**Assimilation of Compliance Software in Highly Regulated Industries: An Empirical Multitheoretical Investigation**

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**Abstract**

In this paper we follow a theory-based approach to study the assimilation of compliance software in highly regulated multinational enterprises. These relatively new software products support the automation of controls which are associated with mandatory compliance requirements. We use institutional and success factor theories to explain the assimilation of compliance software. A framework for analyzing the assimilation of Access Control Systems (ACS), a special type of compliance software, is developed and used to reflect the experiences obtained in four in-depth case studies. One result is that coercive, mimetic, and normative pressures significantly effect ACS assimilation. On the other hand, quality aspects have only a moderate impact at the beginning of the assimilation process; in later phases the impact may increase if performance and improvement objectives become more relevant. In addition, it turns out that position of the enterprises and compatibility heavily influence the assimilation process.

1. **Introduction**

Nowadays, enterprises are confronted with a rising number of regulations. The Sarbanes-Oxley Act (SOX) was a milestone in terms of externally initiated “Corporate Compliance” requirements and took a pioneering role towards professionalization of Internal Controls System (ICS). Enterprise-wide ICS typically consist of hundreds of internal controls which are used for monitoring and supervising potential risk areas and fraud. This results in the need to automate internal controls; software vendors offer so called “Compliance Software”, which is often also marketed as GRC (Governance, Risk Management and Compliance) software.

In this context compliance related software products like Access Control Systems (ACS) have become an important component of ICS. ACS provide comprehensive mechanisms for automated supervision of risk-sensitive activities by controlling and managing access to corporate applications. Examples for ACS are ACL Assurance Solutions, Approva, CSI Tools, and FoxT (cf. [15][19]). The functionality is also integrated in GRC software provided from Oracle (Access Control Governor) and SAP (Access Control). An important functionality is the provision of mechanisms related to internal controls such as Segregation of Duties (SoD). If a company sets up ACS to manage and monitor compliance related requirements there is, amongst others, a demand that the ACS is used routinely and without exception, and that no “shadow processes” for circumventing the controls exist.

In connection with the implementation and use of IT systems, several assimilation theories have been developed. An ACS only has the required degree of effectiveness if the assimilation is, at least, very well advanced. Consequently, enterprises that want to use ACS as an element of their ICS should boost the assimilation process.

In this paper we develop an explanatory model to study the assimilation of compliance software. The decision to test the model for ACS was supported by the fact that the use of this type of software has in some enterprises already reached an acceptable maturity level. It can be assumed that the results obtained for ACS may be relevant also for other types of compliance software. Therefore, we formulated the research question:

*Which factors influence the assimilation of compliance software?*

Many empirical studies consider the assimilation of Information Systems (IS), in particular of ERP systems. However, there is a lack of empirical research on the assimilation of compliance software. These systems need a high degree of attentiveness because in their present form they are relatively new, and in particular the control-oriented approach of these products entails rights and obligations for ACS users and leads to numerous restrictions (e.g. denial of access rights, performance constraints) for application users (e.g. of ERP systems). This may result in conflicts between these two types of users and, at worst, in an assimilation gap [4][9].
We try to reduce the lack of empirical research by a theoretically based, exploratory process and reflect the applicability of selected theories from data obtained in four in-depth case studies. A systematic approach is developed to determine the design of our research model and the derivation of propositions, hypotheses, and associated variables. Our case studies focus on enterprises in highly regulated industries because in other contexts it was shown that these enterprises act more seriously with respect to compliance requirements [13]. In addition, because regulations such as SOX and Basel II make disclosure requirements and (financial) audits for multinational enterprises (MNE) more stringent [22], we assume that MNE are very sensible with respect to the assimilation of compliance software.

The remainder of this paper is organized as follows: In the next section we refer to theories which provide a foundation for analyzing the assimilation of IS artifacts and distinguish several stages of assimilation. Section 3 extrapolates hypotheses from these theories and describes the derived research framework. It also considers situational conditions that may impact the assimilation. In Section 4 we present a summary of the findings from the case studies and the adjusted multi-theoretical model. The paper concludes with a discussion of theoretical and practical implications and sketches further research opportunities.

