdependencies: as the output from one step in a process reflects the input expected by the next step in the process one application cannot be changed without impacting the other one. As Mintzberg (1979) explains, coordinating such sequential interdependencies requires standardization of outputs: the next unit in a sequence has to be able to rely on the fact that the output from the previous unit is as agreed and expected. Again, we see that such standardization of output is negatively affected by the incompatibilities between applications. In both the case interviews and the expert interviews, there were many mentions of issues that emerged at a process or architectural level, as many different systems were differently affected by the integration.

Application chain antagonism may be triggered by adding a single component and will impact one or more of the connected applications as illustrated in the following quote.

"You'd say that [adding a single component] would be easy, but if you take a look at this [refers to EA artefact], you can see that it's not easy at all, so many [other applications] are involved."

Another way of triggering application chain antagonism is by changing or replacing a single application in a chain of applications. Similar to introducing an additional application, one or more of the connected unchanged applications supporting the end to end process fail because of that change - as illustrated in the following quote:

"[..], in that flow, there are so many different systems. It may be the case that somewhere, in between, an adjustment was made that hadn't been passed on to two of the four systems. You can only realize this when you are testing it."

When asked why, interviewees indicated that the application chains in both the target landscape and the source landscape contribute to application chain antagonism. The excerpt below illustrates the complexity of removing interfaces between two applications:

Interviewer: "But more interfaces - that is more difficult?"

Interviewee: "Well, what you just said, every component of a system that communicates then also needs to be changed and then it gets really complicated."

The validation interviews supported the existence of application chain antagonism. A shared opinion among the experts is that application landscapes are highly interconnected through all kinds of interfaces and data exchanges, and that replacing or changing an individual application frequently triggers application chain antagonism. Application chain antagonism is illustrated by the following quote:

"To get a flawless, seamless invoicing process, across all products and clients, that will take at least another 5-6 years to get that chain to work. [...] Sometimes you have to do 10 to 20 steps with all kinds of temporary solutions to get to where you want to be, without breaking things along the way."

Although application chain antagonism shares most of the characteristics and impact of application antagonism there are two major differences:

- Application chain antagonism leads to business process impairment or disruption and can be triggered by removing, changing or adding an application in a chain of applications supporting an end to end business process. However, it is not the changed application itself that causes the disruption – rather, the change causes another application to fail.
- Changing one application in a chain to mitigate business disruption or impairment may trigger further application chain antagonism, which makes it very difficult to predict and mitigate application chain antagonism, and also makes mitigation very IS resource intensive.

Data Antagonism

Data represents many important aspects of a firm that need to be preserved because of audit and reporting requirements, as well as because of the economic value of the data. The value of data is illustrated in the following quote from an expert interview.

"We have a well-developed mature IS integration process. We are only interested in the data, and transfer it to our own systems and decommission the systems in the acquired organization as quickly as possible."

Data antagonism mainly concerns pooled interdependencies when we consider data as a common resource that many different actors, processes and applications rely on. On the other hand, there is also a reciprocal interdependence here, as these actors, processes and applications not only use data, but also produce data. In other words, data are both input and output, and the antagonisms we identify in relation to data concern both these roles of data (and the interactions between them). That means that coordination of data integration relies both on standardization (of data architecture, definitions, etc.) and mutual adjustment (ideally, there is frequent interaction between different actors, processes and tasks, leading to an iterative information flow).

Typical examples of data that needs to be preserved in an M&A includes product data, service data, customer data, contracts and process status. Data antagonism appears to negatively affect the standardization of output coordination mechanism identified by Mintzberg (1979). In our case study, data antagonism was experienced while replacing the Beta CRM with the Alpha CRM. During the preparation of the data migration of customer data, it was discovered that the Alpha CRM did not provide the data structures required for supporting a number of Beta specific products and services delivered to the Beta customers. Additionally, it was discovered that the Alpha CRM was not able to store and process the data volume required for Beta customers, as the number of Beta customers was significantly higher.

