Special Issue Editorial: Rejuvenating Enterprise Systems

Ahmed Elragal
Luleå University of Technology, Sweden, ahmed.elragal@ltu.se

Moutaz Haddara
Kristiania University College, Oslo, Norway, moutaz.haddara@kristiania.no

Eli Hustad
University of Agder, Kristiansand, Norway, eli.hustad@uia.no

Special issue editorial:

Rejuvenating Enterprise Systems

Ahmed Elragal
Luleå University of Technology, Sweden
ahmed.elragal@ltu.se

Moutaz Haddara
Kristiania University College, Norway
moutaz.haddara@kristiania.no

Eli Hustad
University of Agder, Norway
eli.hustad@uia.no

1   Enterprise systems

Enterprise systems (ESs) refer to several categories of business systems or software suites, including systems of enterprise resource planning (ERP), customer relationship management (CRM), supply chain management, and knowledge management (Hustad and Olsen 2014a; Zand 2010). Technically, these systems are standardized, integrated software solutions based on best practices and aim to practically integrate all the various business functions within and across organizations (Davenport and Brooks 2004). ESs are defined as software modular applications for business management and incorporate modules that aid several organizational functional business areas, such as planning, manufacturing, sales, marketing, distribution, accounting, financial management, human resources management, project management, inventory management, service and maintenance, transportation, and e-business operations and processes (Rashid et al. 2002). Organizations strive for business advantages from such systems in terms of efficiency and productivity improvements, enhanced customer treatment, and increased process innovation (Hendricks et al. 2007; Kyriakou et al. 2016; Ross and Vitale 2000).

ESs have existed for decades, and the majority of large organizations worldwide have implemented different kinds of ESs (Demi and Haddara 2018). Companies of all sizes have become increasingly dependent on ESs to integrate their various business functions, manage their operational and routine transactions, comply with regulations, manage their global supply chains, and benefit from the systems' timely reporting capabilities (Lee and Chang 2020). However, in practice, ESs have proven to be complex socio-technical systems, and fluctuating levels of success have been reported over the years (Hustad and Olsen 2014b; Svejvig and Jensen 2013). Generally, ES implementations are resource intensive and require considerable financial investments. Their adoptions also result in widespread organizational changes (Kirmizi and Kocaoglu 2020), and changes in business processes and new organizational roles for employees are complex and under-estimated shifts (Strong and Volkoff 2010). Despite the demanding and risky ES implementation efforts, their substantial business value is evident and recognized (Tian and Xu 2015).

ES adoption and implementation projects ideally follow systematic implementation methodologies and system lifecycle models. On one hand, the implementation methodologies define the stages, processes, and activities that have to be undertaken during the actual project, from the initiation phase to the roll-out/go-live strategies (Markus and Tanis 2000). On the other hand, the system lifecycle models have broader views and phases that go beyond the go-live phase and use and maintenance (El-Telbany and Elragal 2017). Lifecycle models focus on how the systems are adopted, selected, used, and maintained, as well as how they evolve and eventually retire at the end of their useful life in the organization (Esteves and Pastor 1999). While the ex-post literature on ESs is rich and diverse, the plethora of this body of research has apparent gaps in relation to the future of ESs, emerging technologies, and the diversity of perspectives on the actual implementations (Elragal and Haddara 2012). Thus, there is a need to investigate how emerging technologies and different perspectives on ESs can shape the future of such complex systems.

Currently, the technology landscape has drastically changed because of the various emerging technologies that are radically redefining how ESs are offered, implemented, utilized, integrated, and maintained. Hence, businesses require high agility and flexibility, and this has become even more evident in the current outbreak of the Covid-19 pandemic. Therefore, among others, ERP systems should respond to such dynamic needs of today's businesses and the rapidly changing business settings. For example, new sourcing models for ESs have recently been offered, and cloud sourcing has become a popular approach especially for small- and medium-sized enterprises (SMEs). Cloud sourcing is still in its stage of emergence, and it is crucial to identify the most

