



ERP Retirement: Some Considerations on Existing Literature

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Abstract

The final phases of the information systems lifecycle are no less important than the initial ones. However, previous research indicated a lack of studies on information systems discontinuance. This paper aims to verify whether this gap still exists by analysing the literature on enterprise resource planning (ERP) systems, a type of software widely used in many organizations. To identify the relevant literature, the paper involved searching in Scopus and Web of Science databases. Despite several ERP literature reviews suggesting more studies on the retirement phase and no time limits in the search, very few studies have been identified. To sketch the current state of knowledge on the selected topic, the paper developed a scoping review and, based on the results, comments on possible critical issues. The work supports researchers and practitioners interested in information systems discontinuance, as it provides some considerations to develop future research. In addition, it has practical implications because the advancement of the knowledge frontier will help organizations cope with this kind of change.

Keywords: information systems discontinuance, enterprise resource planning, literature review, scoping review, ERP lifecycle, ERP retirement

Introduction

Today, most organizations adopt information systems to manage the enormous flow of data flowing through them (data from operations, data from partners, data from the market, etc.). Enterprise resource planning systems are packaged business software that enable efficient and effective resource management (Nah *et al.*, 2001). Their adoption can be considered one of the clearest proofs of IT acceptance in

organizations, as they are critical projects (Moon, 2007)¹. Therefore, it is crucial to study ERP transition projects.

Given that ERP systems increase enterprise performance, a considerable amount of literature has focused on them, in particular on the implementation phase and critical success factors (Shaul and Tauber, 2013; Ali and Miller, 2017; Kurni *et al.*, 2019). However, other areas deserve attention, like the post-implementation phases. Indeed, several authors have included ERP retirement among the under researched areas (Moon, 2007; Paulsson, 2009), and many ERP LR's called for more attention on this topic (Esteves and Bohorquez, 2007; Haddara and Zach, 2012).

ERP retirement is of interest today because information systems must evolve with the organization, and if ERP vendors do not guarantee system update and evolution, replacement may take place. As new technologies emerge, decisions about discontinuing or switching ERPs will be recurrent. From this perspective, cloud-based computing represents a new way of delivering software applications (software as a service) which stimulated ERP replacement. In fact, as stated in some market reports (Columbus, 2016), most companies started to place their software and infrastructure in the cloud, and this could lead to a replacement of on-premise ERP systems, given that cloud-ERP systems offer attractive benefits such as lower initial investments, more flexible systems, simpler maintenance, faster upgrades, higher scalability, etc. (Owens, 2010; Peng and Gala, 2014; Abd Elmonem *et al.*, 2016).

To this author's knowledge, no dedicated review² has been published on ERP retirement. Considering this, the paper aims to investigate the state of knowledge in this lifecycle phase, to understand whether recommendations from previous ERP LR's have moved the knowledge frontier forward. To this end the paper is organized as follows: the following section presents the literature background. In the third section, I introduce the methodological choices and indicate the selected literature. Then, I describe the main features of the analysed literature. The discussion is presented in the fifth section, where I provide an overview of the state of knowledge and some considerations to support future research. Finally, the last sections present the conclusions.

Literature Background

The literature offers several conceptualizations concerning information systems continued use and discontinuance (see, for instance, Bhattacharjee, 2001; Furneaux and Wade, 2010 and 2011; Venkatesh *et al.*, 2011; Bhattacharjee *et al.*, 2012; Polites and Karahanna, 2012; Recker, 2016). In particular, Furneaux and Wade identified

¹ Concerning this, some authors have estimated that 90% of ERP implementations do not deliver all the expected benefits (Momoh *et al.*, 2010).