"I understand that it seems like it almost stays the same, and the applications pretty much stay the same, but, for example, here we didn't have this free [product], and now we do. [...] So now we have a new variant of [product] in the [product] manager, which requires [data] changes [in all communicating applications and interfaces]."

In the validation interviews, we identified further examples of data antagonism that either required major effort to be resolved or in some cases were not resolved at all.

"If the processes are similar, data migration is easy, if they are not, we are looking at many years to get it done. Take this airline example - not completed after 15 years."

The following quote from a validation interview concerning a banking merger illustrates business process impairment caused by data antagonism.

"The only way to migrate the data was a three day black-out. Stop all [business] processes during a long weekend and back in business after that. Of course we selected a weekend with little customer impact."

Data antagonism causes a negative IS value contribution similar to application and application chain antagonism, but the mechanism is different. While application and application chain antagonism are triggered by replacing an application, data cannot be replaced by its equivalent from the other firm in the M&A. Therefore data replacement is not an option, and as a consequence data antagonism needs to be addressed through a combination of automated and manual operations and may require changing applications, products, services or processes.

Identity and Access Management (IAM) Antagonism

This category of antagonism is related to the fact that an M&A, such as the merger between Alpha and Beta implies the combining and integration of two previously competing organizations. Prior to the merger, both organizations implemented security measures to prevent untrusted outsiders, including employees of the competitor they were later merging with, from getting access to their buildings, systems and data. IAM antagonism is primarily about pooled interdependencies: the whole of systems, regulations and processes involved in IAM can be seen as a common resource that forms the basis for various tasks in the organization. Again, coordination of such interdependencies is focused on standardization, and our analysis shows that the antagonism in terms of IAM complicated this standardization during the operational integration.

As a consequence of the merger, the boundaries between Alpha and Beta fundamentally changed. This is prominently visible in the early stages of the merger when people from Alpha and Beta needed to cooperate. Former Alpha employees did not have access to former Beta buildings and vice versa. Similar patterns can be observed regarding access to Alpha and Beta applications, data, development environments, physical infrastructure, design documents, operational procedures and many other aspects.

Connecting the security infrastructures implies that employees are known and some basic level of trust is associated with recognizing the identity as a member of the organization. More advanced control, however,

such as access to classified information or systems, usually requires setting the access rights of each of the former Beta employees for all of the relevant Alpha applications and services - and vice versa. Executing the task of setting these fine grained access controls for all employees and systems in the integrated IS landscape represents a significant effort. This creates a negative direct IS value contribution through one-time costs while the impaired collaboration represents a negative indirect IS value contribution.

"Yes, processes will be integrated, the way people work. But the systems they need to use are not changed yet. So where an incident is logged depends on the person who calls it in. If an Alpha employee calls, that call goes into the Alpha system, if a Beta employee calls that goes into the Beta system. And yes this will happen until all employees are in one system. But there are insufficient benefits to doing it now, integrating departments, integrating people on top of all that is going on, it is just too much."

In practice, both Alpha and Beta employees resorted to the office environment for exchanging information and collaboration in a manner very similar to how they would have collaborated across organizational boundaries. The existence of IAM antagonism was confirmed in the majority of the validation interviews. An explicit example:

"You put the commercial people together in one office space - and then they don't have access to each other's systems and they cannot work together."

In some cases the IAM problems were quickly understood but not addressed – so workarounds emerged:

"You always have some basic [IS] needs, the hardcore IS infrastructure. So you are able to communicate and easily share information. Think about network and office environment. Crucial, but not that effective in the long term."

This example clearly shows that sharing applications and data is not achieved quickly after day one and that as a mitigation, employees resort to less sophisticated, but generally available resources, like the Microsoft Office suite. Although IAM antagonism causes a negative IS value contribution, the characteristics of IAM antagonism are different from those of the other types of antagonism, and it does not disrupt business in the same way. While the first three types of antagonism may impair running processes, IAM problems prevent employees from working together and sharing information, which tends to impair synergy realization rather than disrupt running processes.