important issues related to cloud computing adoption decisions in enterprises (El-Gazzar et al. 2016). Cloud-ERP systems have notably become important for start-ups and smaller firms because of the promises of lower costs, the speed of implementation, flexibility, and scalability (Zadeh et al. 2018). Additionally, new applications have been integrated with ES, forming the so-called hybrid systems. A hybrid system also incorporates systems from multiple vendors, as well as integrates data from on-premises with those on the cloud (Bjelland and Haddara 2018; Loebbecke et al. 2012). Enterprises also seek to utilize ESs in more intelligent ways by analyzing their transaction data to support decision making at both strategic and tactical levels. Thus, future ESs are expected to highly support digital transformation efforts and incorporate (big) data analytics and artificial intelligence (AI) technology to a greater extent. Moreover, in response to the rapidly changing business and technological environments, modern ESs should be viewed as vehicles and enablers of collaborative innovation across organizations through value co-creation processes, platforms, and frameworks. Value co-creation can be enacted and attained by offering organizations an array of interactive and collaborative system environments comprising stakeholders, processes, and material entities, provided by ESs and technological platforms enriched by state-of-the-art digital technologies (Ramaswamy and Ozcan 2018). Finally, the mainstream literature on ESs mostly reports adoption-related issues from client perspectives, largely disregarding other stakeholders' views (e.g., consultants, vendors) that may enrich the project experience, as well as reduce tensions and challenges among future project partners (Elragal and Haddara 2012).

2 Special issue: Rejuvenating enterprise systems

When preparing and planning this special issue, we decided that its sub-themes should be directly relevant to the *Scandinavian Journal of Information Systems* audience and contribute to the notion of modern ES evolution, with presently emerging and future state-of-the-art technologies. Consequently, we have dedicated this special issue to Rejuvenating Enterprise Systems.

This special issue was based on an open call for papers and attracted several papers to be considered for inclusion. After a three-cycle double-blind review process, five articles were accepted. The chosen papers are diverse and demonstrate the heterogeneity of ES-related topics. Additionally, the research approaches adopted in the papers amalgamate a variety of philosophies, including qualitative (interpretivism) and quantitative (positivism) methods. The research methods employ systematic literature

meta-analysis, conceptual modeling, an in-depth case study, a longitudinal case study, and inferential statistical quantitative analysis.

The first paper, by Bhuvan Unhelkar and Aurilla Aurelie Arntzen Bechina, entitled "A framework for intelligent collaborative systems: Concepts, opportunities and challenges", focuses on the evolution of ESs from being data and information oriented to increasingly becoming more collaborative, boundary-crossing, and intelligent sharing systems. The paper elaborates on and integrates several crucial concepts in terms of big data, AI, machine learning, and communication technologies that can support business analytics, decision making, and knowledge sharing through the utilization of intelligent collaborative ESs. The authors have developed a framework of intelligent collaborative enterprise systems (ICES), where they integrate intelligence features into ESs in terms of analytical characteristics, advanced communication technology features, cloud storage opportunities, and levels of collaboration. The features of the comprehensive framework are illustrated through different visualizations that present (1) boundary-crossing collaborative ESs that provide analytics-as-a-service to users through utilization of sensor data, Internet-of-Things (IoT) devices, and cloud-based storage; (2) maturity levels of collaboration in ESs, showing the movement between data, knowledge, and intelligence; (3) the impact of machine learning and big data technologies that support knowledge discovery; (4) the role of collaborative ESs in a global ecosystem of knowledge workers, business processes, and communication technology; and finally, (5) how machine learning and big data can synchronize the various layers of collaborative ESs.

The main contribution of the paper derives from its sophisticated overview of the opportunities for the evolution of ESs and their conceptual framework. An important message from the paper is that collaborative ESs and emerging technologies should interact and evolve into an ensemble of technological, organizational, and social artifacts (Markus et al. 2002). Advanced communication technologies and business analytics applications are already available for utilization; however, taking advantage of the opportunities offered by collaborative ESs poses certain challenges to the enterprise. The paper proposes specific conditions that should be considered to exploit the opportunities. These comprise the implementation of a security framework, awareness of legislative and contractual issues, the development of generic business rules and standards, making decisions on sharable and non-sharable information to ensure competitiveness, and trust building. The paper is conceptual in nature, and more empirical research is needed. The paper suggests further studies in the form of an action research approach to validate the key elements of the ICES framework.

