An analysis of the “project” misalignment risk in ERP projects

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Abstract: ERP (Enterprise Resource Planning) systems are integrated software packages offering a standard solution, which must be adapted and customized to the needs of a company. A consistent alignment between the company and the ERP system influences the success of an ERP project. Decision-makers have thus to be guided in order to conduct and manage this alignment. In this paper, we define and analyse what we call the ‘misalignment risk’ in order to have a better vision of this alignment problem. Our analysis allows (1) highlighting the links that exist between this risk and the other ones; (2) setting the related risk factors in the ERP project lifecycle, and (3) underlining the links between risk categories particularly the “project” misalignment risk and risk factors.

Keywords: Information systems, Enterprise integration, ERP, Risk analysis, Business alignment

1. INTRODUCTION

ERP (Enterprise Resource Planning) systems are off-the-shelf software products used to improve the efficiencies of companies’ financial and human capital, as well as their material and operational processes. The literature dealing with ERP project management links a project success to cost objective, time objective and quality of the product objective (Aloini et al., 2007). The time objective refers to the amount of time available to complete a project. The cost one refers to the resources available for the project including the budget, the project team members and so on. The product objective refers to what must be done to produce the project’s end-result. As ERP systems offer a pre-defined solution, it has to be customized to fulfil the requirements of the company. The objective of this customization is reached when a consistent alignment between the implemented solution and the company’s needs is obtained. The alignment between the deployed ERP system and the Enterprise is one of the most critical issues that influence the success of an ERP (Botta-Genoulaz et al., 2006; Buckhout et al., 1999; Davenport, 1998); that is the reason why we particularly focus on it.

In this context, decision-making tools remain crucial for project managers in order to master this alignment and to act before a misalignment occurs. The question is how to manage and to ensure a consistent alignment?

Therefore, we propose to define what we call the “misalignment risk” in order to have a better control on the misalignment problem. A “project risk” is the probability of the occurrence of an event that has negative effects on the objectives of the project (Boehm, 1991; Hall et al., 2002; Kendrick, 2003; Project Management Institute, 2008; Wiegers, 1998). The “project” misalignment risk is the risk that the real requirements of the company are not satisfied by the implemented ERP system, and/or that the company’s business processes are badly supported by the customized system. The requirements of the company are linked to business processes to be put under control, and take place at different levels: organizational, informational, and functional. The needs are not satisfied when (1) the implemented business processes do not correspond to the wished one, either for the sequencing of the activities or about people who are involved in the activities (organizational and functional levels), and also at the level of data used or impacted by the processes (informational level); (2) the degree of integration, that is to say the way the processes have been put under control, is not reached. Moreover, sometimes, a company may fail in expressing its accurate requirements.

This paper presents an analysis of the “project” misalignment risk, which is a prerequisite to its management. Considering this objective, the previous definition is only a first step: our analysis proposes to set this particular risk in its links with other project risks and their related risk factors. Therefore, it is because it cannot be considered as independent from other risks, we first describe the links existing between the “project” misalignment risk and the other ERP project risks. Moreover, risk management is generally based on the identification of the related risk factors; since a risk factor constitutes the circumstances that activate the event influencing a risk (Barki et al., 1993; Bourdeau et al., 2003; Ravalison, 2006). So, the rest of our analysis works out a risk factor typology and the potential links between the “project” misalignment risk and its related risk factors.

The paper is organised as follows. Section 2 studies the importance of the “project” misalignment risk in the scientific literature. Section 3 presents the results of our analysis by highlighting first the links between “project” misalignment risk and other risks, and then those with the
related risk factors. Finally, we conclude and give some research perspectives in Section 4.

