The fragmentation of theoretical contributions in ERP research: an exploratory study

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Abstract

Theorizing is an essential endeavor in IS research, and top-ranked journals require their publications to include substantial theoretical contribution. In this paper, we seek to analyze and understand whether ERP research has been successful in building theory and developing a cumulative tradition. Our working hypothesis is that the profusion of theoretical contributions is hindering the cumulative construction of knowledge, and is impeding the emergence of robust theories in certain IS domains. Furthermore, we believe that replication is rarely considered when research is designed and published, thus indirectly contributing to the publication of yet more theoretical proposals. To explore and test this hypothesis, we develop an analysis framework and apply it in the ERP research field to a set of papers published in two leading European IS journals. Our findings confirm our hypothesis and show that it is difficult to build stable theories in ERP research as the theoretical corpus is fragmented; researchers tend to propose new theoretical contributions rather than test and confirm existing theories. We discuss the possible reasons behind this state of affairs and make a series of recommendations. This paper contributes to a better understanding of the theorizing process in ERP research and is of interest for researchers engaged in theory building.

1. Introduction

The Information Systems (IS) research community tends to believe that if research “lacks theory, it is not research” [14, p. 342]. Indeed, within the discipline, theory development is an important criterion for judging the merit of an academic publication. Journal editors often highlight the proposal of new theory or the development of extant theory as a measure of the quality of a manuscript [17][28].

Looking back at IS literature, researchers have regularly encouraged theorization and explicitly called for theory development [34][27]. Theory development involves abstracting the studied phenomena into conceptual constructs and generalizing the findings to a well-defined subset of reality [14]. Undeniably, theory building is an iterative process and “theory builders need to go through iteration afterwards to perfect the theory” [19, p.647]. However, “building good theory is clearly a challenge” [ibid, p.647], and the theory building process continues to perplex the IS community [25][8]; indeed, much remains to be understood [7].

The aim of this paper is to investigate the state of theory development in the field of ERP research and to explore the underlying process. We question the extent to which the iterative, cycle-based approach to theory development is at work. We believe the time is right for the 20-year-old ERP research community to turn a reflective lens on itself and analyze the theorizing it has produced. In line with similar endeavors in the IS field (e.g. [17], [25], [28]), a first step is to review and assess the theoretical contributions already published.

When browsing the numerous literature reviews in the ERP research field (e.g. [5], [23]), we are troubled by the fragmentation of the knowledge corpus. It is indeed difficult to obtain a clear picture of what we actually know regarding basic ERP research questions. There is indeed no comprehensible set of accepted and confirmed theoretical frameworks for understanding and predicting certain ERP phenomena. We tend to believe that the ERP research field lacks a cumulative theorizing tradition. We see this reflected in the research practice whereby IS researchers tend to dabble in disjointed and disparate theories rather than attempt deep theorizing to confirm or extend an existing ERP theory. Our intuition is that the pressure on authors – from journal editors and research practices – to include a theoretical contribution in their papers (or to risk the rejection of their paper), has resulted in a plethora of theoretical proposals [1].

This work is based on the hypothesis that the profusion of theoretical proposals is hindering the cumulative construction of knowledge. Indirectly, it is impeding the emergence of confirmed, broad theoretical contributions in certain IS domains. Confirmation is an essential part of the theory building
process; it involves testing theoretical proposals and accumulating knowledge about their validity in different contexts [15]. Replication plays an essential role in this phase [21]. Replication – or repeatability – is indeed regarded as an essential endeavor in science to draw together scattered results and accumulate knowledge [11][33]. Given this strategic significance, it is important to examine the underlying status of replication in ERP research.

This paper develops an analytical framework to understand theory development and applies it to a sample of ERP research work. Because of the exploratory nature of this study, it is limited to research works published in a subset of the AIS basket of journals, European Journal of IS (EJIS) and IS Journal (ISJ). In the proposed analytical framework, we extract information about the theoretical proposals (e.g. form, category, research method, etc.) and look in particular at the issue of repeatability (or replicability), i.e., the extent to which it is possible for an external researcher to replicate the study and test the theoretical claims in similar or different settings. In doing this, we seek to sound the alarm about the fragmentation and stagnation of ERP research concerning theory development. The intent is not to devalue or ignore all the interesting results and contributions of the last two decades; but rather to be aware of the inadequate theorizing practices.