2. Theoretical Background

2.1 Assimilation

IS assimilation is related to adoption and diffusion theories [21], but defined quite differently; in our study we consider assimilation as a post-implementation phenomenon which determines the extent of use of a system, its routinization, and institutionalization (cf. [1][20]).

Several models have been proposed to structure the stages of IS innovations. They differ mostly in the focus areas of innovation, the granularity of the stages, and their labels ([5][14][18][21]). On this basis we structure the post implementation phase (PIP) of ACS as shown in Figure 1.

**Figure 1. ACS Assimilation Process Stage Model.**

We label stage 1 as “Adaptation”; around the middle of this stage the implementation and necessary adjustments are finalized and ACS users as well as concerned parties (e.g. ERP users) start slowly to accept the altered situation. In stage 2, “Acceptance” increases and cautious optimism emerges. In stage 3, “Routinization,” users have integrated the ACS in their daily activities and the use of the software is no longer perceived as uncommon. In the last stage 4 the ACS is extensively used and integrated throughout the enterprise; all objectives associated with the ACS have been achieved. One should be aware that several other indicators for assimilation have been suggested and that the appropriateness of measurements may depend on the perspectives of different stakeholder groups [2].

2.2 Institutional Perspectives

Institutional Theory is based on three isomorphisms and explains why enterprises often show an astonishing degree of homogeneity in structures, procedures, and processes [8][28]. DiMaggio and Powell [8] distinguish three dimensions of institutional isomorphism:

- **Coercive pressures** result from obligatory regulations that enterprises are required to observe. In addition, decisions taken inside an enterprise may also be categorized as mandatory [3].

- **Mimetic or imitative pressures** may be based on strategic decisions or on objectives of lowering costs and/or risks. Enterprises orient themselves often towards the market leader or other successful market participants [8]. They often access the same information, are influenced by the same consultancies and media hypes, and consequently use similar concepts and software products. Imitation processes may also occur unintentionally, e.g., because of job hopping.

- **Normative pressures** typically result from the professionalization of occupational groups. It has been described as a collective struggle to define the conditions and methods of their work, to control the production of the future member professionals, and to establish a cognitive base and legitimization for their occupational autonomy [17]. Norms can be interpreted as accepted practices, pre-evaluated within the organizational field, and applicable without further cognitive effort. With regard to compliance requirements, associations such as ISACA, OGC, or AICPA provide frameworks and train their members who internalize them and grant them normative character. With regard to the confirmation of compliance evidence, the influential role of audit firms (in particular the Big4 auditing and accounting firms) is quite obvious [16] and it can be assumed that their publications are highly influential and contain normative provisions.

Several studies in the context of ERP systems identified institutional isomorphism as a determinant of a successful assimilation [23]. It is argued that the pressures acting on enterprises may encourage the use of technologies. ACS offers the opportunity to automate controls as reaction to compliance related pressures and therefore its assimilation must be a matter of great interest to all parties responsible for controlling and monitoring of compliance requirements.
2.3 Quality Perspectives

The theories for IS assimilation can be linked to research on IS success factors. Researchers have identified numerous factors that foster or impede success of IS. In their seminal work, DeLone and McLean [6] analyze 180 articles from different disciplines and condense them into an “IS Success Model” with six interdependent variables. In [7] they adjust their model to conceptualize and operationalize IS success. In this model three quality-oriented variables “Information Quality,” “System Quality,” and “Service Quality” influence the behavior-oriented variables “(Intention to) Use” and “User Satisfaction”. In addition, the variable “Net Benefits” summarizes objectives and expectations associated with the use of an IS innovation. On the basis of the IS Success Model we formulate the proposition that information, system, and service quality may influence the ACS assimilation. We take this into account by including a specific quality perspective in our research model.

In addition to the institutional and quality perspective other issues may be relevant for explaining the assimilation process. In [2] also an organizational perspective is discussed, which considers stakeholders, the impact of business and IT alignment, and different types of learning in detail.

3. Research Model and Operationalization

The theoretical background given above suggests that institutional, quality, and organizational perspectives affect the assimilation of ACS. Our full research model [2] contains twelve, the truncated one (which neglects, due to space restrictions, the organizational perspective) six hypotheses. The model also considers three enterprise-specific situational conditions that may impact the assimilation as well as indicators for evaluating the assimilation status.