The second paper, by Bjørn Jæger, Sophie A. Bruckenberger, and Mishra Alok, entitled "Critical success factors for ERP consultancies—a case study", is an interesting

exploration of the critical success factors (CSFs) for ERP system projects from the consultants' perspective. The paper uncovers an under-researched area, as the majority of the extant ERP and CSF research is directed toward either the clients' or the vendors' perspectives.

Through a case study on an ERP consultancy company in Norway, the authors conducted interviews with fifteen stakeholders involved in ERP implementations. The stakeholders included ERP project managers, ERP business consultants, senior managers, and client-side employees, among others. The main driver for this research is the goal of exploring the CSFs that are deemed essential for the ERP project from the consultants' perspective. The data analysis suggests that generally, both the client and the consultancy firm measure success in terms of quantifiable units of time, cost, and the project scope and results. However, there are differences in which CSFs are deemed crucial by both parties. For example, while the ERP clients consider classic CSFs, such as top management support, business process re-engineering, support and training, among others, qualitative measures of client maturity and client satisfaction are central factors for achieving project success, from the consultancy firms' point of view, when implementing ERP systems. The client organization's maturity level or preparedness refers to how ready the client is for the ERP implementation project. Thus, client/user organizations are advised to assess their own skills prior to ERP implementation projects (Chang et al. 2013). A low score in skills assessment and organization preparedness should be compensated by the use of experienced ERP consultants (Motiwalla and Thompson 2012). Therefore, the paper confirms and validates the arguments in the extant literature and stresses that the client organization's maturity level is a function of the ERP consultants' degree of involvement and a vital factor for project success. Furthermore, the paper argues that it is crucial that the ERP consultants involved in implementation projects should develop, instigate, and administer expectations, management policies, and procedures during the whole project endeavor to attain and ensure the desired customer satisfaction factor.

The third paper, by Tom Roar Eikebrokk and Dag Haakon Olsen, entitled "Towards a process theory of IS business value co-creation: Insights from enterprise system adoption in an SME cluster", highlights the growing global interest in digital transformation, where a return on information system (IS) investments is envisioned to support the transformation journey. The paper explains how realizing business value from IS investments demands organizational transformation efforts. Such type of organizational transformation is a rather complex endeavor, particularly for SMEs. Toward that end, the paper identifies the need to explain how business value from IS investments is co-created in SMEs in particular. The paper investigates the research question: "How

does cooperation among enterprises manifest itself and contribute to IS business value co-creation?" This paper analyzes a network cluster of approximately 60 SMEs operating in the creative industry. The enterprises in this network have decided to cooperate in order to transform their industry and henceforth improve their services. To achieve that objective, the network of enterprises has initiated a CRM system project as part of their digitalized transformation strategy. The project includes key undertakings, such as developing the capability to analyze customer data in order to improve services.

Based on the authors' longitudinal case study of the above-mentioned network of SMEs, the paper presents a theory about "how co-creation among enterprises contributes to IS business value." The research results corroborate that co-creation can be an important avenue for SMEs to invest in IS and realize IS business value. The paper proposes a rectified IS business value framework to explain how members of an innovation network can co-create IS business value. The findings further reveal that co-creation contributes to IS business value in four ways: building an awareness of the value of audience data, leading to a better ability to master (CRM) technology, contributing to a better ability to share data and knowledge, and finally, strengthening the development of the competitiveness of the cluster and the creative industry.

The fourth paper, by Siarhei Yasiukovich and Moutaz Haddara, entitled "Tracing the clouds: A research taxonomy of cloud-ERP in SMEs", is a systematic literature review of the research on cloud-ERP solutions in the SME context over the last decade (2010-2019). The paper uses an ES lifecycle model (adapted from Esteves and Pastor 1999) to categorize its findings into six stages: (1) adoption decision, (2) acquisition, (3) implementation, (4) use and maintenance, (5) evolution, and (6) retirement. The paper employs a meta-analysis, comprising a statistic synthesis of relevant studies. Notably, the study's findings indicate a majority of research on the adoption decision stage of the ES lifecycle, while studies related to the evolution stage are essentially limited. The paper contributes by providing a state-of-the art perspective on cloud-ERP research in SMEs and suggests future research avenues based on the identified research gaps. Recommendations for future research are outlined for each stage of the ES lifecycle. The paper points to the importance of focusing on the evolution stage for cloud-ERP solutions and mainly pays attention to the predictive capabilities of cloud-ERP systems and how the relevance of big data and predicate analytics can play an important role in well-performing SMEs. The retirement stage also needs further consideration in future research. The paper emphasizes that future studies should focus on the underlying drivers for replacing ESs, such as risk factors and benefits, to understand the lifespan of a cloud-based ERP solution in particular. Regarding the research method, the paper puts forward the need for more qualitative studies in this domain. Future studies should