The paper is structured as follows. In the next section, we present a brief review of the literature on theory definition, the theory building process and the issue of replication in science. In section 3, we present the analytical framework; it contains six properties grouped in two parts, the characteristics of the study and the theoretical proposal itself. Section 4 uses the framework to analyze the sample of ERP research studies. Section 5 presents the results of this analysis and summarizes our findings with regard to our working hypothesis. Finally, section 6 reviews the contribution of this paper, its limitations and some possible future work.

2. Background

The term “theory” covers quite different understandings and conceptualizations, whose exact meanings are not always clear to researchers. This difficulty is accentuated in the IS discipline by the wide variety of epistemological paradigms at the intersection between technological and social sciences, and by the long-term practical applications that the knowledge must have. Moreover, it is quite challenging to define theory without implying or explicitly assuming an epistemological position, (how knowledge is acquired and justified), and adopting an ontological perspective (the subject of the study). Weber’s editorial [27], for example, bypasses this difficulty by carefully selecting terms and exposing arguments from different philosophical points of view, e.g., realism and social-constructivism.

Theory is valid if it helps us understand, reveal or explain the specific phenomenon under study, no matter where the theory comes from. According to Bacharach [2], a theory is the expression of a relationship between units observed in the empirical world, directly or by approximation (ibid, p. 498). “Approximation” refers to a conceptual construct for a phenomenon that, by its nature, cannot be observed directly (e.g. user satisfaction). The “unit observed” refers to a variable that can be measured empirically (e.g. type of use). The primary aim of theory is to answer the questions how, when and why; unlike what questions, the answers to these questions are, according to Bacharach, purely descriptive. Whetten (1989) adopts a similar definition with the components how and why, and includes what [31]. He insists on what he calls context sensitivity, which is the specific boundary condition under which the theory is relevant and valid; i.e., no theory can claim to describe, explain or predict phenomena in every human, technological and/or spatiotemporal situation.

In the IS domain, Gregor [6] defines theory as an abstract entity that aims to describe, explain and improve understanding of the world and, in certain cases, to predict future events and provide a basis for intervention and action. Despite the inclusive ambition of her analysis, which goes beyond epistemological and ontological divisions, she insists that “abstraction and generalization about phenomena, interactions, and causation are thought to be at the core of a theory” [ibid, p. 616]. Weber (2012) espouses a similar position, defining theory as a particular type of model intended to report on a predefined subset of phenomena in the real world [28]. By “report,” he means that the theory helps to predict and/or explain the phenomenon studied, and claims that a theory cannot help to understand without first having attempted to explain. For Weber, the analytical aim of explaining must outweigh the descriptive aim of understanding.

Finally, the IS theories taxonomy developed by Gregor is essential to understand theories and theorizing efforts [6]. She identifies five fundamental categories for theories in IS: Analysis (A) – Explanation (E) – Prediction (P) – Explanation and Prediction (EP) – Design and action (D).

To sum up, we consider that variations in theory definition are essentially related to purpose. In particular, the issue of understanding versus explaining is symptomatic of epistemological divide between
interpretivism and positivism. However, we support an inclusive position that considers these two broad goals for theory construction as complementary and equally important [9].

2.1 Theory building

Theory building is a challenging, complex process that raises epistemological issues. The investigative procedure, whether it be inductive (i.e. extrapolation of concepts from data analysis) or deductive (by testing hypotheses derived from an extant corpus), quantitative (questionnaire and statistical analysis) or qualitative (analysis of the actors’ discourse and/or direct observations), will affect the theorization process. We briefly summarize the subject using key sources from the literature.

