Exploring Relationships in Tailoring Option, Task Category, and Effort in ERP Software Maintenance

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ABSTRACT

Maintenance to in-house applications is often done by modifying source code; however, packaged applications also enable certain maintenance to be done through changes to configurational parameters rather than through changes to the source code. This research presents preliminary evidence from the field to fill this gap in the empirical understanding of ERP maintenance. Using data from 503 ERP maintenance requests, the author’s results suggest that relative maintenance effort distributions for all maintenance categories and tailoring options are not normal distributions but heavy-tailed positively skewed distributions. Comparing ERP systems to in-house developed software, the author found a large proportion of corrective maintenance requests than adaptive requests. Enhancement and corrective task categories that use the programming tailoring option show a trend of increment in relative maintenance effort per request moving median over time. In contrast, enhancement and adaptive task categories that use the configuration tailoring option show a trend of reduction in relative maintenance effort per request moving median over time. The number of maintenance requests for all tailoring options and task categories were increasingly high four months after the introduction of a new module. Comparatively, under the same period, there was relatively higher number of maintenance requests for enhancement task category than other task categories, indicating that unique or orthogonal requirements were not available in the ERP system.

Keywords: Boxplot, Enterprise Resource Planning (ERP) Maintenance Effort, Enterprise System, Maintenance Requests, Relative Maintenance Effort Distribution, Relative Maintenance Effort Trend, Software Maintenance Effort, Tailoring Option

INTRODUCTION

Enterprise resource planning (ERP) systems, also known as enterprise systems, are reconfigurable standard software packages. ERP integrates application programs across various business functions and typical processes such as finance, human resource management, sales and distribution, manufacturing and logistics, supply chain management, and customer relationship management. ERP provides a common standard user interface, a single database, and
a real-time information system to form the necessary corporate information technology and e-business technology infrastructure. ERP originated from material requirement planning (MRP) and manufacturing resource planning (MRPII), but its application is beyond manufacturing including banking, food and beverages, and many others. In addition, the fundamental functionalities and usages associated with ERP systems do not in fact concentrate on either planning or resources capabilities, but rather on “their abilities to process transactions efficiently and to provide organized record keeping structures for such transactions” (Jacobs & Bendoly, 2003: pg. 233).

Like traditional in-house software, ERP packaged software requires maintenance (Ng & Gable, 2010). Maintenance activity represents the longest and most costly phase in a software lifecycle (Glass, 2003), and this also applies to ERP software (Lübke & Gómez, 2009). The importance of software maintenance, which has been attributed with, on average, consuming 50-70% of the total software cost (Banker et al., 1991), is recognized among researchers, and this has motivated a number of researchers to investigate the software maintenance effort (Ahn et al., 2003). Further, all of those studies had one common objective – to contain software maintenance costs and improve effort prediction capabilities. Compared to research in software development, research in software maintenance has long been considered under investigated and not given proper recognition. Similarly, while there exists quite a large amount of literature on ERP implementation issues, e.g. (Jafarnejad et al., 2012), there is a dearth of ERP maintenance research. ERP maintenance activities are the post-implementation activities, including user supports, upgrading, making changes or modifications to the system and integrating ERP system with existing information systems (Ng et al., 2002).

Traditional in-house software maintenance literature suggests that different maintenance categories demand significantly different portions of the total maintenance effort (Lientz & Swanson, 1980) and maintenance productivity (Jørgensen, 1995). These findings are generally based on small- to medium-sized standalone software packages that are specifically designed according to a company’s unique requirements. As many companies are now adopting large ERP software packages, greater attention and effort will need to be diverted to maintenance, making it imperative that we examine to what extent this new phenomenon is still accountable to the existing theory of software maintenance, see (Ahn et al., 2003; Banker et al., 1991; Lientz & Swanson, 1980). More in-depth discussion on the nature of the differences between in-house software maintenance and ERP software maintenance can be found in Ng et al. (2002).

As seen in much of the ERP implementation literature, misfits between organizational specific functionality requirements and the prescribed processes and functionalities of ERP are crucial issues for most companies. Various tailoring options are available to resolve potential misfits (Brethm et al., 2001) and ERP implementing-clients must make choices among the options. The most common tailoring options consist of configurations and programming-related one. The programming-related tailoring option is associated with some sort of source codes or programming activities, e.g. the use of the original ERP programming language, writing extended reporting, workflow programming, etc. However, empirical insights into how these common tailoring options relate to ERP maintenance efforts remain unavailable.

Understanding what drives the maintenance effort and maintenance productivity is at the crux of maintenance effort estimation reliability, which is critical to making maintenance decisions under the constraints of limited resources and fluctuations in maintenance needs over time. However, management often has to make resource allocation decisions based on very limited information – often only a brief description of the maintenance request. If management are able to make educated estimates based on very early information including the task category a maintenance request belongs to and the appropriate tailoring option to adopt, together with the up-to-date information on the available maintenance support provided by the ERP vendor, it is likely that they could better
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