Addressing Antagonism

One of the key characteristics of antagonism is that it becomes visible as soon as operational integration starts and requires immediate attention, which is illustrated by the following quote:

"After day one it becomes problematic, then you need to make the choices, and execute."

The implication is that in addition to the expected and planned tasks, the manifestation of antagonism needs to be addressed with a certain level of urgency. In the case study, antagonism was mostly mitigated through modification or extension of Alpha applications. In the case study and validation interviews combined, we identified three different ways of dealing with antagonism, (1) allocating resources for resolution, (2) changing or discontinuing specific products or services or (3) postponing resolution. To address antagonism a detailed operational analysis and resolution is required. The following quote illustrates that the choice between the three options was typically made for each application individually.

"For each application consolidation we tried to determine the least invasive way of addressing it, [...] Every change introduces a risk to the business and you need to deal with it."

In the case study, eventually, senior management acknowledged the delays in both direct and indirect positive IS value contribution, as well as the negative IS value contribution. To address both the delays and the negative IS value contribution, senior management resorted to increasing the workforce by re-employing some of the previously dismissed employees complemented with more expensive external resources.

"Some people were fired only to be re-employed later on. That is kind of weird, isn't it? So first someone tells you, "No sorry, there is no room for you", and two months later, "Oh, actually, we do need you for a little while longer."

This increase in IS workforce is associated with an increase in IS costs and represents a negative direct IS value contribution.

Conclusion from Findings

Our findings identify major differences between the predicted positive direct IS value contribution (based on strategic considerations pre-merger) and the realized negative direct IS value contribution based on operational-level observations. These differences cannot be explained by strategic misalignment between BIS and IIS, because in our case study BIS and IIS were aligned, with an *absorption* BIS and a *consolidation* IIS. Neither can these differences be explained by ineffective decisions, ignoring or deviating from the IIS, because the application consolidation decisions were in line with the IIS, which prioritized the realization of the direct IS value contribution through the improvement of IS infrastructure and IS internal processes.

Only when the negative operational impact on the business, associated with IS antagonism and the lack of IS resources to mitigate its impact became apparent, were the IS value contribution priorities re-evaluated and changed. As a consequence, the indirect IS value contribution, consisting of business continuity support and business synergy realization, was prioritized over the direct IS value contribution. Our findings illustrate that pre-merger strategic considerations, ignoring the potential operational impact of IS antagonism, may lead to a negative IS value contribution. Unexpected negative IS contributions due to strategic level analysis based on incomplete data gathering, represent a shared theme in the validation interviews. Addressing the negative operation-level consequences during execution of the strategy by contracting additional IS resources, or by changing the IIS, emerges as a common theme in these interviews. In our discussion we will reflect on how these observations impact current understanding of IS value contribution through IS workforce reduction.

Conclusion and Discussion

IS Antagonism, Workforce Increase, and Negative IS Value Contribution

Our aim in this paper was to build a theory, explaining why and how operational integration of IS in M&A causes a negative IS value contribution in M&A. The IS antagonism concept offers novel explanations beyond strategic misalignment and considers the nature of the information systems themselves in the integration phase. It explains why and how the operational integration of previously autonomous IS during an M&A leads to negative direct and indirect IS value contributions. Four different types of IS antagonism were identified, each different in cause and impact. A graphic representation of the theory is presented in Figure 1.

IS antagonism can emerge as the consequence of operational integration. This is represented by arrow (1) in Figure 1. Conflicting and incompatible design decisions made pre-merger, when both firms and their IS were autonomous and independent, are associated with antagonism. We have identified four categories of antagonism each associated with a distinct category of potentially conflicting design decisions. All four categories of antagonism may lead to business impairment or disruption and to delays in synergy realization. All of these are inherently value-destructing and thus IS antagonism leads to a negative indirect IS value contribution, represented by arrow (2). This negative contribution appears to be independent of, and in addition to, value-destructing mechanisms identified in earlier research.

We found that IS antagonism can be mitigated through active interventions, represented by arrow (3). Our findings indicate that IS antagonism mitigation requires increasing the IS workforce, represented by arrow (4). The increase in IS workforce results in additional IS costs and thus leads to the negative direct IS value contribution represented by arrow (5).