3.1 Situational Conditions

The assimilation of ACS is influenced by situation-related, enterprise-specific variables [10][17]. Liang et al. [17], for instance, use “Absorptive Capacity” to explain the ability to adopt an IS innovation, “Organizational Compatibility” for risks that potentially prevent or inhibit assimilation, two measures for size, and one for the time since completion of implementation. For investigating the assimilation of ACS, variables expressing the position of the enterprise, its compatibility, and the length of time since the ACS went live (PIP duration) appear particularly suitable.

Position represents enterprise-specific attributes derived from well-defined figures as well as the history, the sector affiliation, and the products and services offered.

For investigating the assimilation of ACS, the position of an enterprise is primarily geared towards size and global orientation (which we denote below, for sake of shortening, as a multinational enterprise (MNE)). These enterprises are typically affected by challenging compliance requirements; a certain experience and routine in proving compliance is therefore assumed. An IS innovation typically triggers both organizational and technical changes. Enterprises which have established advanced processes for change management are better able to accommodate the requirements of an IS innovation and implement it accordingly. In MNE typically advanced change management processes exist, which should simplify the implementation of an ACS and the conduction of other activities associated with it. We assume that MNE achieve the most benefit from using ACS and have high interest in accelerating the assimilation. Thus, the following situation-related hypothesis (SH) is formulated:

SH1: The position of an organization as a multinational and highly regulated enterprise has a positive effect on the assimilation of ACS.

Compatibility can be assessed by numerous indicators, e.g., culture, strategic orientation, experiences, and the infrastructure of an enterprise [17][21]. Many events may prevent or inhibit the assimilation process (e.g., unforeseeable software adaptations, subsequently discovered errors, broad SoD conflicts, SoD conflicts that can only be resolved through process changes). In addition, burdensome tasks of the implementation phase may have been carried over to the PIP, or such tasks may have become apparent not until the actors involved became more experienced [17]. The professional management of such events is an important indicator for compatibility. A further indicator is the engagement of senior management, which sometimes has to support unpopular measures when running an ACS. Standardized, well documented processes and ERP systems, and experience in dealing with access and in particular SoD controls are also indicators of high compatibility. This leads to

SH2: High compatibility of an enterprise has a positive effect on the assimilation of ACS.

Duration of the PIP seems to be an obvious indicator for assimilation progress. The longer the go-live dates back, the more extensive should be the experience in dealing with ACS. Liang et al. [17] argue that adaptation is a time-sensitive process and misalignments that might have existed initially may have been resolved. This leads to our third situational hypothesis

SH3: The duration of the PIP has a positive effect on the assimilation of ACS.
3.2 Institutional Perspectives

Issues related to access controls and, as a special case, to SoD controls have been considered in the organizational literature and in the context of ERP systems for years. However, only the introduction of the SOX and other demanding compliance requirements [25] prompted management to address access and SoD controls seriously and to decide for the implementation of ACS. This leads to a highly plausible hypothesis which is based on coercive pressures:

\[ \text{H1: Obligatory external requirements have a positive effect on the assimilation of ACS.} \]

The enactment of SOX and other far-reaching compliance requirements resulted in a hype and extensive media coverage. Various institutions, consultancies, and other experts proposed reference models and “best practices” or published examples of allegedly successful implementations. ACS are intensively marketed by their suppliers, often supported by arguments from audit firms. This results in a hypothesis which is based on mimetic pressures:

\[ \text{H2: (Media) presence of compliance software, reference models, and “best practices” have a positive effect on the assimilation of ACS.} \]

Influential organizations such as ISACA and the Big4 accounting and audit firms refer, in particular in connection with the SOX, to risks caused by inadequate access controls. In this context special focus is given to access and SoD controls; automation of these controls is highly recommended [11][12]. This results in the following hypothesis, based on normative pressures:

\[ \text{H3: Requirements and recommendations of influential organizations have a positive effect on the assimilation of ACS.} \]

3.3 Quality Perspectives

With the upcoming SOX, the ACS market underwent remarkable changes as a result of increased demand and new offerings. Large ERP system vendors acquired smaller, more specialized ACS software providers such as Virsa (acquired by SAP) and LogicalApps (acquired by Oracle) and integrated the ACS functionality into their GRC offerings. The unforeseen demand for ACS provoked that some products were brought to the market rather hastily; one might assume that the quality of the products was impaired by this time pressure.

