# Organizational Learning and ERP Systems in the post-implementation phase: Where do we Stand? A Literature Review

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**Abstract**: ERP systems are today implemented in a great number of organizations. Research has invested much energy and time to make descriptions and recommendations regarding how the implementation should best be managed. The next step in practice as well as in research is how to continue to develop the business processes and ERP systems in order to take advantage of all their promises, and to refine how ERP systems are used in day-to-day activities. A starting point for the present study is that organizations today are characterized by strong external and internal pressure. In order to response to and deal with these, organizations strive to balance demands regarding stability and change. This implies that organizations put effort into designing and maintaining or changing practices, rules and routines. Within the general fields of organization theory and management accounting/control the ambition to create deliberate change is often conceptualized as processes of organizational learning (OL). This concept has also been used in the context of ERP systems. The research field is however heterogeneous and findings are scattered and inconsistent. There is a need for further development of our knowledge about the role of ERP systems in processes of organizational learning after the implementation phase. The present paper strives to consolidate and synthesize the current knowledge. The research question is to what extent and how do research conceptualize organizational learning and its interactions and involvement with the ERP system? The paper is a literature review of research on OL in the context of ERP systems in the post-implementation phase between the years 2005-2015. A total number of 18 research articles were identified. The aim is to analyze and classify previous research, and also to give suggestions for avenues suitable and fruitful for future research. The review compares and contrasts approaches in order to analyze similarities and dissimilarities and to investigate what topics or issues have been addressed by previous research. The analysis shows that overall there is a lack of definitions and stringency in research on OL in an ERP systems context in the post-implementation phase. The final section also forwards some suggestions for future research.

**Keywords**: ERP systems, organizational learning, stability, change, literature review

## 1. Introduction

Research on ERP systems has grown over the years. The research topics are several, as is the theoretical foundations of research. The growing numbers of research articles however make our knowledge limited as to how far our knowledge has evolved. Already several years ago research pointed out the need to focus on the post-implementation phase of the projects (for example, Botta-Genoulaz et al. 2005; Gattiker & Goodhue 2005; Shang & Seddon 2002) which is still considered to be a current research topic (Law et al. 2010). There is need of a synthesis of post-implementation research in order to establish what achievements has been accomplished so far, and what studies would need to be further carried out. The phases of an ERP project can be described in different manners, for example as the five phases of design, implementation, stabilization (also called the shake-down phase), continuous improvement, and transformation (Ross & Vitale 2000). In the current paper the three last phases are regarded as post-implementation. A starting point for the present article is that the use of an ERP system implies a continuous change process, where people interact with the technology in every day practice. At the same time the organization is exposed to strong external and internal pressure in a globalized world, which can be characterized as competitive and institutional pressures (cf. Benders et al. 2006). Due to the complexity in these pressures the deployment of an ERP system also may lead to standardization within and between organizations (ibid.). There is thus a need for organizations to balance demands regarding stability and change.

The deployment of ERP systems increases the need for organizations to adjust, to learn to do things in new ways, and even to think in a new manner (Myreteg 2007). The expected benefits of ERP systems can be located in several dimensions: operational, managerial, strategic, IT infrastructure, and organizational, where organizational learning is included as a benefit (Shang & Seddon 2002). The concept of organizational learning (OL) is based on the works of Bateson (1972) and furthered by Hedberg (1981), Argyris and Schön (1978) and Argyris (1977). OL comes about when individuals that acts as agents for the organization are involved in learning activities (Argyris 1977). The use of an ERP system need to be regarded as part of a total organizational development program in order to facilitate learning (ibid., p. 121) which corresponds to a


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holistic view of the relationship between IT and the social organizational life (ensemble view; embedded technology; Orlikowski & Iacono 2001).

The dynamic concept of OL is a possible and fruitful starting point for evaluating and synthesizing research regarding the post-implementation phase. The concept holds a broad analytical value and is used in several academic disciplines, such as organization theory and management. We need to further its application in the area of ERP systems. The question in this article is to what extent and how does research conceptualize organizational learning and its interactions and involvement with the ERP system?