Theory building starts with theorizing. Intermediary elements such as field data, literature reviews, lists of variables, conceptual constructs, descriptive diagrams and explanatory hypotheses do not make up a theory in themselves [24]. They are nevertheless part of a continuous theorizing process and are the building blocks for theory development [30]. From a micro level point of view, theory development is a creative process that relies heavily on innovative thought generation with disciplined trial-and-error and selection stages [29]. From a macro level point of view, theory building can be seen as a five-stage process: conceptualization – operationalization – confirmation – application and refinement [15]. While the first stage relies heavily on the researcher’s ability to theorize the studied phenomena creatively, the second stage calls upon his ability to transform problem conceptualizations into observable and measurable features. The next two stages raise different types of issues. Confirmation involves further testing the theory and accumulating knowledge about its validity in different contexts, e.g. longitudinal studies, use of different operationalization strategies (observation, surveys, interviews, etc.), or statistical aggregation, using, for example, meta-analysis [13]. Application refers to “applied” theories that Lynham’s method aims to build. It seeks to link the knowledge provided by the theory (descriptions, explanations, etc.) to the practical context in which it is supposed to apply. The final refinement stage relies on results from previous stages to adjust, extend and revise the theory to optimize its fit with investigated phenomena.

2.2 Replication as a Mean for Theory Development

Replication is fundamentally about the testability and repetition of scientific observations [20]. The crucial role of replication is well established in natural science but still controversial and limited in social science. In organization science, Tsang and Kwan (1999) clarified the concept and defined six types of replications [26]. They explain how it influences the theoretical and practical relevance of research by providing a measure of assurance that theoretical propositions and actions derived from their conclusions are founded in valid science, and not in biased, anecdotal, or idiosyncratic observation. Questions concerning replication and its frequency have recently been raised in different scientific domains, for example psychology [16] and software engineering [12]. In marketing science, Hubbard and Lindsay [10] suggest a shift in the business research paradigm from testing for significant difference to testing for significant sameness. Their position is obvious; by encouraging more replication, we could improve the relevance of business research. Because of the bias against replication, they warn the community that “the vast majority of empirical business research consists of unauthenticated, “novel” results based on single studies” [10, p. 1386]. To make replication more frequent and more systematic, it has been suggested that research should be designed and published in a way that makes its replication easier [4].

3. The analytical framework

Our work is inspired by Weber’s notion that theory development can be bounded and explained by considering two facets [28]. He first considers the parts of the theory, i.e. constructs, associations between constructs and boundary conditions for the constructs. Second, he considers the following properties of theory: importance, novelty, parsimony, level, and falsifiability.

Our framework includes six properties organized in two categories (table 1). First, the framework analyzes the study itself: the research topic dealt with, the empirical terrain in which it was carried out, the theoretical corpus used by the researcher to tackle the problem and develop a theoretical proposal, and finally the methodological procedure, or how the theory was developed and if possible how the researcher validates – or ascribes validity – to the results obtained (i.e. to the theoretical proposal). Secondly, the framework focuses on the theoretical proposal itself. The property “Category” refers to Gregor’s (2006) classification and shows the purpose of the theoretical proposal in relation to its form. Finally, the criterion “reproducibility” assesses the extent to which it is possible for a researcher to replicate the study and test the theoretical claims in similar or different settings. This will depend on the level of detail provided in the
description of the research method and above all, on the availability of the methodological artifacts (questionnaire, intermediate data, etc.) used in the study and to be used by others.

<table>
<thead>
<tr>
<th>Property</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Features of the Study</strong></td>
<td></td>
</tr>
<tr>
<td>Research topic</td>
<td>The topic or category of problem addressed in the study</td>
</tr>
<tr>
<td>Terrain</td>
<td>The terrain where the data was collected to apply or develop the theory</td>
</tr>
<tr>
<td>Theoretical grounding and justification(s)</td>
<td>The theoretical corpus mobilized to understand the problem, the researcher’s source of inspiration, which he “dips into” to obtain material for development of the theoretical proposal</td>
</tr>
<tr>
<td>Research methodology</td>
<td>How the researcher has developed the theoretical proposal from the field data, and if possible, how he validates this proposal</td>
</tr>
<tr>
<td><strong>Theoretical Form and Category</strong></td>
<td>How the theoretical proposal is expressed and its category according to Gregor’s typology (2006)</td>
</tr>
<tr>
<td>Reproducibility</td>
<td>The extent to which it is possible for another researcher to test any predictions of the theoretical proposal, and/or to replicate the study</td>
</tr>
</tbody>
</table>