DeLone and McLean [6][7] recommend to measure the information quality of an IS innovation as an important success factor. Based on their work we regard as main determinants of information quality the currency, accuracy, and completeness of the information provided by the ACS. Furthermore we added the relevance of information and user-friendly reporting formats (e.g. of SoD risk analyses). These determinants are highly applicable to ACS because the information is used as evidence of SoD compliance. The quality of the evidence is also a prerequisite for its acceptance by auditors. This results in

\[ \text{H4: Information quality has a positive effect on the assimilation of ACS.} \]

According to [6][7] the system quality of an IS innovation is another important success factor; in the past, researchers used numerous determinants to measure it (e.g. convenience of access, flexibility of the system, integration of the system, response time, realization of user expectation, reliability, ease of use, or usefulness of specific functions). To measure system quality of ACS we focused on reliability, reasonable response, throughput times, system flexibility, and ease of use. This leads to

\[ \text{H5: System quality has a positive effect on the assimilation of ACS.} \]

The service quality of an IS innovation can be investigated, according to [7], by numerous indicators. Key determinants are reliability and expertise of the service provider as well as timely and solution oriented service. Since advanced ACS are an innovation for most enterprises and need to be integrated into typically complex ERP environments and their authorization concepts, the quality of support plays a crucial role. This results in

\[ \text{H6: Service quality has a positive effect on the assimilation of ACS.} \]

3.4 Measurements

The assimilation status can be determined in different ways ([1][9][10][17]): the measurements for the assimilation predicates are not very exact and may be system-specific. For investigating the assimilation of ACS it seems appropriate to use quantitative as well as qualitative measurements. We adopt three quantitative variables (Depth, Diversity, and Volume) from [17] to evaluate the coverage of the ERP landscape by the ACS and from [7] the construct Benefits as qualitative measurement. Depth was measured by asking the respondents to indicate the daily impact of ACS on their business activities. Diversity represents the number of subsidiaries, divisions, or functional areas using ACS technology. Volume was operationalized by inquiring the percentage of compliance relevant business processes and activities that were controlled by the ACS. To reconcile enterprise specific objectives which led to the implementation of ACS and the results achieved at the time of the interviews, we used the construct Benefits.
To measure the variables related to the hypotheses formulated in Sections 3.1 to 3.3, we employ a common rating scheme (Table 1) which distinguishes three degrees, labeled as High, Medium, and Low. Whenever possible we asked the interviewees to express their experiences in terms of the rating scheme. In other cases we assigned the transcribed interview texts to the schema. The most difficult evaluations concerned the construct benefit, because (with one exception) the objectives associated with ACS were not clearly defined and documented in the initiation phase; this resulted in quite divergent responses about the achievements obtained from using the ACS.

**Table 1. Rating scheme.**

<table>
<thead>
<tr>
<th>Degree</th>
<th>Characteristics</th>
<th>Underlying Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (H)</td>
<td>Very influential; Consistently positive impact</td>
<td>Adequately supported</td>
</tr>
<tr>
<td>Medium (M)</td>
<td>Influential in some cases; Positive but minor impact</td>
<td>Under certain conditions supported</td>
</tr>
<tr>
<td>Low (L)</td>
<td>Mild or completely absent; Rather small impact</td>
<td>Not supported</td>
</tr>
</tbody>
</table>

3.5 Research Model

The theories referred to in Section 2 and the hypotheses developed from institutional and quality perspectives form the basis of our research model. In Figure 2, assumed causalities between the variables are visualized by arrows.

**Figure 2. Research model for ACS assimilation.**

4. Empirical Investigation

4.1 Design

We tested our research model with four in-depth case studies. The selected enterprises are highly regulated multinationals and market leaders, in different industries with numerous subsidiaries, and listed on stock markets. E1, E2, and E3 are headquartered in Switzerland. E4 was selected as contrasting entity, as a bit smaller enterprise, which is not headquartered in Switzerland and not SOX-regulated; however, it has to achieve compliance, e.g., with FDA and GxP regulations.