The following method was adopted: The review was restricted to the period from years 2005 unto 2015. Articles published in academic journals were searched using web search facilities on the keywords enterprise resource planning and organizational learning, in IS and management research. Based on the abstracts, a further selection eliminated articles about the early phases of ERP projects. A total of 18 articles were selected and analyzed. It is difficult to find agreement on OL and its definitions. Different classifications have been developed, which in the present study are regarded to be complementary rather than exclusive. The paper is structured as follows. The sections below have the ambition to model OL, followed by an analysis and classification on previous research on OL and ERP systems in the post-implementation phase. The review compares and contrasts approaches, striving to identify similarities and dissimilarities, and to investigate what topics or issues have been addressed. Based on this analysis an assessment is made on the standings of research in the field. Conclusions are drawn, and finally some suggestions are made for future research.

## 2. The concept of organizational learning

The idea of organizations as learning systems is developed from an interest of how information processing is carried out within the organization. Early on, comparison was made with the human brain and important contributions were made by Simon and March as they challenged the assumptions made about the optimizing behavior of individuals (cf the notion of the "economic man") and concluded that individuals, and organizations, settle for good enough, and thus satisfy needs rather than optimize. Argyris and Schön (1974, 1978) and Argyris (1977) made the distinction between single-loop and double-loop learning. In a single loop, the learning is restricted to an ability to detect and correct errors in accordance to the operating norms that were previously set up (using budgets, performance reports, and deviation analyses). In double-loop learning the set objectives and basic norms need to be repeatedly challenged over time. Instead of being occupied with "keeping the course", goals and norms are reviewed and changed as needed (Argyris 1977). Many organizations' control systems are based upon the idea of single-loop learning (using budgets, performance reports, and deviation analyses). More difficult is to achieve double-loop learning, where the set objectives and basic norms need to be repeatedly challenged over time. As the situation and its conditions change the operating norms may become obsolete. Double-loop learning involves understanding this, and having an ability to detect and correct errors that are related to the design of operating norms. Instead of only being occupied with "keeping the course", the goals and norms are thus reviewed and changed as needed (Argyris & Schön 1974; 1978; Argyris, 1977).

Another approach to organizational learning can be found in organizational research and the concept of organizational memory (e.g. Stein 1995, Stein & Zwass 1995, Walsh & Ungson 1991, Wang 1999). Here, what people learn is collected and saved within a storage device (i.e. the ERP system; cf. Wang 1999) in the organization; the organizational memory. This notion resembles of how Morgan (2006) uses the brain metaphor to discuss learning: the image of the organization as a brain may help us explain how the same process can combine logical reduction and creative expansiveness, or use a parallel high degree of specialization and distributed function. By the use of IT, such as ERP systems, we may process vast amounts of data that is needed in large and complex organizations, and the uncertainty of tasks may be reduced. The concept of OL has found its way into IS research (see for example Martins & Kambil 1999, Robey & Newman 1996, Salaway 1987).

## 3. Organizational learning in previous studies

Robey et al. (2000) carried out an early review of OL in IS research. They found research either be occupied with OL *about* IT, or with IT designed to *support* OL in practice. With the first is meant studies that investigate the implementation and use of IT itself as learning. Here, studies are occupied with questions regarding the role of experience, how to overcome knowledge barriers, and the dynamics of learning (Robey et al 2000:

 

128). The other group consists of studies that are concerned with how to design and use IT to achieve learning. Here, IT can be the enabler or a disabler of OL while it supports (or not) organizational memory, communication and discourse (Robey et al 2000: 128). It is thus of interest to separate research into two tracks: one who considers how actors get to learn how to use ERP systems, and another who investigates how ERP systems may be used to support learning. As previously mentioned, the expected benefits of ERP systems may occur in different aspects. Shang and Seddon (2002) distinguish between five groups of expected benefits of ERP systems: operational (tangible benefits linked to business value chain processes and end-results, such as quality), managerial (intangible benefits regarding resource management, planning and decision-making), strategic (mostly intangible issues related to business expansion, product and marketing competition), IT infrastructure (tangible as IT costs, indirect support for business changes), and organizational (mostly intangible benefits linked to work patterns, individual attitudes, interpersonal relations, facilitating OL, empowerment, and common vision). The present article makes use of these to identify what topics the reviewed articles are concerned with. The analysis spurred the need for a sixth group to be added: fit. With fit is meant a fit between the ERP system and the internal environment (the processes) or the external environment of the organization. Studies with this topic not so much investigated the benefits of ERP systems as of how ERP assimilation could be facilitated.