2. THE “PROJECT” MISALIGNMENT RISK IN THE LITERATURE

ERP systems offer a generic solution, which has to be aligned to the specific requirements of a company. An effective management of the “project” misalignment risk in the early stages of the ERP project lifecycle is necessary to ensure a consistent fit between the ERP system and the company’s requirements. Otherwise, if a misalignment occurs, it can impact the company’s performance and even leads to its bankruptcy. (Davenport, 1998) has reported some examples of well-known companies’ bankruptcies like Fox Meyer Drug, Dell Computer or Dow chemical. The main problem, during their ERP project, was linked to a bad management of the alignment. Indeed, they failed in managing the gap between their specific needs and the generic processes the ERP system provided. To avoid this situation, the alignment must be worked out efficiently during the ERP project lifecycle. Several visions of this lifecycle are available in the literature. There are, for example, the ASAP Roadmap (SAP AG, 1999) decomposing the ERP lifecycle in five phases or the ones of (Esteves, 1999; Quellenec, 2007) both providing a six phases lifecycle. We particularly focus on the three-phase proposition of (Aloini et al., 2007; Kumar et al., 2003): pre-implementation, implementation and post-implementation. It is during the post-implementation stage that the consequences of a bad management of the “project” misalignment risk occurs and can be observed. The management of the misalignment risk must be done during the two first phases.

Managing the “project” misalignment risk during the ERP project lifecycle is a key task to ensure a successful project. First of all, in order to be able to propose suitable management tools, it requires a consistent understanding of this risk.

In section 2.1 we focus on the place granted to this risk among the existing IS and ERP projects risk categories proposed in the literature. The related risk factors are studied in section 2.2.

2.1 Place of the “project” misalignment risk in the literature

Numbers of authors have studied risks and successes in IS and ERP projects, and several risk and success categories have been proposed. By making a synthesis of the propositions of (Aloini et al., 2007; Barki et al., 1993; Bourdeau et al., 2003; Bradford et al., 2003; Bradley, 2008; Kyung-Kwon et al., 2002; Tiwana et al., 2006; Tsai et al., 2009; Weiling et al., 2008), the “project” risk categories are:

- R1: Risk of stopping the project;
- R2: Risk of overtaking the deadline;
- R3: Risk of exceeding the budget;
- R4: Risk of implementing a system that not respects the required performance (in terms of reliability, stability, etc.);
- R5: Risks that the degree of integration wished is not reached;
- R6: Risk that the implemented processes do not fit those required by the company;
- R7: Risk that the end-users fails to use the implemented ERP system.

By definition, the R4, R5 and R6 categories are those related to the “project” misalignment risk. However, they are not identified as such. The “project” misalignment risk is decomposed and merged with all other risk components of ERP and IS projects. This is harmful because risk categories are defined as independently from each other. Moreover, most of the above-mentioned authors have a global vision of the effects of the related risk factors. Indeed, they consider that all the risk factors lead to the project failure in general. Only (Tiwana et al., 2006) make a list of six risk factors that have a negative effect on the translation of the company’s knowledge into software code. This study focuses on the role of these factors on the perceived overall project risk. We propose to deepen this approach for the “project” misalignment risk by focusing on the related ERP risk factors.

2.2 Risk factors in ERP projects

We analyse in this sub-section the literature dealing with risk factors. Because of the great number of papers proposing ERP risk or success factors lists, we decide to unify the vocabulary by proposing our own risk factors list. It is based on the propositions of (Aloini et al., 2007; Huang et al., 2004; Law et al., 2010; Somers et al., 2001; Taylor, 2005). As the risk factors are set up in various manners (interview of IT providers and managers, review of the literature and so on), it enables to collect several, complementary points of views. Our list has been completed thanks to returns of experiments in ERP projects (Botta-Genoulaz et al., 2005; Botta-Genoulaz et al., 2006). On this basis, 21 risk factors have been listed (see Fig. 1). This list provides a comprehensive picture of the risk factors in ERP projects.