² Following Huang and Yasuda (2016) a dedicated review usually focuses on one single topic in the ERP research field.

some reasons behind the cessation of an information system, such as low levels of integration, system capability shortcomings, and limited support services. With respect to the product lifecycle, decisions about the replacement of information systems can be attributed to the decline phase. Many ERP lifecycle models are available in the literature (see, for instance, Markus and Tanis, 2000, or Chang *et al.*, 2008). This paper adopts the framework proposed by Esteves and Pastor (1999), as it is one of the most widely used for the allocation of research (Esteves and Bohorquez, 2007; Shaul and Tauber, 2013; Albanese, 2019; etc.). This model consists of six phases: adoption decision, acquisition, implementation, use and maintenance, evolution, and retirement. In the adoption decision phase, the organization acknowledges the need for an ERP and identifies its business needs and required ERP functionalities. In the acquisition phase, the organization evaluates and selects ERP vendors and packages according to its needs. Implementation is a very critical phase because it is costly and time-consuming since it concerns the ERP system installation. Therefore, it may involve several activities such as process re-engineering, data migration, customization, etc. The use and maintenance phase starts when the ERP go-live takes place and concerns the system use, user acceptance, maintenance processes, etc. In the evolution phase, the focus is on ERP development and extension and integration with other applications (e.g., advanced planning systems or customer relationship management). The retirement phase is related to the appearance of new solutions or the inadequacy of the adopted ERP (e.g., due to new business needs). Thus, this phase concerns the obsolescence of the information systems (which can be retired after a period of maturity), the abandonment of the adopted ERP, and its replacement with new software.

Esteves and Pastor (1999) were among the first authors to point out issues concerning ERP retirement. In subsequent years, few studies have explored this topic in depth as confirmed by a series of LRs adopting the ERP lifecycle as a classification dimension. Esteves and Pastor (2001) found no studies on the retirement phase, but in those years most organizations were in the implementation and use and maintenance phases, so this could be justified. The ERP LR by Esteves and Bohorquez (2007) also identifies no studies focusing on this phase and the authors conclude as follows (p.416): “*we expect that in the future these cases (ERP systems retirement) will be analysed in more detail*”. Moon (2007) and Haddara and Zach (2012) pointed out that there are not many studies on ERP retirement with reference to both large companies and small and medium-sized enterprises. Finally, Huang and Yasuda (2016) developed an umbrella review (Paré *et al.*, 2015) based on 86 ERP LRs. They confirmed that (p.18): “*the implementation phase takes most attentions of researchers, and the pre-implementation phase is a little higher than the post-implementation phase*”. Furthermore, considering the post-implementation phase, usage is the most studied topic, and retirement is the least. Something may have changed in the meantime; the current analysis aims to shed light on this issue.

Methodology

Although many scholars divide LR methods into qualitative and quantitative (Aldag and Steams, 1988; Rosenthal and DiMatteo, 2001; etc.), an author can conduct different types of LR and adopt different approaches and techniques. In fact, there is a continuum of LR typologies between these opposite approaches (Guzzo *et al.*, 1987; Massaro *et al.*, 2016), and LRs may vary from purely qualitative to semi-quantitative (moderately quantitative) to purely quantitative (King and He, 2005).

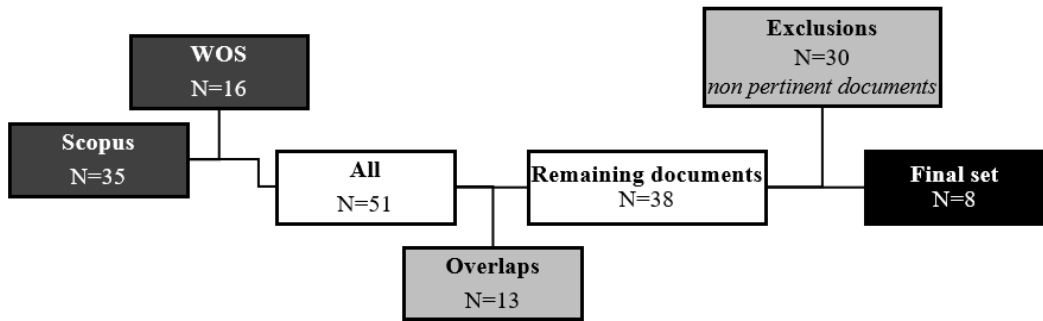
The literature offers many categorizations of LRs (Xiao and Watson, 2019; Paul and Criado, 2020; Booth *et al.*, 2021; etc.). To indicate the review developed, I refer to the taxonomy adopted by Paré *et al.* (2015). Following this classification, I conducted a scoping review, which is a qualitative systematic review aiming to provide some indications on a specific topic (Arksey and O'Malley, 2005; Levac *et al.*, 2010), and followed a sequential approach based on three phases: input collection, processing, and output generation (Levy and Ellis 2006).