OL as a field can be sorted into different streams. One method of classifying OL research is to separate it by its conclusions into three groups (Dodgson 1993): i) the goals of learning (outcomes), ii) learning as a process or iii) the ways in which learning may be facilitated and impeded. According to a similar classification by Bapuji and Crossan the difference between studying the process of learning (ii) and studying the facilitators of learning (iii) is a difference in perspective. In the present study articles have been classified as a study of OL as a process if the learning was regarded as carried out over time, for example through interaction between different actors, or if the researcher investigated different learning strategies. If the reviewed article tested different types of factor models to investigate what factors were important or not for learning to occur it was classified to the group where facilitators and impediments are regarded as critical (OL as CSF).

Another classification of previous research was made by Lähteenmäki et al (2001). They examined OL research from a critical perspective with the aim to reveal knowledge gaps. They are very critical to the poor achievements in the field. They found that OL conceptualizations were vague, and that very little empirical research had been done. Bapuji and Crossan (2004) however note that empirical OL research has increased, and also judge that the field is maturing. An explanation to, and somewhat a support of, Lähteenmäki et al.'s critical judgment of OL research is given by the review of Shipton (2006). She claims that research with a prescriptive stance towards learning takes as a starting point that there *is* a positive relationship between learning and firm performance. When Lähteenmäki et al (2001) critically judge earlier research one understanding of this is that they observe, and react upon, this untested positive relationship within prescriptive research. In a critical research vein it would be suitable also to challenge the assumption that OL will lead to benefits; compare this to Argyris' (1977) difficulties to give recommendations of how to overcome the problems regarding how to design a management information system that stimulates learning, and especially a double-loop learning (ibid. p. 121). Shipton further confirms Lähteenmäki et al.'s estimation that there is a lack of empirical testing within this area of research (Shipton, 2006). The present article will in the review of the selected articles investigate whether they use an empirical material for the analysis or not.

The model developed by Shipton (2006) describes research approaches on a continuum from prescriptive/normative to explanatory/descriptive. Combined with the dimension individual or organizational learning, Shipton creates four areas of research with different key features (figure 1). Quadrant 1 represents an idealized view of learning. The other quadrants includes research that is, more or less, critical to the idealized vision. In quadrants 1 and 2 research deals with the anticipated outcomes by learning and with how to transfer learning from individuals to the organization. In quadrant 3 research focuses on identifying changes rather than the outcomes of learning. According to Shipton this perspective is especially concerned with dysfunctional aspects and less than optimum results by learning; these researchers regard learning as an imperfect process (Shipton 2006). In quadrant 4 research is descriptive, which difficulties to draw general conclusions and few practical implications (Shipton 2006).

In her article she describes the model as based on a "continuum". This means that a study can be more or less clearly positioned within a certain quadrant. The present article uses this framework, and the model displays four different positions (figure 1). The reader should thus keep in mind that the boundaries between the

positions are not as strict as the boxes may imply; the four areas are based on a continuum. Difficulties that was encountered in the present analysis was in some instances to separate between the normative and the explanatory perspective. It is possible for research to show traits of both. When conclusions were stated as that the "ERP must be managed" or that an effective ERP assimilation "requires" the organization to act in a specific manner (see Mu et al 2015: 366), or that it is "crucial to --- measure and maximise the ERP impact" (Chang & Chou 2011: 257) the research was classified as normative---even if it also showed signs of explanatory ambitions.