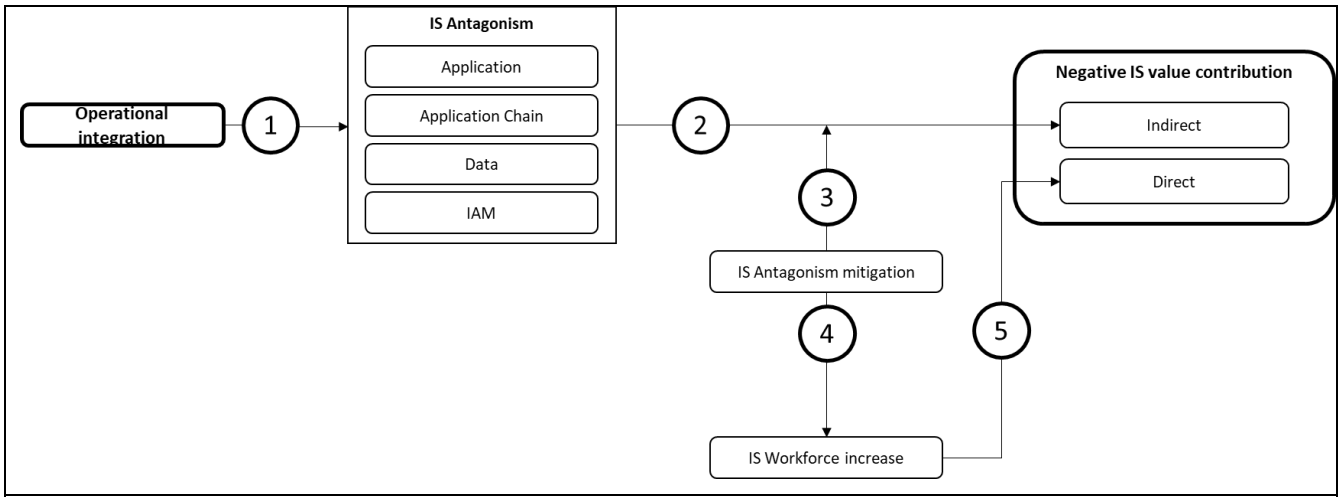

Figure 1. Antagonism in IS Integration during M&A

Theoretical Implications

Understanding the nature and impact of IS antagonism contributes to the knowledge of the negative IS value contribution in M&A in two ways: (1) in addition to deficiencies identified from a strategic perspective, antagonism emerges as a mechanism causing post-merger business impairment and disruption and delays synergy realization during operational integration; (2) the concept of IS antagonism provides an explanation for why negative IS value contributions can happen if BIS and IIS are aligned

Our key contribution is the identification and conceptualization of *IS antagonism*, the destructive interaction between two previously autonomous and independent IS, which is triggered when these are operationally integrated. Antagonism is associated with incompatibilities in the design and implementation of IS that emerge in the operational phase of the integration. Antagonism is triggered because one firms' IS cannot support the other firms' processes, products or services. Antagonism was identified as a result of our focus on what happens operationally during in integration, complementing earlier research that focused on strategic level analysis. In strategic level analysis these differences are often either not identified, considered insignificant, ignored or assumed to be resolvable. Focusing on the operational level of analysis, however, we found that these differences cannot be ignored nor can easy resolution be assumed. Failure to identify the differences may result in the observed business disruptions and impairments. With this, our research confirms the importance of IS in general and technical distance specifically in explaining negative value creation in IS integration (Graebner et al., 2017; Lee et al., 2022). We extend and refine this concept by distinguishing four distinct types of antagonism, each relating to a specific element of technical distance. Each of the four different types of antagonism may occur individually, but in M&A it is common for multiple types of antagonism to be triggered simultaneously. Resolving antagonism requires active interventions. Elaborating these types of antagonisms in terms of the interdependencies they concern, and how they affect the coordination mechanisms required for these interdependencies, provides indications of how to shape such interventions (as we will elaborate in the practical implications section). Antagonism appears to persist if not actively mitigated, illustrated by examples of antagonism still being present after 13 years.