To identify the relevant literature, I searched the Scopus and Web of Science (WoS) databases. This is because the most relevant contributions are supposed to be published in leading journals (Webster and Watson, 2002). In particular, I carried out some queries in September 2022 by searching the title, abstract and keywords for the following terms: retirement, ERP, and enterprise resource planning¹.

Although the queries had no time limit, the number of documents identified was not high, as I found 35 documents on Scopus and 16 on WoS. After comparing these records, I eliminated 13 duplicates. Then I analysed the abstract and, if necessary, the introduction and conclusion and identified the studies not related to the domain of this LR. In fact, due to the different meanings of the acronym ERP (e.g., early repolarization pattern, early retirement pensioning, etc.), I had to exclude 30 documents because they were not pertinent. Thus, the final set of selected documents consists of 8 studies (Figure 1). In addition, as one of these studies is not available in full text, I could only analyse 7 works in depth.

¹ I searched for documents by applying queries like this: (TITLE-ABS-KEY(retirement) AND (TITLE-ABS-KEY(enterprise AND resource AND planning) OR TITLE-ABS-KEY(erp))).

Figure 1 – Relevant literature



Source: elaboration on Scopus and WoS data

To depict the selected literature, I present the documents by year and indicate the publication outlet and authors. In addition, I analyse the research approach and method (Table 1). Given that the selected literature consists of a small number of documents, it is not convenient to adopt granular taxonomies. Therefore, I apply the following classes to determine the research approach: qualitative, quantitative, mixed, and conceptual. To define the research method, I adopt the following classes: single case study, multiple case study, survey, secondary data analysis, conceptual paper, literature review, mixed methods (qualitative dominant, equal status, quantitative dominant), and not defined method. Finally, I provide a snapshot of the research areas assigned by Scopus to the selected literature.

Main Features

The selected literature was published between 2009 and 2022. The analysis reveals that there is very limited research on ERP retirement, as only 8 documents were identified. Moreover, the number of studies reduces if one considers that a conference paper was later published in a journal (Haddara and Elragal, 2011 and 2013). This scientific production is fairly spread over time. Every two or three years, a study is carried out and, in most cases, published in a journal (Table 1). Several authors investigated ERP retirement, but Haddara is the only one who continued to analyse ERP retirement.

In the studies analysed, the qualitative approach prevails. In five cases, the authors adopted the case study method, but none have been developed as multiple case studies. The remaining three works are conceptual in nature since they are literature reviews. Unfortunately, none of these LRs focused on ERP retirement, which confirms the originality of the present analysis. No quantitative study was conducted.

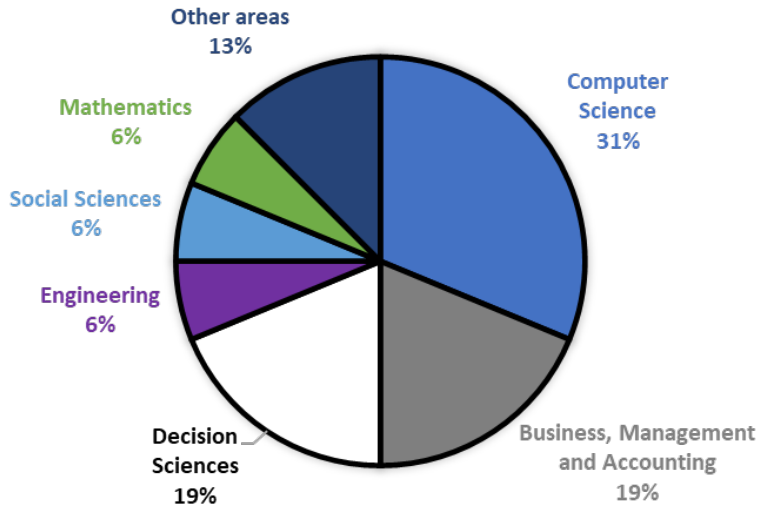
Table 1 - Main characteristics of the selected literature

