

## Chapter 3

# Enterprise Resource Planning and Lean Six Sigma

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### ABSTRACT

*Over the last two decades, two of the hottest topics in business have been Enterprise Resource Planning (ERP) and Lean Six Sigma. Companies have spent millions of dollars implementing both of these, and the resulting benefits have been mixed. In this chapter, the authors examine the basic foundation of ERP and what drives organizations to implement ERP systems that cost hundreds of millions of dollars. The chapter also explores the history of ERP and who was and are the major players in the marketplace.*

### INTRODUCTION

The focus of this chapter is ERP. Initially this chapter will provide an overview of ERP and a historical perspective. The common characteristics of an ERP system are presented along with the current major vendors in the ERP marketplace. This will be followed by a discussion on implementation issues and challenges, along with the benefits of ERP systems. Literature reviews will be integrated throughout the chapter to align with the discussion topic of that section.

This chapter will also examine the critical success factors for ERP implementation and the relationship of those success factors with Lean Six Sigma. A more detailed analysis will follow addressing the functionality of ERP systems and the alignment with Lean Six Sigma concepts. This will be broken down into the major process areas as defined by of a leading vendor in the ERP marketplace and best practices integrated into these process areas. A review of some of the technical elements of an ERP system will also be presented at this point in the chapter.

The next section of the chapter will focus on the integration of Lean Six Sigma into the ERP implementation process. This will include a discussion on the requirements for a Lean Six Sigma approach to ERP systems and the implementation. The potential application areas of Lean Six Sigma concepts in ERP system will be included here. Specific areas that will be addressed include: production planning, manufacturing execution, purchasing, inventory management, sales, quality management, and service

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management. The end of the section will address how ERP can support an organizations Lean Six Sigma program, including an alignment framework, process applications and examples. The final section of the chapter will look at some of the new and potential future developments in ERP that impact Lean Six Sigma. This will include: big-data analytics, in-memory computing, mobile applications, and expansion of cloud ERP.

## **BACKGROUND OF ENTERPRISE RESOURCE PLANNING**

Enterprise Resource Planning systems are defined as integrated sets of comprehensive software. These sets usually include a set of mature business applications and tools for financial and cost accounting, sales and distribution, materials management, human resource, production planning and computer-integrated manufacturing (Bancroft, Seip, & Sprengel, 1996). With combinations of these fundamental software modules, companies are able to model a wide variety of business processes (ASAP, 1996). Over the last 20+ years a majority of large corporations have implemented ERP systems to automate and to manage their complete organization. These companies count on the ERP system to coordinate order management, support manufacturing operations, track customers, vendors and employees, improve customer service, increase inventory accuracy, track cash flow and financial transactions, etc. Further complicating this environment is the interfacing of ERP systems between companies where organizations are partnering to create “business to business” electronic commerce.

ERP systems date back to the 1970s. However, the name Enterprise Resource Planning was given to these types of systems in 1990 by the Gartner Group. The history of the ERP systems begins with Materials Requirements Planning (MRP) developed by Joseph Orlicky in 1964. MRP focused on production planning and inventory control. Oliver Wight expanded MRP into MRP II (Manufacturing Resource Planning) in 1983. Wight integrated master scheduling, rough-cut capacity planning, capacity requirements planning (CRP), and sales and operations planning (SOP) into the MRP II. Both MRP and MRP II were software-based systems. In the 1970s, several IBM software engineers started playing with the idea of integrating more financial processes into the software. These engineers eventually formed the company SAP.

The early ERP software companies were SAP, Baan, JD Edwards, and Lawson. In the late 1980s, Oracle and PeopleSoft got into the ERP market. In 1991, SAP introduced the client/server ERP architecture with SAP R/3. Currently, the ERP software market is estimated at over \$25 billion annually. The largest player in the ERP market is SAP with a 25% market share. Oracle is next with 13%, followed by Sage and Infor with 6% each and Microsoft with 5%. Hundreds of other small and niche ERP companies divide up the remainder of the market (Columbus, 2013). The standard characteristics of most ERP systems include the following:

- Link all business processes automatically
- Reduce inter-processing time (transactions occur one time at the source)
- Maintain complete audit trail of all transactions
- Utilize one common database
- Perform automatic internal conversions (e.g., foreign currency, taxes, legal “rules” for payroll, product pricing)

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