The sample was selected on the basis of studying enterprises that implemented ACS in the last three years. The four enterprises started implementing ACS between 2006 and 2008. E1, E2, and E3 can be classified as early adopters. Table 2 shows the ACS with which they went live, their currently implemented ACS, and their intentions to replace it.

**Table 2. Enterprises and their ACS lifecycle.**

<table>
<thead>
<tr>
<th>MNE</th>
<th>ACS Start (Go Live)</th>
<th>ACS (Start)</th>
<th>ACS (Current)</th>
<th>ACS (Target)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>2006-01</td>
<td>Approva</td>
<td>Approva</td>
<td>SAP GRC AC</td>
</tr>
<tr>
<td>E2</td>
<td>2007-01</td>
<td>Securinfo and Virsa</td>
<td>Securinfo and SAP GRC AC</td>
<td>Solely SAP GRC AC</td>
</tr>
<tr>
<td>E3</td>
<td>2007-06</td>
<td>Virsa</td>
<td>SAP GRC AC</td>
<td>-</td>
</tr>
<tr>
<td>E4</td>
<td>2008-07</td>
<td>SAF GRC AC</td>
<td>SAF GRC AC</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 3 describes the job titles of the interviewees in the four enterprises. Additional expert interviews with ACS vendors, implementers, supporters, and auditors were carried out to validate the results. In total, 39 interviews took place from January 2009 till January 2010.

**Table 3. Interview Partners.**

<table>
<thead>
<tr>
<th>MNE</th>
<th>Job Titles</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Global Compliance Manager; Corporate Financial Controls; Global IT Risk and Compliance Manager; Business Process Governance Manager; Risk and Controls Consultant (external)</td>
</tr>
<tr>
<td>E2</td>
<td>Global SOX Manager; Head of Group SOX; Corporate Financial Controls; Chief Compliance Manager Business; Compliance Manager Business; IT Compliance Manager; Technical Risk and Controls Manager (external)</td>
</tr>
<tr>
<td>E3</td>
<td>Head of Compliance and Internal Controls; Manager of Compliance and Internal Controls; IT Manager; Risk and Compliance Manager (external)</td>
</tr>
<tr>
<td>E4</td>
<td>Manager Finance; Compliance Manager IT; SoD Manager IT; IT Risk Manager (external); IT Risk and Compliance Manager (external)</td>
</tr>
</tbody>
</table>

Semi-structured, narrative interviews based on the research model were our main data gathering method. In addition we analyzed documents provided by the enterprises and used a short questionnaire to disclose ACS related decisions during pre- and post-implementation.

4.2 Data Analysis and Results

The data were coded and analyzed by using MAXQDA [26], a software package for qualitative data analysis which helped to structure and to interpret the
data. The interview transcripts and other documents were first categorized by data reduction. The initially established categories were closely related to the model variables; if considered relevant, we supplemented new categories. Based on the data, detailed case descriptions were written-up and validation was sought from different stakeholders. Data analysis consisted of within- and cross-case analysis through coding, clustering, and pattern-matching techniques, and was designed to meet appropriate validity requirements [27]. The findings were matched with the theoretical framework and the corresponding hypotheses.

To decide which of the hypotheses to retain, adapt, or reject, we determined for each enterprise the stage of assimilation, based on quantitative measurements (depth, volume, diversity) and qualitative data (pursued and attained ACS objectives as indicators of benefits). In a second step we assessed the hypotheses in terms of relevance. Due to space restrictions, the results are presented in a compressed form, focused on the most relevant effects from the cross-case analysis. The latter was performed to understand the variations between the cases and to explain the findings of the within-case analysis [27].

### 4.2.1. Assigning assimilation stages.

To assess the influence of the situational, institutional, and quality related variables, we determined for each MNE the assimilation stage. Figure 3 shows the PIP duration and the time-dependent assimilation stages. It also illustrates the blockades in E1 and E2, and potential next assimilation stages in E3 and E4 as dotted arrows.

Most of the interviewees in E1, E2, and E3 stated that they were satisfied with the ACS because they achieved the main objectives. Matching the pursued and realized benefits and evaluating the quantitative measurements, we assigned stage 2 as assimilation status; in more detail, E1 was rated in the middle, E2 at the beginning, and E3 at the end of the “Acceptance” stage.