Year	Authors	Title	Publication outlet	Research approach	Research method	Available in full text
2009	Paulsson W.	Moving ERP research forward: The future directions for ERP research	Proceedings of the 3rd European Conference on Information Management and Evaluation	Conceptual	Literature review	No (only abstract)
2011	Haddara M., Elragal A.	ERP lifecycle: When to retire your ERP system?	Communications in Computer and Information Science	Qualitative	Single case study	Yes
2013	Haddara M., Elragal A.	ERP lifecycle: A retirement case study	Information Resources Management Journal	Qualitative	Single case study	Yes
2014	Chofreh A.G., Goni F.A., Shaharoun A.M., Ismail S., Klemeš J.J.	Sustainable enterprise resource planning: Imperatives and research directions	Journal of Cleaner Production	Conceptual	Literature review	Yes
2017	Kähkönen T., Smolander K., Maglyas A.	Lack of integration governance in ERP development: a case study on causes and effects	Enterprise Information Systems	Qualitative	Single case study	Yes
2018	Demi S., Haddara M.	Do cloud ERP systems retire? An ERP lifecycle perspective	Procedia Computer Science	Qualitative	Single case study	Yes
2020	Yasiukovich S., Haddara M.	Tracing the clouds. A research taxonomy of cloud-ERP in SMEs	Scandinavian Journal of Information Systems	Conceptual	Literature review	Yes
2022	Kakhki M.D., Gargeya V.B., Mousavi R.	ERP systems transition in small manufacturing companies: the tale of two countries	International Journal of Business Information Systems	Qualitative	Case study (2 cases)	Yes

Source: elaboration on Scopus and Wos data

The analysed literature intercepts several subject areas. Taking into account the classification used by Scopus, the areas with the highest number of articles are computer science, business, management and accounting and decision sciences (Figure 2).

Figure 2 – Documents by subject area



Source: elaboration on Scopus data

Discussion

The literature analysed is numerically small and, in some cases, does not focus exclusively on the ERP retirement phase, as in the works of Chofreh *et al.* (2014), Yasiukovich and Haddara (2020) and Kähkönen *et al.* (2017). Indeed, the first two analyses are LRs, but not being dedicated LRs on the ERP retirement, the findings do not focus on the phase of interest. In particular, the first analysis focuses on sustainable ERP systems, intended as a holistic solution to support sustainability initiatives, which can replace legacy systems. The second study illustrates the current body of knowledge on cloud-ERP in SMEs and provides a holistic landscape. Following other studies, the authors recommend that ERP retirement needs further investigation. The third work is on integration challenges and problems due to the diversity of systems. This analysis indicates that problems with systems integration can lead to ERP retirement. Considering that one study is not available in full text (Paulsson, 2009), only four studies focused on ERP retirement are available. Therefore, the selected literature shows that the retirement phase is not only an under-researched topic but is almost unexplored.

As reviewers often remind us, the scarcity of studies does not imply a gap. However, this objection does not hold in this case, as ERP systems can be seen as one of the means for enterprise integration (Kien and Lian, 2009) and their retirement inevitably influences this feature. Thus, increasing knowledge about ERP retirement is important because it may affect enterprise performance and the work of ERP users. In particular, research on ERP retirement needs to be extended further to provide insights into when, why, and how an organization changes its ERP. Indeed, abandoning the ERP too early can affect the return on investment. At the same time, delaying the ERP replacement can reduce operational efficiency. In other words, it is important to know what causes ERP retirement, what influences migration, which conditions facilitate ERP retirement, which strategies are mostly pursued, which stakeholders are involved, etc.