4. Methodology: a Sample of ERP 
Research in European Journals

In this section, we apply the analytical framework presented above to analyze published research in the domain of ERP research. Our goal is to explore the state of theory development in this field. For this illustrative work, we decided to focus on journals rather than major conferences, since journals tend to value theory development more than contributions to practice [3]. We limited ourselves to papers drawn from a subset of the AIS basket journals, i.e. two European based journals: European Journal of Information System (EJIS) and Information System Journal (ISJ). The main reason for this limitation is related to the exploratory nature of this study. At this stage, our research goal is to confirm and/or refine the analytical framework. The development of this framework is a challenging endeavor and it makes little sense to apply it to a large set of studies before validating it. Moreover, as we are European-based researchers, we preferred to look at research published in European journals.

Although not explicitly formalized, the research protocol we applied here is similar to a general literature review process: search – select – extract – synthesize [20]. First, using search functions available on the journal’s website, we selected all papers whose title or abstract contain the character strings “enterprise resource planning”, “enterprise system”, “ERP”, or “package” published during the period 1999-2013. We screened the results individually to check that their content was coherent with our selection criteria, i.e. that the article tackled ERP issues. We rejected papers that did not target a specific ERP research question, e.g. technical papers or editorials. Our full sample contains 32 papers; they are listed in Annex 1 and 2. We extracted and recorded data from each paper according to our analytical framework. In many papers, the theoretical proposal was difficult to identify, because the theoretical contribution is informally presented through a narrative, unstructured and loosely conceptualized discussion. The task was much easier when the theoretical proposal was further abstracted and presented as a model with clearly defined components (variables, constructs, hypotheses, etc.) and relationships. It was also difficult to define the category at times, and in particular to distinguish between Analysis (type I) and Explanation (type II). In these cases, we applied a two-phase protocol: each co-author extracted and formulated the theoretical proposal separately, and then we compared and discussed the proposals to obtain a single definition. Finally, we analyzed the extracted data to synthesize new knowledge.

Figure 1 presents descriptive statistics of the sample of papers analyzed. These statistics are related to the three basic properties in the framework (cf. Table 1). Tables 2 and 3 present the rest of the results obtained by applying the framework. Table 2 groups all papers that explicitly use an existing theory to build their research. Table 3 groups the papers that do not explicitly mention the theory mobilized and, instead, propose a new theoretical contribution by reviewing and synthesizing the literature.
### Table 2. EJIS and ISJ papers (from 1999 to 2013) based on specific theory

<table>
<thead>
<tr>
<th>Paper n°</th>
<th>Research topic</th>
<th>Theoretical grounding</th>
<th>Form and category</th>
<th>Reproducibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>#03</td>
<td>User resistance</td>
<td>• Psychological contract theory • Literature synthesis on user resistance</td>
<td>• Proposition of User Resistance Behaviors Development Model (E)</td>
<td>Possible – Interview guide available</td>
</tr>
<tr>
<td>#07</td>
<td>Enterprise – software package alignment</td>
<td>• Institutional theory • Literature synthesis on package–organization misalignments</td>
<td>• Misalignment typology with 4 types (A)</td>
<td>Impossible</td>
</tr>
<tr>
<td>#11</td>
<td>ERP adoption</td>
<td>• Technology Acceptance Model (TAM) &amp; socio-technical approach.</td>
<td>• Research model with informants control and TAM (EP)</td>
<td>Impossible</td>
</tr>
<tr>
<td>#15</td>
<td>Cross-functional inter-depends</td>
<td>• Emergent process theory and cross-functional coordination.</td>
<td>• No explicit proposal – A structured narrative to describe findings (A)</td>
<td>Possible – Interview protocol available</td>
</tr>
<tr>
<td>#16</td>
<td>ERP user participation and involvement</td>
<td>• Theory of Reasoned Action (TRA) • Literature synthesis on ERP Adoption</td>
<td>• A revised version of model developed initially by Barki and Hartwick in 1994 based on TRA (E)</td>
<td>Possible – questionnaire available</td>
</tr>
<tr>
<td>#26</td>
<td>Managerial factors affecting ERP implementation</td>
<td>• Social influence theory (Klein &amp; Sorensen model (1996)) • Literature synthesis on ERP implementation</td>
<td>• Test of Klein &amp; Sorensen (1996) theoretical model of implementation effectiveness. (A)</td>
<td>Possible – Construct measures available</td>
</tr>
<tr>
<td>#30</td>
<td>Understanding the role of managerial agency in achieving business benefits from ERP systems</td>
<td>• Structuration theory • Literature synthesis on ERP life cycles, CSFs, models assessing the business benefits achieved with ERP systems and ERP system in use.</td>
<td>• No explicit proposal – Discussion of role of managerial agency across all levels of business and IT management during ERP planning, implementation and use in the four organizations. (EP)</td>
<td>Impossible</td>
</tr>
<tr>
<td>#32</td>
<td>Managing trust relationships in implementation projects</td>
<td>• Structuration theory (Giddens’ account of modernity) • Literature synthesis on trust</td>
<td>• Research model explaining principle trust processes in implementation projects. (A)</td>
<td>Impossible</td>
</tr>
</tbody>
</table>