consider new theoretical approaches, and the lifecycle models require further develop-
ment to be more fitted to cloud-based solutions.

The fifth and final paper, by Amgad Badewi, Taghreed AbuSalim, Lilas A-Asfahani,
and Doaa Shehata, entitled "ERP system as an enabler for bottom-up innovations", dis-
cusses ERP systems for innovation purposes. The paper uses a resource-based method
to develop a framework pertaining to the role of ERP systems, following a bottom-up
approach to innovations. The resource-based method is a framework that explains the
variability in organizational performance in terms of resources (Melville et al. 2004),
as well as the possibility to combine those resources to gain a competitive edge (Barney
and Clark 2007; Pohjola 2002).

The research question investigated in this paper is "how organizations can improve
bottom-up innovations through their ERP systems." In this empirical work, the authors
have developed a framework comprising five resources: attitude, organizational charac-
teristics, skills, ERP human resources, and ERP technological resources. They adminis-
tered a survey sent to ERP-based organizations. The responses from 210 organizations
were analyzed using structural equation modeling (SEM).

Regarding resources, the survey results do not support the premise that an organiza-
tion's characteristics (agility or innovation sponsorship) and attitude toward technology
have a direct effect on organizational innovativeness. Instead, the findings reveal that
these relationships are mediated by employees' quantitative skills. Concerning technical
resources, ERP human resources (the ability to create business partnerships) and ERP
technological resources (the customizability of reports) have a significant impact on an
organization's ability to innovate.

What has been known about ERP systems for such a long time is about to change,
which is highlighted in this research paper as one of its main findings. Toward that end,
ERP systems are not merely planning systems that aim to improve intra-organizational
and inter-organizational communication, but they also have the potential to contribute
to innovation. However, to enable innovation, the necessary organizational and techni-
cal resources must be available.

Acknowledgments

bjerg for their support. Finally, we appreciate the reviewers for their dedication and constructive feedback to the authors.

References

Barney, J. B., and Clark, D. N., (2007). Resource-based theory: Creating and sustaining competitive advantage, Oxford University Press on Demand.

Bjelland, E., and Haddara, M., (2018). Evolution of ERP systems in the cloud: A study on system updates. Systems, (6:22): 1-26.

Chang, J. Y., Wang, E. T., Jiang, J. J., and Klein, G., (2013). Controlling ERP consultants: Client and provider practices. Journal of Systems and Software, (86:5): 1453-1461.

Davenport, T. H., and Brooks, J. D., (2004). Enterprise systems and the supply chain. Journal of Enterprise Information Management, (17:1): 8-19.

Demi, S., and Haddara, M., (2018). Do Cloud ERP Systems Retire? An ERP Lifecycle Perspective. Procedia computer science, (138): 587-594.

El-Gazzar, R., Hustad, E., and Olsen, D. H., (2016). Understanding cloud computing adoption issues: A Delphi study approach. Journal of Systems and Software, (118): 64-84.

El-Telbany, O., and Elragal, A., (2017). Gamification of enterprise systems: A lifecycle approach. Procedia computer science, (121): 106-114.

Elragal, A., and Haddara, M., (2012). The Future of ERP Systems: look backward before moving forward. Procedia Technology, (5): 21-30.

Esteves, J., and Pastor, J., An ERP lifecycle-based research agenda, Published in: First International workshop in Enterprise Management and Resource. Planning: Methods, Tools and Architectures,EMRPS, 1999, pp. 359-371.