In our risk management context, the link between risk factors and the stages of the ERP project lifecycle in which they must be managed is important. So We focus on the lists proposed by (Aloini et al., 2007) and (Somers et al., 2001). The former, as specified in the section 2, identifies three main phases in the ERP project lifecycle. The authors classify the ten most important risk factors into the corresponding phases. They consider the importance of a risk factor according to its occurrence in the literature. The latter identifies six stages (the two first ones, two following ones and two last ones are related respectively to the pre-implementation, implementation and post-implementation phases according to (Aloini et al., 2007) vocabulary) and makes the list of the five most important success factors at each stage. We have studied (Somers et al., 2001) by turning those success factors into risk factors. An analysis of these two classifications enables to draw some conclusions about risk factors:

Firstly, we notice that the most important risk factors occur at the beginning of the project. Indeed, seven of the ten success
factors proposed by (Aloini et al., 2007) are classified in the first phase before the software selection and there are no factors in the last phase. Besides, the most important risk factors are mainly related to some important decisions and to the necessity to make, early in the project, the right choices. Indeed, “inadequate ERP selection”, “ineffective strategic thinking and planning strategy”, “wrong architecture choices” and “inadequate BPR (Business Project Reengineering)" are all classified in the pre-implementation phase by the two authors.

Secondly, factors related to project team and end-users’ skills, trust and motivation run through the entire ERP project lifecycle. They are all influenced by the way the management is conducted during the ERP project. Indeed, five of the ten factors proposed by (Aloini et al., 2007) are related to this notion (“bad management conduction”, “low top management involvement”, “ineffective project management techniques”, “inadequate change management” and “inadequate training and instruction”), and are classified all along the project lifecycle. In the same way, “top management support”, “interdepartmental communication” and “interdepartmental cooperation” are classified in at least four stages of the six stages proposed by (Somers et al., 2001).

2.3 Synthesis

As a result of this literature analysis about the “project” misalignment risk, it can be firstly noticed that it is not sufficiently highlighted with regard to the other risk categories of an ERP project. Moreover, few authors underline the various links that exist between this risk and the others risk categories. The cause and effect relations that exist between risk categories are not highlighted in the literature. Risks are often presented as independent (Kajko-Mattsson et al., 2008). We identify from the literature review 3 main risks that compose the “project” misalignment risk. It is merges it with the other risk categories.

In addition, most of the authors do not distinguish risk and risk factors as they all lead to the project failure. Those that make a link, assign one risk factor to one risk, whereas one risk factor can affect several risk categories. Moreover, the literature review on ERP risks factors shows that there are two kinds of factors: these related to a specific stage of the ERP project lifecycle and the transversal ones. This implies at least two different ways to treat them. However, the kind of risk factors and their mutual influences remain unexploited in the ERP risk management literature.

We propose in the next section an analysis of the “project” misalignment risk and its related risk factors.

3. ANALYSIS OF THE “PROJECT” MISALIGNMENT RISK:

The aim of our analysis is to provide a wide picture of the “project” misalignment risk to help the decision-makers considering it. In particular: (1) it defines this risk with regard to the other risk categories in ERP projects; (2) it reorganizes the related risk factors according to the ERP project lifecycle stages in which they occur; and (3), it underlines the relationships between risk categories and risk factors.

The three next sub-sections present the three aspects of our analysis.

3.1 The links between the “project” misalignment risk and the other project risks

This sub-section aims at setting the “project” misalignment risk back in the context of the various risks in an ERP project. The risk categories list quoted in Section 2.1 is reused.

It is proposed to exploit the (ISO/IEC Guide 73:2002 (E/F), 2002) standard to detail the links also call the consequential links between the various risk categories. This standard defines the “project risk” and “residual risk” notions. The first notion corresponds to the risk affecting the objectives of a project. The second one deals with the risk resulting from the treatment of the “project risk”. Based on these notions the “project” misalignment risk can be described, towards the other risk categories, as follows:

- The “project” misalignment risk is the residual risk of other project risks. Indeed, for example, the budget and planning are set at the beginning of the project in order to control the R2 and R3 risks (overtaking of the deadline and exceeding of the budget). However, this treatment influences the way the processes will be implemented (degree of customisation...), the duration of the implementation, the number of implemented modules and so on. Thus, R4, R5 and R6 risks (the implemented system does not respect the required performance, the degree of integration whished is not reached, the implemented processes do not fit those required by the company) are influenced by the treatment of R2 and R3 risks. They are residual risks of R2 and R3.