No significant issues were reported by the interviewees from E1 and E3. In both enterprises the ACS related processes had been integrated in their core business processes. It is remarkable that E3 gradually changed its ACS during the PIP and implemented the adjusted solution offered by its ERP vendor SAP, which had acquired E3’s former ACS supplier Virsa. E1 also intended a change of its ACS vendor Approva (to SAP, its ERP provider), although the interviewees were satisfied with the current ACS; reasons for the planned transition were a consolidation of vendors and a reduction of interfaces. The interviewees of both enterprises stated that significant benefits were achieved by the use of ACS. However, no systematic comparison between the initial objectives and the achieved ones had been conducted, and the achieved benefits were mostly derived from successfully passed audits and the confirmation of the effectiveness of internal controls by the auditors.

In E2, two units use different ACS. The level of ACS adaptation was lower, assigned only to the beginning of “Acceptance”. A lot of issues still existed and replacing the ACS in one unit was considered. Despite of the intended replacement of one of the currently used systems, the enterprise had already integrated its ACS related processes in its core business processes. Interviewees described some benefits achieved from ACS, in particular derived from successfully passed audits.

E4 was also satisfied with the status of its ACS and pleased with the achievement of their objectives (almost no SoD conflicts), but aware that the overall use of ACS needed further improvements; in combination with some unsolved starting problems and the short operation time of the ACS (9 month at the time of interviews) we assigned the end of stage 1 as assimilation status.

### 4.2.2. Analyzing situational conditions.

To account for the differences among our MNE, we investigated three situational conditions with the result that position and compatibility turned out to be more important for assimilation than the PIP duration. Table 4 shows the degree of support for the situation-related hypotheses, as determined by our rating scheme (Table 1); the PIP duration is stated in months.

<table>
<thead>
<tr>
<th>Table 4. Degree of support for SH1-SH3.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MNE</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>E1</td>
</tr>
<tr>
<td>E2</td>
</tr>
<tr>
<td>E3</td>
</tr>
<tr>
<td>E4</td>
</tr>
</tbody>
</table>

E1 and E2 emphasized their strong position and explained it primarily with their responsibilities towards external stakeholders. The risks of non-compliance, litigations, and loss of reputation were considered extremely high; this led to a strong willingness to invest in compliance and hence in compliance software.

E3 and E4 also emphasized their strong position but assessed the risk of non-compliance lower. Based on the original data we evaluated position as more relevant than the other situational indicators; it seems that in particular the risks of non-compliance and loss of reputation drive the assimilation. The larger, more global, and more powerful an enterprise is, all the more it will be supported, e.g., by vendors and consultants.
Such enterprises are also able to raise huge resources in terms of finance, technology, networks, and expertise. As a result, the assertiveness is at a high level and this affects the assimilation progress, even when disadvantages of ACS are well known and painful. It is also interesting that enterprises in strong positions started with ACS implementations in a very early stage of market maturity, knowing that the products lacked functional and technical sophistication. This observation may explain that two of the analyzed enterprises replaced the ACS during the PIP, shortly after their ERP vendor came up with a more integrated ACS solution.

Compatibility was measured by different indicators, among others with descriptions of change management processes, e.g., the flexibility to manage unforeseeable software adaptations, a large number of unexpected sensitive access violations, and a huge number of SoD conflicts. Events that occurred during the PIP have also been taken into account. We were impressed by the flexibility of E2 and E3 to replace their ACS quite a short time after going live and to switch to a product from another vendor. Main reasons for the ACS replacements were unsolvable issues with functionality, e.g., to manage the huge amount of data associated with access control rights and SoD requirements. We considered the engagement and decisiveness of senior management to support unpopular measures, such as the restriction of access rights, the separation of tasks, and the bundle of changes in business and organizational processes, as an indication of compatibility. We conclude that enterprises with high compatibility will achieve ACS assimilation more quickly than others.