Another difficulty to classify the selected studies was to separate between an individual or an organizational level of learning. Often the research design forces the researcher to collect data on an individual level; for example by sending out questionnaires to a number of respondents. In the present analysis the choice was made to decide the level of analysis based on the discussion and conclusion sections and not on the mode for data collection. Thus, when an article discusses "human agency", "social actors", "individuals", "user", and "users" (see for example Boudreau & Robey 2005; Nwankpa & Roumani, 2014) it was classified as dealing with learning on an individual level. If the article referred to "groups" or "networks" (such as van Fenema et al 2007), or a specific department (for example the IT function; Mu et al 2015) it was marked as treating learning on an organizational level. If discussion and conclusions were made regarding both individuals and groups (see for example Wagner & Newell 2007), or concerns the relationship between managers and users (Boudreau & Seligman 2005), the present analysis has marked the study as taking an interest in organizational level learning.

| | |
|---|---|
| Quadrant 1<br>The prescriptive perspective<br>Individual learning | Quadrant 2<br>The normative perspective<br>Organizational learning |
| Quadrant 4<br>The descriptive perspective<br>Individual learning | Quadrant 3<br>The explanatory perspective<br>Organizational learning |

**Figure 1:** OL research as four different areas (based on Shipton 2006)

The present study includes the following aspects in the review process: **topic** (six dimensions of benefits with ERP systems), **method** (theoretical, survey, field or case study), **research approach** (prescriptive, normative, explanatory or descriptive), **relationship between ERP and OL** (how users learn about the ERP system, or how ERP can support learning), **level of learning** (individual or organizational learning), and **view of learning** (OL as a process, as related to critical success factors (CSF), or OL as an effect of using ERP).

## 4. Advances so far: Organizational learning and ERP systems

Research on IT and OL is a growing field, which only some years ago was described as being in its early history (Robey et al 2000). Since ERP systems today are very commonly used in organizations of all sizes, it is important that we increase our knowledge on every aspect of how these systems are used within organizations. In a previous review of articles treating the selection, implementation and use of ERP systems OL as a theoretical concept was found to be little used (Myreteg 2009).

### 4.1 Classification of research on OL and ERP systems in the post-implementation phase

The literature about ERP and OL in the post-implementation phase is heterogeneous (table 1). 12 treated the relationship between OL and ERP as an issue on group, network, or organizational level of how actors learn how to use ERP (6 kept the discussion on an individual level). Only three studied how ERP systems can be used to support OL. Two of these were empirical, one was theoretical. This is an imbalanced state; research neglects issues concerning how information technology may support OL.

Six articles defined learning as a process, and nine viewed learning as a CSF. Only three studied the implication the ERP system had on OL. Of these, only one took an interest in how ERP, by supporting learning, gave benefits to business operations. The other two studied organizational benefits. Almost all of the identified articles were empirical studies: only two were theoretical. Of the rest, six were case studies (one or several cases), two were field studies, and eight were surveys.

 

The complete set of articles were analyzed to reveal patterns or trends that could show development of the research area over time (change of interest regarding topic, definition of OL, choice of method, *et cetera*). Two such patterns were possible to spot (table 2). Due to the small number of total articles it is impossible to confirm or corroborate that the patterns reveal a trend, however it is an interesting observation that should be noticed. One pattern is that case and field studies as methods dominated research between the years 2005-2010, while the survey has dominated the last five years of the literature review (N.B.: by the time of writing the year 2015 has not come to an end). The second pattern concerns the view of OL. Research that regards learning as a process or as an effect of the ERP use were carried out in the years 2005-2010. From 2011 and onwards, OL was treated as a CSF in order for OL to come about.