Hendricks, K. B., Singhal, V. R., and Stratman, J. K., (2007). The impact of enterprise systems on corporate performance: A study of ERP, SCM, and CRM system implementations. Journal of Operations Management, (25:1): 65-82.

Hustad, E., and Olsen, D. H., (2014a). Educating reflective Enterprise Systems practitioners: a design research study of the iterative building of a teaching framework. Information Systems Journal, (24:5): 445-473.

Hustad, E., and Olsen, D. H., (2014b). ERP Implementation in an SME: A Failure Case. In: Information Systems for Small and Medium-sized Enterprises: State of Art of IS Research in SMEs, J. Devos, H. v. Landeghem and D. Deschoolmeester (eds.), Springer, pp. 213-228.

Kirmizi, M., and Kocaoglu, B., (2020). The key for success in enterprise information systems projects: development of a novel ERP readiness assessment method and a case study. Enterprise Information Systems, (14:1): 1-37.

Kyriakou, N., Loukis, E., and Arvanitis, S., Enterprise Systems and Innovation--An Empirical Investigation, 2016 49th Hawaii International Conference on System Sciences (HICSS), IEEE, 2016, pp. 4686-4696.

Lee, N. C., and Chang, J., (2020). Adapting ERP Systems in the Post-implementation Stage: Dynamic IT Capabilities for ERP. Pacific Asia Journal of the Association for Information Systems, (12:1): 28-59.

Loebbecke, C., Thomas, B., and Ullrich, T., (2012). Assessing Cloud readiness at Continental AG. MIS Quarterly Executive, (11:1): 11-23.

Markus, M. L., Majchrzak, A., and Gasser, L., (2002). A design theory for systems that support emergent knowledge processes. Mis Quarterly, (26:3): 179-212.

Markus, M. L., and Tanis, C., (2000). The enterprise systems experience—from adoption to success. In: Framing the Domains of IT research: Projecting the future...through the past, R. W. Zmud (ed.), Cincinatti OH, Pinaflex Educational Resources, pp. 173-207.

Melville, N., Kraemer, K., and Gurbaxani, V., (2004). Information technology and organizational performance: An integrative model of IT business value. MIS quarterly, (28:2): 283-322.

Motiwalla, L. F., and Thompson, J., (2012). Enterprise systems for management, Pearson Boston, MA.

Pohjola, M., (2002). The new economy in growth and development. Oxford Review of Economic Policy, (18:3): 380-396.

Ramaswamy, V., and Ozcan, K., (2018). What is co-creation? An interactional creation framework and its implications for value creation. Journal of Business Research, (84): 196-205.

Rashid, M. A., Hossain, L., and Patrick, J. D., (2002). The evolution of ERP systems: A historical perspective. In: Enterprise Resource Planning: Solutions and Management, F. F.-H. Nah (ed.), IGI global, pp. 35-50.

Ross, J. W., and Vitale, M. R., (2000). The ERP Revolution: Surviving vs. Thriving. Information Systems Frontiers, (2:2): 233-241.

Strong, D., and Volkoff, O., (2010). Understanding Organization-Enterprise System Fit: A Path to Theorizing the Information Technology Artifact. MIS Quarterly, (34:4): 731-756.

Svejvig, P., and Jensen, T. B., (2013). Making sense of enterprise systems in institutions: a case study of the re-implementation of an accounting system. Scandinavian J. Inf. Systems, (25:1): 3-36.

Tian, F., and Xu, S. X., (2015). How Do Enterprise Resource Planning Systems Affect Firm Risk? Post-Implementation Impact. Mis Quarterly, (39:1): 39-60.

Zadeh, A. H., Akinyemi, B. A., Jeyaraj, A., and Zolbanin, H. M., (2018). Cloud ERP Systems for Small-and-Medium Enterprises: A Case Study in the Food Industry. Journal of Cases on Information Technology (JCIT), (20:4): 53-70.

Zand, F., Enterprise Systems Adoption and Firm Performance in Europe: The Role of Innovation, The American Conference on Information Systems (AMCIS) 2010 Proceedings. 244., 2010.

138

Elragal, Haddara & Hustad:
Rejuvenating Enterprise Systems

12