The third situational indicator was the PIP duration. In E1 the ACS was used already three years but the assimilation was not very progressed. In E2 the ACS was run about 2.5 years and the assimilation stage was still at the beginning of “Acceptance”. In E3 the ACS went live almost two years ago, and the assimilation was comparatively mature, in the end of the “Acceptance” stage. E4 used its ACS quite a short time (9 months) and had not left the first assimilation stage. It seems that the duration after go-live does not determine the assimilation; of course, an enterprise needs some time to make assimilation progresses, but a long PIP does not automatically indicate advanced assimilation. In fact we explored two cases (E1, E2) in which the PIP was quite long but the assimilation was blocked; both enterprises already started relatively early in the stage “Acceptance” with the analysis of another ACS.

4.2.3. Analyzing institutional perspectives. Our interest in investigating the institutional pressures was triggered by the hypotheses H1-H3 which assume that in highly regulated environments externally initiated pressures influence the assimilation of compliance software. The analysis of the institutional dimensions shows specific differences between the four MNE but, conflating the data, the results are reasonably homogenous and the three hypotheses are clearly supported. Table 5 shows the degree of support based on our rating scheme.

<table>
<thead>
<tr>
<th>MNE</th>
<th>Coercive Pressures (H1)</th>
<th>Mimetic Pressures (H2)</th>
<th>Normative Pressures (H3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>E2</td>
<td>H</td>
<td>H</td>
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<tr>
<td>E3</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
<tr>
<td>E4</td>
<td>H</td>
<td>H</td>
<td>H</td>
</tr>
</tbody>
</table>

Coercive pressures are caused primarily by legal requirements, in particular in E1, E2, and E3 which have to fulfill SOX requirements. In these MNE the ACS implementation process was strongly supported by members of the top management, the progress, and all issues with potential to cause a delay were monitored by a newly established steering committee. In the role out phase, a dedicated committee oversaw adherence and developed guidelines in accordance with access control and SoD compliance. In the PIP, this committee is established as a permanent organization unit to monitor the internal controls related to sensitive access and SoD and to react to new regulations. In E4 the engagement to implement and run an ACS was triggered by national law - not as challenging as SOX but SOX requirements were discussed as benchmark to be met in the future.

The influence of mimetic pressures became particularly clear when we considered the selected software vendors: In the three SOX-regulated MNE the originally
chosen software came from innovative niche providers but the decisions in favor of these providers were revised shortly (E3) or at least questioned (E1, E2) after the ERP market leader came up with a comparable functionality. The turn to the market leader can be interpreted as evidence for mimetic effects, although the interviewees strived to assure that the expected integration and synergy effects determined the (intention to) change. In contrast, E4 followed an unwritten policy to work only with software offered by the provider of its ERP system. It was clearly stated that the enterprise relies on the market leader’s innovative power and promised ability to meet high quality expectations, in particular with regard to compliance evidence. A further indicator for mimetic effects was the strong orientation of internal bodies to the conduct of external consultants, and in particular of external auditors. The reasons given for the material influence of external bodies were their expertise related to “best practices” in terms of internal controls and compliance requirements. In particular, the use of best practices in form of SoD related matrices, patterns, and samples were emphasized. The awareness of inherent risks in the use of pre-programmed and ready-to-use material was poor but present. However, all analyzed MNE trusted in the “power of the market”, implying that innovations bought/used by other market participants were honored with high credibility.

Our third hypothesis that normative pressures affect the ACS assimilation is also supported. In particular the input of external bodies is highly influential. It seems that the recommended measures have been implemented with only little internal reflection. An indicator of the influence of external auditors is the recruitment behavior: E1 and E2, and less apparent also E3, recruited as compliance officers preferably former Big4 employees. One side-effect of this behavior is that expectations and approaches from leading auditing firms were transferred into internal frameworks, in particular with respect to the management of access and SoD controls, to ensure externally forced quality levels. E4 did not recruit their compliance officers from former Big4 employees, but engaged Big4 experts to customize the ACS inherent standard SoD matrix, to implement the ACS, and to manage and monitor the remediation processes with the goal to achieve “Zero SoD Conflicts” in their ERP authorization roles.

4.2.4. Analyzing quality perspectives. The analysis of the quality dimensions was triggered by the hypotheses H4-H6. The interviewees rated the effects of information quality and systems quality only as medium. These results provide only limited support for H4 and H5. The service quality was evaluated very low in three cases and in one case as barely medium. This leads to a rejection of H6. Table 6 shows the degree of support of our hypotheses.