**Table 1:** Analysis of ERP and OL research in the post-implementation phase during 2005 - 2015

| | | | | Relationship ERP-OL *and* level of learning | | View of OL | | |
|---|---|---|---|---|---|---|---|---|
| Author/-s and year | Topic | Method | Research approach | Learn ERP | ERP to learn | process | CSF | effect |
| Boudreau & Robey 2005 | ORGANIZ. | CASE | EXPLANATORY | INDIVID | | X | | |
| van Fenema et al 2007 | ORGANIZ. | CASE | DESCRIPTIVE | ORG | | X | | |
| Graville & Compeau 2008 | ORGANIZ. | FIELD | NORMATIVE | INDIVID | | X | | |
| Wagner & Newell 2007 | ORGANIZ. | CASE | EXPLANATORY | ORG | | X | | |
| Boudreau & Seligman 2005 | ORGANIZ. | CASE | EXPLANATORY | ORG | | X | | |
| Ettlie et al 2005 | ORGANIZ. | SURVEY | EXPLANATORY | ORG | | X | | |
| Wang et al 2007 | FIT | SURVEY | NORMATIVE | ORG | | | X | |
| Saraf et al 2013 | FIT | SURVEY | EXPLANATORY | ORG | | | X | |
| Mu et al 2015 | FIT | SURVEY | NORMATIVE | ORG | | | X | |
| Chang & Chou 2011 | ORGANIZ. | SURVEY | NORMATIVE | INDIVID | | | X | |
| Wang et al 2006 | ORGANIZ. | SURVEY | EXPLANATORY | ORG | | | X | |
| Chou et al 2014 | ORGANIZ | SURVEY | EXPLANATORY | INDIVID | | | X | |
| Nwankpa & Roumani 2014 | ORGANIZ | SURVEY | EXPLANATORY | INDIVID | | | X | |
| Chen et al 2009 | MAN. | CASE | EXPLANATORY | ORG | | | X | |
| Wang & Ramiller 2009 | IT-infrastr. | FIELD | EXPLANATORY | ORG | | | X | |
| Ryu et al 2005 | ORGANIZ. | THEOR | NORMATIVE | | INDIVID | | | X |
| Cotteleer & Bendoly 2006 | OPERAT. | CASE | EXPLANATORY | | ORG | | | X |
| Tomblin 2010 | ORGANIZ. | THEOR | EXPLANATORY | | ORG | | | X |

## 4.2 Illustration of the reviewed research by research approach

In the present review, no article was prescriptive research but as many as five were normative (figure 2). Within quadrants 3 and 4 there are a great variety of research approaches (figure 3). Case studies are found in both. Only one article was considered more of a descriptive kind. The biggest share of articles is found in quadrant 3, where researchers explain OL as a problematic process or explain the importance of factors involved in learning. Researchers seem to have listened to the previous calls for more explanatory research about OL as a process (i.e. Robey et al 2002). That this research would be especially concerned with dysfunctional aspects, which Shipton (2006) claims, is however not supported by the present analysis.

**Table 2:** Analysis of articles in order to investigate possible trends over time during 2005-2015

| Period | Author/-s | Year | Method | View of OL | | |
|---|---|---|---|---|---|---|
| | | | | process | CSF | effect |
| 2005 - 2010 | Boudreau & Robey | 2005 | *CASE* | X | | |
| | Boudreau & Seligman | 2005 | *CASE* | X | | |
| | Ettlie et al | 2005 | SURVEY | X | | |
| | Ryu et al | 2005 | THEORETIC | | | X |
| | Wang et al | 2006 | SURVEY | | X | |
| | Cotteleer & Bendoly | 2006 | *CASE* | | | X |
| | van Fenema et al | 2007 | *CASE* | X | | |
| | Wagner & Newell | 2007 | *CASE* | X | | |
| | Wang et al | 2007 | SURVEY | | X | |
| | Graville & Compeau | 2008 | *FIELD* | X | | |
| | Chen et al | 2009 | *CASE* | | X | |
| | Wang & Ramiller | 2009 | *FIELD* | | X | |
| | Tomblin | 2010 | THEORETIC | | | X |
| 2011 - 2015 | Chang & Chou | 2011 | SURVEY | | X | |
| | Saraf et al | 2013 | SURVEY | | X | |
| | Chou et al | 2014 | SURVEY | | X | |
| | Nwankpa & Roumani | 2014 | SURVEY | | X | |
| | Mu et al | 2015 | SURVEY | | X | |

| Quadrant 1 | Quadrant 2 |
|---|---|
| The prescriptive perspective | The normative perspective |
| | Ryu et al 2005 T<br>(three different learning processes) |
| | Wang et al 2007 S<br>(learning as a knowledge transfer) |
| | Graville & Compeau 2008 F<br>(software training, learning strategies) |
| | Chang & Chou 2011 S<br>(learning is a critical factor) |
| | Mu et al 2015 S<br>(learning as requirement for ERP assimilation) |

**C:** case study
**F:** field study
**S:** survey
**T:** theoretical study

**Figure 2:** Classification of ERP and OL research in full text during 2005 – 2013, based on research perspective: the prescriptive and the normative perspectives.