### Table 3. EJIS and ISJ papers (from 2002 to 2013) based on literature review and synthesis

<table>
<thead>
<tr>
<th>Paper n°</th>
<th>Research topic</th>
<th>Theoretical grounding</th>
<th>Form and category</th>
<th>Reproducibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>#01</td>
<td>ERP adoption</td>
<td>• Literature synthesis on nature and scope of ERP projects</td>
<td>• Three-tier conceptual model with 5 research hypotheses (EP)</td>
<td>Possible – research instrument available</td>
</tr>
<tr>
<td>#02</td>
<td>ERP assimilation and cognitive factors</td>
<td>• Literature synth. on ERP assimilation • Foucault’s notion of ‘dressage’</td>
<td>• Proposition of an individual level ERP assimilation model (E)</td>
<td>Possible – interview questionnaire available</td>
</tr>
<tr>
<td>#04</td>
<td>Control vs. productivity in ERP implementation</td>
<td>• Literature synth. on power and control in IS • Critical realism approach</td>
<td>• No explicit proposal – A narrative and conceptualized description using Foucault’s notion of ‘dressage’ (A)</td>
<td>Impossible</td>
</tr>
<tr>
<td>#05</td>
<td>Upgrade decision and process</td>
<td>• Literature synth. on acquisition and maintenance in IS</td>
<td>• A descriptive model for the upgrade decision process (A)</td>
<td>Impossible</td>
</tr>
<tr>
<td>#06</td>
<td>Implementation process</td>
<td>• Literature synth. on packaged software implementation</td>
<td>• A linear conceptual stage model for implementation &amp; a graphical conceptualized model of learning intensification (A)</td>
<td>Impossible</td>
</tr>
<tr>
<td>#08</td>
<td>Individual performance</td>
<td>• Literature synth. on Task-technology fit and User Satisfaction</td>
<td>• A structural model of TTF, ERP User Satisfaction, and individual performance Impact (EP)</td>
<td>Possible – questionnaire available</td>
</tr>
<tr>
<td>#</td>
<td>Description</td>
<td>Literature Synthesis</td>
<td>Explicit Proposal</td>
<td>Research Methodology</td>
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<tr>
<td>09</td>
<td>IS integration</td>
<td>Literature synth. on Thompson’s three types of interdependence</td>
<td>No explicit proposal – A conceptualization of integration effects of an enterprise system (A)</td>
<td>Possible – Interview instrument available</td>
</tr>
<tr>
<td>10</td>
<td>Making ERP work</td>
<td>Literature synth. on ERP usage</td>
<td>A model of technology power loops in pre ERP and ERP area (A)</td>
<td>Possible – Interview instrument available</td>
</tr>
<tr>
<td>12</td>
<td>ERP acceptance</td>
<td>Literature synth. on User Acceptance Model</td>
<td>No explicit proposal – A narrative description organized in 3 items (A)</td>
<td>Possible – Survey instrument available</td>
</tr>
<tr>
<td>13</td>
<td>Misalignment and ERP adoption</td>
<td>Literature synth. on Misalignments and organizational change in ERP implementation</td>
<td>No explicit proposal – A conceptualized vision of cascading effect of business misalignment (A)</td>
<td>Possible – Interview instrument available</td>
</tr>
<tr>
<td>14</td>
<td>ERP integration and EAI</td>
<td>Techno-change approach based on literature synth. on ERP/EAI implementation.</td>
<td>No explicit proposal – A post hoc ERP/EAI impact and evaluation conceptualizations (A)</td>
<td>Possible – Interview instrument available</td>
</tr>
<tr>
<td>17</td>
<td>Critical Success Factors</td>
<td>Literature synth. on ERP Critical Success factors</td>
<td>A set of 3 propositions that explicit success factors role in ERP implementation success (E)</td>
<td>Possible – Interview instrument available</td>
</tr>
<tr>
<td>18</td>
<td>Ex-ante evaluation</td>
<td>Literature synth. on ERP software and implementation</td>
<td>No explicit proposal – A four stages ERP life-cycle (A)</td>