Our study also contributes to a deeper insight into the role of *alignment between BIS and IIS* in explaining negative value creation. Extant literature often assumes BIS-IIS alignment to be associated with the realization of the IS value contribution (Henningsson & Kettinger, 2016; Wijnhoven et al., 2006). Challenging this, other work has emphasized the importance of emergent strategies in explaining positive IS value contributions in cases where BIS and IIS were *not* aligned (Baker & Niederman, 2014). We further add to this body of knowledge by explaining how IS antagonism can lead to negative IS value creation, even if BIS and IIS *are* aligned. This corresponds with the recent focus in the business-IT alignment literature on the importance of operational alignment – and how operational alignment can be quite different from strategic or intellectual alignment (Liang et al. 2017; Wagner, Beimborn and Weitzel. 2014; Zhou et al.

2018). The concept of IS antagonism puts the focus on the operationalization of the IS integration strategy, rather than alignment of that strategy with the business integration strategy. In that operationalization, an ongoing process of aligning between business and IT is essential, and may ultimately shape the integration in quite a different way than envisioned in the strategic plans. Our findings confirm that strategic level alignment between BIS and IIS is neither a prerequisite for success nor an unambiguous indicator for failure (Baker & Niederman, 2014). Differences between firm-specific IS that are not obvious at the strategic level are important at the operational level, and what appears identical at the strategic level may be quite different at the operational level. It is the resulting operational mismatch that leads to business impairment and disruptions.

Practical Implications

The theory presented in this paper has practical implications for both the pre-merger and post-merger phases of an M&A. In the pre-merger phase, there are implications for target identification, value prediction, and due diligence. First, an important implication (especially for same market M&A) is that lower levels of IS similarity trigger higher levels of IS antagonism and, as a consequence, reduce the synergy potential. In the due diligence phase, an analysis of differences between the IS landscapes of the firms involved in the M&A should become an integral task to prevent unanticipated post-merger IS integration problems. Those involved in these M&As should be aware that strategic level comparisons are not sufficient to identify the IS antagonism potential. In order to prevent over-optimistic decisions, operational level comparison needs to be included in the target identification and screening. Furthermore, value predictions in M&A need to anticipate for IS antagonism.

For the post-merger phase, our findings emphasize the importance of addressing the different categories of antagonism. Based on the independencies and coordination mechanisms, we provide insights into how to possibly address the different types of antagonism (e.g. by standardization – or by realizing that standardization will not work and designing alternative interventions). A crucial implication is that IS antagonism mitigation activities need to be included in the planning of post-merger IS integration activities. Anticipating IS antagonism and planning for its mitigation likely reduces its impact and the negative IS value contribution. Furthermore, it is important to be aware that IS antagonism will (at least initially) require additional IS staff. Since the cost of these resources will typically be higher when they are needed urgently, it is important to secure these resources in advance. Further to the previous point, early availability of the resources potentially reduces the negative impact of IS antagonism as mitigation can start earlier in the operational integration phase.

Limitations and Further Research

The main limitations of our study concern the explorative nature of the research. Although our study was been carefully grounded in previous research through an extensive literature review, the case study was characterized by a very specific combination of an absorption BIS and a consolidation IIS. Such a strategic direction enlarges the issue of IS antagonism. The decision to essentially impose the system landscape of one organization on the other, magnifies the importance of incompatibilities between these landscapes. This specific combination allowed us to clearly observe the multiple manifestations of antagonism. On the other hand, it also means that our findings may be specific for this particular combination, emphasizing the importance of replicating our findings in different contexts.

Finally, increased complexity of the post-merger IS portfolio appears to play a role, besides the observed antagonism. Further research would be needed to clarify the relation between antagonism, antagonism mitigation and complexity as antagonism mitigation in IS tends to increase the complexity of IS through more complex applications, more complex application chains, more complex data models and more complex IAM structures.

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