- The “project” misalignment risk has some residual risks. The above-mentioned links can be reversed. For example, the treatment of R4, R5 and R6 risks has an impact on the budget and the planning. In this context, R2 and R3 risks are residual risks of R4, R5 and R6. In the same idea, R7 risk (the end-users fail to use the implemented ERP system) can be one of the residual risk of the “project” misalignment risk. Indeed, the decisions made to treat the “project” misalignment risk (taking into account the as-is business processes, redefining the whished business processes to fit the ERP system, adapting the ERP system to fit the business processes and so on) have an impact on the new organization, which defines the new way the end-users have to work. Thus, if this new organization is too different from the as-is one, the probability that the end-users fail to use the new ERP system will increases.
The “project” misalignment risk cannot be considered as an individual component. Its treatment is influenced by the decisions taken to treat the risks from which it is the residues and influences its residual risks.

3.2 Risk factors and ERP project lifecycle

This sub-section describes the second aspect of our analysis and aims at setting the risk factors back in the ERP project lifecycle. This enables to highlight the way they have to be managed (all along the project lifecycle or at some particular stages). We reuse the risk factors list defined in the section 2.2 and the three-phase ERP project lifecycle defined in the introduction of section 2. Some risk factors can be associated to one of these phases, as they have to be managed at this specific phase; they are called “vertical risk factors” and are quoted VRx in Fig. 1. Others have to be managed all along the project lifecycle; they are called “horizontal risk factors” and are quoted HRx in Fig. 1.

During the project lifecycle, nine horizontal risk factors (HRF1 to HR9) have to be managed all along the project lifecycle in parallel to the twelve vertical ones (VR1 to VR12). The horizontal risk factors concern mostly the skills of the project team including external and internal consultants, key users and the project leader. They are also linked to communication and management problems. Vertical ones concern some isolated activities occurring at specific phases of the project lifecycle like the establishment of the goals and the planning, or the choice of the package, which occurs during the pre-implementation phase.

**Fig. 1. Risk factors in the ERP project lifecycle**

3.3 Links between the “project” misalignment risk and the related risk factors

This sub-section describes the third aspect of our analysis and aims at linking the “project” misalignment risk to its related risk factors. We particularly focus on the risk factors that have to be managed in order to treat (1) the “project” misalignment risk, (2) the risks from which it is a residual risk and (3) its residual risks. Some risk factors are common to the treatment of those three kinds of risk. We do not represent the risk of stopping the project because it is not a risk influencing the alignment one. Tables 1 and 2 highlight those links respectively for the horizontal and vertical risk factors.

In Tables 1 and 2, the columns correspond to the risk factors, respectively HRFx and VRFx. The lines represent the risks (Rx), pooled in three groups: (i) risks that can be either residual of the “project” misalignment risk or from which the “project” misalignment risk can be a residue; (ii) risks corresponding to the “project” misalignment risk, and (iii) risks that are the residues of the “project” misalignment risk.
A double x (xx) in a Table cell means that a link exists and has been identified in the literature. A simple x (x) indicates that a link potentially exists and has to be validated. An empty cell means that there is no links. We assume that this is a first version that has to be validated further.

Table 1 shows that the “project” misalignment risk, like the other ones, are influenced by the way the project team – including the project leader, consultants and key-users – are involved in the project and work together (HRF1 to HRF6). Indeed, they take important decisions all along the project lifecycle. Moreover, few risk factors (HRF7, VRF4, VRF10, and VRF11) are common to the “project” misalignment risk and the risk that the end-users fail to use the ERP system (R7).