<td>Possible – Interview instrument available</td>
</tr>
<tr>
<td>19</td>
<td>ERP implementation</td>
<td>Literature synth. on the factors that contribute to success in the context of ERP implementation.</td>
<td>No explicit proposal – A three level framework for ERP implementation (A)</td>
<td>Possible – Survey instrument available</td>
</tr>
<tr>
<td>20</td>
<td>Intangible benefits valuation in ERP projects</td>
<td>Literature synth. on tangible and intangible benefits in IT and ERP projects</td>
<td>No explicit proposal (A)</td>
<td>Possible – Survey instrument available</td>
</tr>
<tr>
<td>21</td>
<td>The ERP challenge in China: a resource based perspective</td>
<td>Literature synth. on ERP, CSF and Resource Based Perspective</td>
<td>Proposition of an empirical three-tier Resource-Based Perspective (RBPF) model on ERP challenges in China (E)</td>
<td>Possible – Interview guide and questionnaire available</td>
</tr>
<tr>
<td>22</td>
<td>ERP implementation strategy effect on Cross-Functionality</td>
<td>Literature synth. on Cross-Functionality</td>
<td>Proposition of a model of impact of ERP implementation strategy on cross-functionality (E)</td>
<td>Possible – Interview guide and questionnaire available</td>
</tr>
<tr>
<td>23</td>
<td>Technical and management perceptions of ES</td>
<td>Literature synth. on management perception of IT</td>
<td>No explicit proposal – comparison of IT and management perceptions of ERP (and optionally SCM and CRM systems) (A)</td>
<td>Possible – Interview guide and questionnaire available</td>
</tr>
<tr>
<td>24</td>
<td>Evaluation criteria for Enterprise Systems</td>
<td>Literature synth. on packaged software selection</td>
<td>Equation model explaining managers’ likelihood of recommending purchase (A)</td>
<td>Possible – Survey instrument available</td>
</tr>
<tr>
<td>25</td>
<td>ERP for niche companies</td>
<td>None</td>
<td>Action research: discuss practices in niche companies. (A)</td>
<td>Possible – Interview guide and questionnaire available</td>
</tr>
<tr>
<td>28</td>
<td>Examining technology, structure and identity during an ES implementation</td>
<td>Literature synth. on critical discourse analysis and identity in the workplace</td>
<td>No explicit proposal – Discussion of the organizational consequences of an ES at State University over a period of 5 years and two temporal frames – technology as imaginary phenomenon and technology as artifact. (A)</td>
<td>Possible – Interview guide and questionnaire available</td>
</tr>
<tr>
<td>29</td>
<td>ERP implementation and BPR</td>
<td>Literature synth. ERP success and failure and BPR</td>
<td>No explicit proposal – Comparison of the results of the paper with Martinson’s earlier work (2004). (A)</td>
<td>Possible – Interview guide and questionnaire available</td>
</tr>
<tr>
<td>31</td>
<td>Evaluation criteria in proprietary and open-source enterprise application software selection</td>
<td>Literature synth. concerning proprietary EAS evaluation with literature dealing with characteristics of OS communities that is relevant for EAS evaluation</td>
<td>Research model comparing companies’ preferences regarding the relative importance of evaluation criteria in the selection of open-source and proprietary ERP and Office systems. (A)</td>
<td>Possible – Survey instrument available</td>
</tr>
</tbody>
</table>
5. Results and discussion

Based on our analysis of the panel of 32 papers from EJIS and ISJ, this study makes two main contributions to the IS and ERP literature:

– First, we observe a fragmentation of theoretical backgrounds and contributions. The results show that the majority of our sample (75 %) used a literature review only, rather than using a specific theory to develop the research.