The analysed literature provides only a few answers, and the findings have some limitations in terms of generalizability. Thus, this research strand cannot be considered mature, but what do we learn from the selected literature? Haddara and Elragal (2011 and 2013) developed a single exploratory case and investigated the factors leading to the ERP retirement decision. They identified some reasons for the ERP retirement, such as wrong ERP selection, insufficient involvement of managers and users, and lack of functionalities. Demi and Haddara (2018) offered a broader view on ERP retirement as they developed a single case study on an ERP vendor based on interviews with ERP consultants and sales. Consequently, the respondents responded based on many years of experience. This study proposes interesting results because it indicates further factors that lead to the switch from cloud or on-premise ERP to cloud ERP (availability of the newest functionalities, higher flexibility and scalability, fewer resources required, ease to swap to other ERP vendors). Also, they noted that cloud ERPs may have a shorter ERP retirement phase in contrast to on-premise solutions¹, but in general, they have a longer lifecycle. Furthermore, some interesting insights come from the work of Kakhki *et al.* (2022), who studied the transition from legacy systems to new ERP systems in SMEs in developed and developing countries. Although the authors had a broad focus on the entire transition process, they identified the following factors relating to ERP retirement/switching, such as the increase in costs of support, reduction of support services, improvement of operational performance, inability of the early systems to support business processes (new needs).

Case studies are useful in exploring new phenomena and in situations of lack of knowledge they can provide important insights and indicate directions for future research, but their generalizability is limited (Yin, 2009). Given that none of the selected studies adopted a quantitative approach, the findings certainly show some weaknesses. But if ERP retirement is important, why do we have so few studies? It is

¹ According to respondents, cloud ERP retirement could last from 3 months up to two years.

not easy to answer with certainty. Among the possible reasons I include: the difficulty in identifying ERP retirement cases, the availability of key contacts (because it is easier to talk about successes than failures), the variety of determinants to be studied (which are not necessarily of a technical nature), and the amount of information to be collected. In fact, although Haddara and Elragal (2013) and Kähkönen *et al.* (2017) developed single case studies, they conducted numerous interviews (approximately 40 and 21 interviews).

This paper does not have a recipe for dealing with all these issues. However, some considerations are offered. To increase the generalizability of the results, the research strategy of Demi and Haddara (2018) is convenient, as it is based on interviewing ERP consultants and sales, who responded based on a larger number of cases. Interviewing ERP vendor side players is useful not only in this respect, but also in identifying interesting case studies. In fact, if an ERP vendor may be reluctant to talk about the replacement of its product, it will have little problem indicating when its ERP has replaced another product. Since the causes of retirement include factors related to both the ERP adopter organization and the ERP vendor, to improve the findings, future qualitative studies should involve various key ERP actors (Albanese, 2017). Of course, there is no doubt about the need for quantitative studies, which are currently unavailable. Overall, more research is needed on ERP retirement, more empirical evidence, and systematic analysis of the drivers that lead to ERP switching, and the benefits and risks of ERP replacement.

Conclusion

In this paper, I developed a dedicated literature review on ERP retirement. It may have some limitations in terms of comprehensiveness. To increase it, future analyses may extend the databases searched (e.g., by including Google Scholar).

The number and exploratory nature of the selected studies showed that knowledge of ERP retirement is lacking. Filling this gap is important because the analyses will provide suggestions for enterprises and managers dealing with the final stage of the ERP lifecycle. This support will be especially relevant for SMEs in developing countries where ERP consultants are less available.

Following Yasiukovich and Haddara (2020) and Kakhki *et al.* (2022), I emphasize the need for more research on ERP retirement and suggest the development of new case studies, possibly multiple case studies based on different key ERP actors. To this end, I provide a few considerations to enhance the generalizability of future qualitative research results. Furthermore, there is a clear need for survey-based analyses covering different sectors and countries that seem to be missing in the literature.

Due to lower switching barriers, a considerable number of SMEs are modernizing their legacy systems. Indeed, some ERP and sales consultants argued that “*replacing the ERP system would occur more often in the future*” (Demi and Haddara, 2018,

p.593). The opportunities to advance in research will therefore increase, but will this be enough to close the gap? The publications of the coming years will answer the question.

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