

Chapter 25

Establishing and Verifying a Risk Ontology for Surfacing ERP Post-Implementation Risks

Guo Chao Alex Peng
University of Sheffield, UK

Miguel Baptista Nunes
University of Sheffield, UK

ABSTRACT

This chapter aims to establish and verify a risk ontology for the post-implementation of Enterprise Resource Planning (ERP) systems. The risk ontology was initially constructed through the process of a critical literature review. It consists of 40 ERP exploitation risks related to diverse operational, analytical, organization-wide, and technical aspects. This theoretical risk ontology can be used as the basis for identifying and assessing ERP post-implementation risks within different organizational and national contexts. In order to illustrate the discussion, a previous ERP study in China is presented as an example. The study adopted a mixed-methods design, which involved a questionnaire survey and a follow-up case study. The questionnaire examined the suitability of the established risk ontology in the context of Chinese State-Owned Enterprises (SOEs). The follow-up case study then further explored and validated the questionnaire findings. By integrating the quantitative and qualitative findings, the original ontology was verified, revised, and extended.

INTRODUCTION

As discussed by Genesereth and Nilsson (1987), the formal representation of a body of knowledge in a specific area/domain is often based on a conceptualization. A conceptualization includes the objects,

concepts, and any other entities that are presumed to exist in the domain of interest and the relationships that hold among them (Genesereth & Nilsson, 1987; Gruber, 1993). When a conceptualization is an abstract and simplified view of the world that we want to represent, Gruber (1993) proposes that an ontology is “an explicit specification of a conceptualization.” More specifically, an ontology

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is a diagrammatic model that defines a common vocabulary for a domain in which knowledge is shared (Gruber, 1993). This representational vocabulary provides interpretable definitions of basic concepts within the domain and indicates relationships between these concepts (Gruber, 1993; Noy & McGuinness, 2007). By using ontologies, important domain concepts and knowledge can be effectively defined, organized, shared, and reused (Noy & McGuinness, 2007). Given these features, the notion of ontology has been widely adopted by researchers in many subject areas, including artificial intelligence, software programming, e-business, knowledge management, business process management, and Information Systems (IS).

This chapter presents a practical example on the use of ontology in the area of Enterprise Resource Planning (ERP) systems. ERP systems are enterprise-wide information system packages, which consists of a comprehensive set of software modules that aim to support and integrate diverse cross-functional business processes within an organization by using a single data repository. As widely acknowledged by the IS community, successful implementation of ERP systems can potentially provide a variety of tangible and intangible benefits to modern companies at operational, managerial, strategic and organizational levels (Gupta, et al., 2004; Oliver, et al., 2005; Peng & Nunes, 2009a). However, and despite these potential benefits, ERP implementation is actually fraught with difficulties and risks. Moreover, even if the system is implemented, the “go-live” point of the system does not represent the end of the ERP journey (Peng & Nunes, 2009b; Pan, et al., 2011; Willis & Willis-Brown, 2002). In fact, a wide range of severe challenges and risks can occur during the use, maintenance, and enhancement of ERP systems in the post-implementation or exploitation stage (Peng & Nunes, 2009a, 2009b). An extensive review of the ERP literature identifies that problems and risks associated with the system implementation phase have been well explored and reported in previous IS studies (Zhang, et

al., 2005; Gargeya & Brady, 2005; Umble, et al., 2003; Zhang, et al., 2002; Sumner, 2000). However, there is a significant scarcity of ERP studies aiming at investigating factors and risks that can lead to failure in the system post-implementation stage. As more and more companies progress from implementation to organizational exploitation of ERPs, this research gap has become increasingly crucial (Peng & Nunes, 2009b).

This chapter thus aims to contribute to this significant research gap by establishing and verifying a risk ontology for ERP post-implementation. A desktop study, based on the process of a critical literature review, was conducted by the researchers. As a result of this extensive literature review, the researchers identified and proposed a total of 40 ERP post-implementation risks related to diverse operational, analytical, organization-wide and technical aspects. A risk ontology was subsequently established to organize and present these ERP risks, as well as to highlight their potential causal relationships. It is expected that this theoretical risk ontology can be used as the basis for identifying and assessing ERP post-implementation risks within different organizational contexts. In order to illustrate our discussion, a previous ERP study on Chinese companies was used as an exemplification. The study adopted a mixed-methods design, which consisted of a questionnaire survey and a follow-up case study. The questionnaire examined the suitability of the established risk ontology in the context of Chinese State-Owned Enterprises (SOEs). The follow-up case study then further explored a set of top prioritized risks and their relationships as identified from the questionnaire findings. By integrating the quantitative and qualitative findings, the original ontology was revised and extended. A final empirical ontology, which contains 44 ERP exploitation risks, was then developed for Chinese SOEs.

The rest of this chapter is organized as follows: the next section discusses the process of the critical literature review and the establishment of the initial risk ontology. Subsequently, the ERP study

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