 

| Quadrant 4 | Quadrant 3 |
|---|---|
| The descriptive perspective | The explanatory perspective |
| van Fenema et al 2007 C<br>(necessitates OL, learning increase) | Boudreau & Robey 2005 C<br>(improvised learning) |
| | Boudreau & Seligman 2005 C<br>(quality of use) |
| | Ettlie et al 2005 S<br>(strategic predictors) |
| | Wang et al 2006 S<br>(knowledge transfer, fit) |
| | Cotteleer & Bendoly 2006 C<br>(order lead-time improvement) |
| | Wagner & Newell 2007 C<br>(participation, post-implementation) |
| | Chen et al 2009 C<br>(project management) |
| | Wang & Ramiller 2009 F<br>(innovation, community) |
| | Tomblin 2010 T<br>(theory development) |
| | Saraf et al 2013 S<br>(absorptive capacity) |
| | Chou et al 2014 S<br>(post-training self-efficacy needed) |
| | Nwankpa & Roumani 2014..... S<br>(learning as a capability; user satisfaction) |

**C:** case study
**F:** field study
**S:** survey
**T:** theoretical study

**Figure 3:** Classification of ERP and OL research in full text during 2005 – 2013, based on research perspective: the descriptive and the explanatory perspectives.

## 5. Conclusion and issues for future research

The present article investigated research on OL in the context of ERP systems in the post-implementation phase. The aim was to analyze and classify previous research compare and contrast approaches in order to analyze similarities and dissimilarities and to investigate what topics or issues have been addressed by previous research. A framework for the analysis was constructed based on research on OL in the organization and management fields. 18 research articles were identified and reviewed. They were classified based on what topics were addressed, what methods were used, view of OL, how they constructed the relationship between OL and ERP system, level of analysis, and research approach. The analysis shows great variety in research and the overall impression is a lack of definitions and stringency in the field.

Topics varied from some focusing on management activity, IT-infrastructure, and operational effects, or the importance of fit between ERP and institutional pressures. Mostly they addressed organizational benefits of different kinds (i.e. individual attitudes, interpersonal relations, participation, general use, reinvention, avoidance, and resistance). The vast majority of the identified articles treated the relationship between OL and ERP as how users learn to use ERP, and disregarded how ERP can support OL. A conclusion is that it is truly problematic that we lack research concerning ERP as a support for OL. There is a heavy dominance of studies concerning how to use the ERP system itself, rather than investigating how IT can support learning processes that could have operational, managerial, strategic or organizational benefits. For the promised benefits of ERP

systems to be realized in practice we need to know more about how organizations can use them to support how to work and think in a new manner.

Two patterns over time were spotted: (1) a shift from the use of case or field studies to the use of survey as choice of research method, and (2) a shift from regarding OL as a process or as an effect of ERP system use to regarding OL as a CSF. The two patterns are possibly related: the use of survey as a method give foremost a snapshot imagery of actors and/or the organization---which makes it more appropriate to investigate OL as a CSF rather than to view it as a process. Survey data will be difficult to use in order to say anything about development over time (OL as a process). Because of the small number of articles, it is however difficult to corroborate that the observed patterns represent an actual trend.

The current article suggests future research to better state the topic under investigation: to avoid treating organizational benefits as unspecified, intangible benefits related to attitudes and general usage, and to particularly focus on managerial issues (such as resource management, planning and decision-making) and operational benefits (tangible benefits linked to business value chain processes and end results; quality). This together with the study of how ERP can support OL will make a fruitful avenue for future research. Bapuji and Crossan (2004) and Shipton (2006) concluded that empirical OL research has increased, which is supported by the present study: only two articles were theoretical and the rest used empirical material in some form for the analysis. This would mean that the situation is not as dark as Lähteenmäki et al (2001) feared it to be when they found that very little empirical work had been done.