Most interviewees were not able to differentiate between quality issues resulting from functional capabiliti-
4.2.5. Results. Summarizing the most important results, the analysis indicates that the effect of coercive, mimetic, and normative pressures on ACS assimilation is very strong; this leads to a high degree of support of hypotheses H1-H3. With regard to quality, the perspective of the interviewees did not give high priority to assimilation progress. The achievement of objectives (in particular related to compliance requirements) devoted a great deal of attention and all other aspects (e.g., quality issues) have been deferred. It appears that the quality perspective of ACS is not unimportant but secondary. Therefore, the MNE reduce quality expectations as long as the use of ACS assures compliance with laws and regulations. A higher quality receives management attention and support only if it promises better business performance.

With regard to situational conditions, we found that position and compatibility strongly influence the assimilation. The PIP duration seems to be less important as assumed and does not indicate the assimilation stage. A long PIP duration can result in a blockade, as seen in E1 and E2. The position of the enterprise is strongly related to the institutional perspective: the higher the position and the associated external compliance requirements, the more important appear in particular coercive pressures.

The results related to our main hypotheses (H1-H3 supported, H4 and H5 partly supported, and H6 rejected) and the situational hypotheses (SH1 and SH2 supported, SH3 less conclusive) are reflected in our adjusted model (Figure 4). Due to their close relationship, we place dotted arrows from Position to Institutional Pressures. The selected measurements (Section 3.4) proved their worth; in particular, DeLone and McLean’s [7] proposal to use “Net Benefits” as a construct for all results related aspects was very helpful. The term “benefits” allowed the interviewees to reflect the “real” objectives and their achievements.

![Figure 4. Adjusted research model for ACS assimilation.](image)

5. Conclusions and Outlook

This research contributes to the IS innovation literature by focusing on the much neglected post-implementation assimilation processes for the case of compliance software. The purpose was to identify, classify, and analyze factors that may explain what enables or inhibits the successful assimilation of compliance software, exemplified for ACS.

Drawing on institutional theory and IS related quality factors, and the literature on IT adoption and diffusion as well as IS success factors, we developed and tested an assimilation model for ACS. Our theoretical framework reconciles the independent contributions of two established streams in the literature: studies that explain the impact of institutional pressures and those that explain the effect of different quality determinants. Analyses based on case studies in four multinational enterprises largely support the hypothesized relationships: Our results confirm that institutional pressures are significant for the progress of the assimilation. However, quality factors, in particular service related issues, are of less importance.

A theoretical contribution of this research is the treatment of the scarcely discussed role of institutional pressures in combination with quality aspects affecting the assimilation of compliance software. The paper contributes to the theory of IS innovation in the following way: First, the focus is on post-implementation assimilation of compliance software, extending the work of other researchers [17][24]. Second, this study integrates institutional pressures and the influence of quality criteria on the assimilation process into one model. Third, the finding that institutional pressures play a significant role in the assimilation of compliance software and some of these pressures should be considered more explicitly in IT assimilation models. Fourth, the result that for some types of IS quality aspects may be less important than indicated by other empirical analyses.

Our findings offer guidance to management and IT practitioners. The study indicates that compliance software is useful for governing internal controls. Senior managers should be aware that institutional pressures strongly influence assimilation. This is important for understanding why enterprises implement, for instance, ACS, knowing full well or accepting quality lacks. Pressures from outside often result in a purchase decision for ACS and push the assimilation relatively independent from the overall quality of the chosen system; even if it does not meet the expectations or if internal or external circumstances trigger modifications, early adopters may achieve some benefits from their efforts, e.g. the availability of risk assessments and SoD matrices.
A more general recommendation resulting from the case studies is that the deployment of ACS should be embedded in a managed assimilation process by addressing situational conditions, institutional pressures, and, to some extent, information and system quality.

Our results motivate future research endeavors on automated IT governance processes. More in-depth case studies across a variety of industries as well as large-scale surveys could provide valuable insights. Future research could expand and elaborate our model by considering additional theoretical constructs or situational conditions. It could also be valuable to investigate in more detail the role of the IT organization in the PIP, its implication for the assimilation process, and, in a broader perspective, the alignment between business and IT.

6. References