– Second, in the sample studied, there is a lack of replicated and replicable studies. Few studies explicitly include in the paper the research instrument used.

We develop these two principal results in more detail in the following sections.

5.1 Patchwork of theoretical backgrounds and contributions

Our analysis of the theorizing process within the ERP research sample revealed the tendency to propose new theoretical frameworks and empirically test them rather than focusing on the cumulative task of theory building. Indeed, we notice first that the scope of ERP research is very broad, covering different themes in line with earlier literature reviews [5]. As new research themes regularly emerge, research has focused more on specific themes, but with a more diverse approach and theoretical background. Furthermore, the study confirms the tendency to import and adapt elements from general theoretical frameworks, e.g., structuration and Technology Task Fit. If we look at the theoretical background of these articles, they constantly seek to confirm their simple models of the world. In most cases, we are in the presence of a new theoretical research model, but the justification for the model is partly or wholly absent, or weak and unconvincing.

With regard to Gregor’s theory classification, the main form of theory is Analysis (21 papers out of 32). Only five papers cover Explanation, and five more Explanation and Prediction (c.f. Fig. 1). In category A, for example, paper #05 (Min Khoo and Robey, 2007) develops a theoretical model from a case study to explain what influences upgrade decisions. The proposed model shows how different forces interact without making any prediction or testing the dynamic nature of upgrade decisions. In category E, for example, paper #02, by Liu et al. (2011), identifies a research gap in the technology assimilation literature, particularly ERP assimilation, and attempts to address this gap via an exploratory case study. The authors extend ERP assimilation research from organizational level to individual level. Finally, the three papers #01, #08, and #11 make theoretical proposals rooted in the category Explanation and Prediction, demonstrating and testing new factors and variables. They develop a conceptual model and theoretical constructs before testing them quantitatively.

On the other hand, with regard to rigor, many of the studies in our sample are built on a broad literature review and synthesis without explicitly relying on existing theory. Unfortunately, although focusing on the literature review alone, they adequately identify previous theory relevant to the phenomena being studied, they also contribute to theoretical fragmentation and the proliferation of untested theoretical contributions. We are clearly in the presence of a cycle of frameworks that are easy to generate and difficult to test and apply. This finding confirms the malaise identified by some researchers in the IS field: “we become unable to produce theories with broad impact within IS and beyond” [22, p.242].

By making a synthesis of the literature, researchers identify a knowledge gap and propose new factors or
variables within a precise model. Although this literature review process allows them to demonstrate their theoretical grounding, it confirms R. Weber’s observation that we have “a clutter of partially articulated, partially tested theories” that leads to “overload and disarray” in IS research [28, p.17].

Finally, we investigated whether there are emerging theoretical threads running through ERP studies, and we found none. What is slightly surprising is that very few papers studied here mobilize an IS specific theory (e.g. Technology Acceptance Model). This confirms the current trend, in IS research, of adapting a general theory from another discipline to formulate a theoretical proposition [25].

Another interesting insight from data in Table 2 is that a theoretical proposition may be conditioned by the research methods adopted. When the methodology is quantitative, the proposition is expressed as a correlation between variables and constructs, and is demonstrated with questionnaires and statistical analyses. Alternatively, when the methodology is qualitative, the proposition is less formal, taking the form of a narrative or an informal model. Although we might argue that the choice of theoretical framing and inquiry methods should be guided by the research questions and the phenomenon under investigation, Holmström and Truex in [25] suggest that researchers must consider the ‘fit’ between problem domain, theory and the relationship of the chosen theory to the method of inquiry. Moreover, they argue in [8] that the way to “move our field’s theoretical discourse forward is to continuously challenge our own position and concepts and, thus, be open to dropping our theoretical tools for the sake of the discourse and growth of the discipline” (p.285).