### Table 1. Links between the “project” misalignment risk and the horizontal risk factors

<table>
<thead>
<tr>
<th>Residual risk of the MR/ risk from which the MR is residual</th>
<th>HRF1</th>
<th>HRF2</th>
<th>HRF3</th>
<th>HRF4</th>
<th>HRF5</th>
<th>HRF6</th>
<th>HRF7</th>
<th>HRF8</th>
<th>HRF9</th>
</tr>
</thead>
<tbody>
<tr>
<td>“project” Misalignment risk (MR)</td>
<td>R2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Residual risk of the MR</td>
<td>R4, 6</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td>X</td>
<td>XX</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2. Links between the “project” misalignment risk and the vertical risk factors

<table>
<thead>
<tr>
<th>Residual risk of the MR/ risk from which the MR is residual</th>
<th>VRF 1</th>
<th>VRF 2</th>
<th>VRF 3</th>
<th>VRF 4</th>
<th>VRF 5</th>
<th>VRF 6</th>
<th>VRF 7</th>
<th>VRF 8</th>
<th>VRF 9</th>
<th>VRF 10</th>
<th>VRF 11</th>
<th>VRF 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>“project” Misalignment risk (MR)</td>
<td>R2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>R3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Residual risk of the MR</td>
<td>R4, 6</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>XX</td>
<td>X</td>
<td>XX</td>
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</tr>
</tbody>
</table>

x: proposed link, to be validated  xx: link emphasized in the literature

As the project “project” risk and the risk that the end-users fail to use the ERP system (R7) seem independent, one can, during the implementation phase, take decisions and manage the alignment risk factors without taking into account the as-is organization. So, even if the implementation phase ends with a theoretical consistent alignment between the company and the ERP system, R7 can turn into a critical risk. As it is a residual risk of the “project” misalignment risk, the way to manage the risk factors allowing the end-users to feel more confidence with the new system is influenced by the decisions made to implement the system. For example, if the gap between the implemented system and the as-is organization is too wide, the way to conduct the training (VRF10) will be influenced. Besides, we note in Table 2, that the risk factors influencing the “project” misalignment risk are almost common with those influencing R1 and R2 risks (time overtaking and budget exceeding). The management of those particular risk factors (VRF1 to VRF2 and VRF5 to VRF9) has constantly to take into account on the one hand, the implementation decisions (Business Process Reengineering, enterprise requirements, degree of customisation and so on) and on the other hand, the engendered costs of those decisions. For example, to treat the “project” misalignment risk, a consistent BPR is needed. However, in order to master the budget, the BPR must take into account the embedded ERP systems business processes. This highlights the reciprocal residual link existing between these two risks.

### 4. CONCLUSION AND PERSPECTIVES

This paper proposes an analysis of the “project” misalignment risk in ERP projects. It constitutes the beginning of its characterisation. It is crucial for project-managers and decision-makers since it constitutes the first step in order to find the most adapted tools to manage it. The three dimensions of the proposed analysis allow drawing some helpful conclusions, for the decision-makers to better manage the “project” misalignment risk. Firstly, it highlights that this risk cannot be defined as an independent project risk and must be treated by taking into account the other ones (risk to overtake the deadline, to exceed the budget and that the end-users fail to use the implemented system). This is due to the residual links existing between them. Secondly, the analysis underlines that the related ERP risk factors are either horizontal or vertical. This guides the decision-makers during the ERP project lifecycle, to know when to act. Indeed, the risk factors related to project team skills and to communication and management problems have to be managed all along the project lifecycle. The other risk factors are managed at some specific stages. Finally, it highlights the risk factors on which decision-makers must be concentrated in order to manage the “project” misalignment risk by also taking into account the others risks having a residual links with it.
However, this study can be extended by, for instance, adding the nature of the risk factors (human/technical and internal/external). This could be helpful to understand on what it is necessary to act in order to decrease the “project” misalignment risk. Besides, the FMEA (Failure Mode and Effects Analysis) method could also be exploited. It could help in defining the potential failure modes (what goes wrong inside of the project?) and their negative effects (what are the effects of those failure modes?). Associating the negative effects to the risk factors could help to understand what could go wrong inside an ERP project and cause the existence of the risk factors.

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