Previous research has suggested that research should regard OL as a process and disregard critical success factors (Robey et al 2002). Of the reviewed articles six regarded OL as a process, and nine studied CSF. As was previously mentioned, to sort the articles on publishing year further revealed a pattern of that the view of OL as a CSF for OL to occur also is the dominating view from year 2011 up to now. Considering the suggestion made by Robey et al, the development of the research field would benefit if more research applied the view of OL as a process. Furthermore, few of the articles that regarded OL as a process succeeded in illustrating explicitly the relationship between OL and the ERP system. Mostly they discussed learning as an increased understanding of ERP systems. There is still a general lack of precision in accounts of who, when, how and what was learnt, and the role of the ERP system in this. In line with previous calls for research, the present analysis revealed that the majority of research was explanatory. However, the question still remains whether these articles explain the phenomena that are most important for us to understand in order to make sure the promised benefits of ERP systems are realized. The complexity of the ERP system and how that can be understood, how the artifact functions or interplays with the organization and the organizing process, is seldom discussed in greater detail. This can be compared to that Orlikowski and Iacono (2001) showed that studies of IT in organizations seldom make use of what they call the ensemble view, where the IT system is regarded to be developed and used in a complex, dynamic context. They suggested that more research should apply the ensemble view, which is what the present study also states. If learning in organizations, at least partially, depends on the use of enabling technologies (Robey et al 2000), it would be a worthwhile effort to analyze more closely how, when and why an ERP system can be used in this respect.

Further, few of the reviewed articles defined OL as an effect of the use of ERP systems, that is: focused on the role the ERP system played in the organization for its learning. A conclusion is that in order to investigate and reach a full understanding of ERP systems and their role in organizations, it is important that we set our mind at having them play an important role in processes of learning. If research assumes that ERP *contains* a structure that the user must apply, and that there is a "right" or "wrong" way to use the system (cf. Orlikowski & Robey 1991), this means it is sufficient that users learn to use ERP in a "proper way" to have desired results. If research however considers the ERP system to be an artefact that emanates in and is enacted by the actual usage – that is: the system does not contain structures, but users interact with the system and thus *invent and create* its possibilities and embed it into the socio-economic reality of the organization (Orlikowski & Iacono 2001) – it is important that research acknowledges that users and the organization hold the keys to how ERP systems should be designed and used in the specific situation in order to achieve and support OL. Then it is not enough to focus on getting users to learn "how to use the system", the issue of achieving OL – and especially double-loop learning – runs deeper than that. The definition of the ERP system as an artifact is thus of great importance, just as Orlikowski and Iacono (2001) argues, and needs to receive more attention in future research.

 

Finally, an observation should be made of the difficulty of carrying out the classification of the investigated articles. The borderlines between the four perspectives, for example, are not obvious. Shipton's (2006) framework is not unambiguous and could be improved. The interpretation of whether the level of analysis is at the individual or at a group or organizational level is difficult to make; organizational learning deals with a situation when individuals acts as agents for the organization and are involved in learning activities (Argyris 1977). This is also one of the strongest critiques to the concept of OL that it is problematic to talk about an organization learning when it is *de facto* the individuals belonging to the organization that learn (see for example Huber 1991). If a broad definition of OL is selected this would imply that all articles that analyze individuals as members of an organization (as separated from individuals as private persons) are investigating learning at an organizational level. Thus, the distinction in the present article between organizational and individual analysis should be regarded as suggestive.

To sum up, the review of research in the field of OL and ERP systems in the post-implementation phase shows a need for further research. It is of great importance that research defines what is meant by OL and how the ERP artifact is defined. Analyses should be more explicitly engaged with the relationship of how ERP systems may support OL, especially focusing on areas of ERP benefits such as operational, managerial, strategic, and organizational benefits. These benefits need to be well defined so that research may contribute with specific theoretical knowledge as well as practically relevant and realizable knowledge. Questions of what role or function ERP systems may or should have in the OL process has so far not been advanced in research. Future research need to be more specific regarding what OL involves. As long ago as 1991 Huber noted the lack of cumulative work and lack of synthesis of work from different research groups in the area of organizational learning. It seems much remains to be done in research in order to correct these deficiencies.

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