5.2 Lack of replicated and replicable studies

When it comes to replication, we observe a genuine divergence in our sample. How many of the studies are replicable? At this point, we simply observe that only 6 out of 19 papers (EJIS) and 5 out of 13 (ISJ) publish their research instrument, such as questionnaire items, acronyms used, interview guide and protocol, etc. The others are silent about how to replicate their research. Providing such instruments is essential to test or repeat the research and could improve the production of credible, valuable new knowledge and provide a more solid empirical foundation for theory development.

We also note that explicit theory development appears to be avoided. Empirical testing of existing theories occurs in our sample more than theory building. For example, #28 (Alvarez, 2008) attempts to build on the authors previous work, which examines technological and organizational change by focusing on polarizing forces that both promote and resist change. He conducted his research on the same site but collected new data.

Taking the position that it is not enough to provide merely descriptive studies, we identified few hooks by which one might try to replicate studies and further test the efficacy of the research findings. We found little attempt at theorizing at all. The goal of these articles was not the development of new theory; it was more about testing new models with new variables or in different contexts. New theory development has been relegated to a position of secondary importance relative to the empirical testing of existing theories.

This observation is consistent with prior literature addressing methodological issues [26]. We know that there is no common convention about replication within social science. However, we believe that it is of strategic importance for theory development and the consolidation of our cumulative IS knowledge. Hence, we consider that when assessing the importance of the paper, journal reviewers should consider both the replicability of the submitted research work and explicit replication studies. More than this, the original researchers should initiate the replication process instead of leaving the work to others.

6. Conclusion

The topic of theory development is an ongoing area of interest among IS scholars. The study reported in this paper is one of very few focusing on theory development and the issue of replication within ERP research. It seems to us that the claim of a contribution to theory in ERP research is all too often made rather lightly, so we felt that it is an important debate.

We learned the following lessons from our analysis of the sample of 32 papers from EJIS and ISJ. It appears that ERP research has not done a good job of cumulating knowledge and building theory. Examining the underlying theoretical contributions, we realized that 75% (24/32) of the papers do not explicitly mention the theories mobilized. While not declaring their theoretical positioning clearly, the authors review the literature and develop a new analytical framework to describe and analyze the results of their experiment. This clearly contributes to theory fragmentation and hinders knowledge accumulation.

On the other hand, when authors explicitly specify their theoretical background, we notice that all the theoretical proposals build on theories borrowed from neighboring disciplines such as social sciences. These theories include structuration theory, psychological contract theory and social influence theory. Other theories are identified within management and information system disciplines: institutional theory, the
theory of Reasoned Action and the Technology Acceptance Model. The coexistence of several theories is a way to take account of the complexity of the real world and remains necessary. Indeed, it is still too early to define an overall identity and kernel for the field of IS, and even more so for ERP.

Additional evidence offered by this ongoing work is the preponderance of descriptive and explanatory theoretical proposals. Indeed, a large portion of the papers (21/32) have collected data and conducted their inquiry using a variant of the case-study approach [32]. Thus, the theoretical proposals derived are descriptive and do not attempt to make predictions. Furthermore, such studies are mostly difficult – or even impossible – to replicate because no operational research instrument is published along with the theoretical proposal.

This study has two main limitations. The first is related to the sample, which is confined to publications from only two journals. Nevertheless, they are a good representative of theory building in the IS field. Although the results we have obtained cannot be generalized, they provide significant evidence about the current state of theory development in the ERP field. The second limitation concerns data extraction and interpretation. As mentioned in the methodology section, it was difficult to identify and categorize the theoretical contribution of certain papers in the sample. Nonetheless, we carefully revised and discussed each case to find a consensus and formulate the extracted data in the adequate form.

In the future, we plan to overcome these limitations and apply our proposed framework to a broader set of research papers selected from all the journals in the AIS basket and from specific ERP research journals (e.g. Journal of Enterprise Systems). Our goal is to build a comprehensive picture of the theoretical contributions available so far in the field of ERP research. We are aware that the analytical precision of our framework needs enhancing, in particular, the issues of reproducibility and the theory building process. Another important future task will be to extend the framework and include theoretical proposals from the Design Science research perspective.

7. References

8. Annex 1: List of papers from EJIS


8. Annex 1: List of papers from EJIS


Annex 2 : List of papers from ISJ