

# Preface

Managing information technology (IT) is one of the most important and challenging aspects of contemporary business. As IT is a fundamental driver of competitiveness for companies in a wide variety of business sectors, it is essential that the strategies and practices of IT management are well understood. However, from the viewpoint of the demand side of IT, many companies in Japan that use enterprise IT systems have not been fully satisfied with the speed of delivery, quality, cost, or productivity of software delivered by IT vendors, although the ultimate goal of Japanese IT vendors is to serve as catalysts for their customers' IT management of enterprise systems. Conversely, from the supply side viewpoint of IT, total sales of the Japanese information service industry have grown at a sluggish pace since reaching 10 trillion yen in 2005. It still, however, has a considerable presence in the world.

In fact, IT vendors in Japan face a wide range of old and new issues in their business environment. These include the need to respond to rapid technological innovations, an orientation toward custom-made applications for the domestic market, global competition with new entrants from emerging countries, man-month-based multilayer subcontractors, leadership of senior managers at IT vendors, software engineers' skill building, and IT management in user companies. In particular, because sustaining shop-floor usability is given priority over introducing technological innovation when IT is deployed in user companies in Japan, the dynamics of user-vendor interactions enable the development of finely tuned custom-made applications. This tends to establish long-lasting relationships between user companies and IT vendors. Thus, the development of custom-made applications can cause a high entry barrier for newcomers from home and abroad. As a result, the Japanese software industry has not established transparent relationships with the international market. This fact, coupled with the Japanese-language barrier, has resulted in the Japanese software industry having for some time been described as a maze, or as having "Galapagos syndrome."

In this book, we address these issues relating to the Japanese software industry as part of the management of software engineering innovation. We simultaneously look at the whole picture from both the supply and demand sides of software. The first step for the Japanese software industry to achieve sustained success in solving

issues relating to managing innovation in software engineering is to grasp an appropriate perception of the present situation in the Japanese software industry in areas such as software engineering capabilities, business performance, and the business environment. Therefore, the objectives of the research are to assess the achievements of software engineering capabilities, as represented by IT vendors in Japan, and to understand better the mechanisms of how software engineering capabilities relate to IT vendors' business performance and business environment.

To achieve these objectives, an original measurement tool called Software Engineering Excellence (SEE) was developed. An aim of the research is to encourage innovation; therefore, in developing the SEE measurement model, state-of-the-art cases were surveyed by more than 50 experts in academic, business, and governmental circles in Japan and the United States, and literature reviews relating to software engineering disciplines were conducted in the broadest sense, focusing on the management of innovation. The scope of the survey also includes Barney's resource-based view of vendors, informed by paying attention to factors such as degree of rarity and inimitability of management resources.

In this study, SEE can be used to evaluate overall software engineering capabilities of IT vendors on the basis of the following seven factors: deliverables, project management, quality assurance, process improvement, research and development, human resource development, and customer contact. In addition, "business environment" expresses the company profile and structure of an IT vendor including, e.g., origin of vendor, number of software engineers, average employee age, business model, customer base, and corporate culture. Thus, business environment factors complement the relationship between SEE and business performance of software vendors, such as profitability, growth, productivity, and efficiency of the management.

This book is structured in two major parts. The first part, Chaps. 1–3, introduces the Japanese software industry and examines Japanese vendors' software engineering capabilities through social surveys and statistical analyses. In Chap. 1, the above-mentioned old and new issues of the Japanese software industry are introduced and the research objectives are articulated based on a literature review of the information service industry in Japan, innovation in software industry, and the research approach. Then, we clarify the relationships among Japanese IT vendors' software engineering capabilities, business performance, and business environment through the remaining chapters of the book. In Chap. 2, the research model and survey results of SEE are introduced. Because the SEE survey results are valuable pieces of information in the study of Japan's software industry, the figures relating to the survey results are included in Appendix. In Chap. 3, statistical analysis results based on the SEE surveys, such as order effect and series correlation, are demonstrated using cross-section analysis, path analysis, stratified analysis, panel analysis, and longitudinal analysis. Additionally, the issues of managing innovation in software engineering in Japan are discussed.

The second part of the book, Chaps. 4 through 8, includes research relevant to managing innovation in software engineering in Japan in the broadest sense. In Chap. 4, the competitive environment in the Japanese software industry and

the differences of characteristics among manufacturer spin-off, user spin-off, and independent vendors are discussed based on Porter's five forces and Barney's resource-based view. In Chap. 5, IT management of individual IT user companies is discussed through large-scale social surveys, called IT management effectiveness (IME) surveys. Additionally, the causal relationships among the following six factors are empirically verified: awareness and actions of top management, linkage between management and IT, IT development capability, IT investment and deployment, IT readiness, and business value creation from IT. In Chap. 6, beyond SEE and IME, a new social research scheme, which includes both the demand side (IT user companies) and the supply side (IT vendors) is designed to accelerate innovation in IT management. In Chap. 7, future scenarios of Japanese software industry structures, giving priority to the effects of offshoring in China, are preliminarily assessed through agent-based simulation. In Chap. 8, an epilogue pursues a research methodology for assembling large-scale social surveys to collect data, statistical analyses, simulations, and other complementary considerations based on the content of the preceding Chaps. 1 through 7.

Although the chapters are intended to cover issues relating to IT management and software engineering innovation in the broadest sense, the research approach—using social surveys, statistical analyses, and simulations based on the resource-based view—has limitations. For example, if the rules of the game in the Japanese software industry change in a rapid and unpredictable manner, e.g., Schumpeterian revolutions, or a paradigm shift caused by a breakthrough in technology, then it will be difficult to adapt the findings discovered by the approach in this book to a new business environment. However, the current business environment is entrenched in the Japanese software industry and is likely to be unchangeable for good or bad, just as in other industries in Japan and other cultures. Thus, through the eight chapters of the book, our hope is that readers, including all the stakeholders in IT management, i.e., the supply and demand sides of IT, researchers, and policymakers at home and abroad, will find enlightenment in the Japanese software industry referred to as the maze or Galapagos syndrome.

The author gratefully acknowledges the valuable suggestions and kind support for statistical analyses received from Professor Hiroe Tsubaki at the Institute of Statistical Mathematics, and the warm support and constant encouragement received from Professors Takao Terano and Hiroshi Deguchi at the Tokyo Institute of Technology. In truth, however, this book would never have been completed without the help of the thoughtful experts in academic, business, and governmental circles in Japan and the United States who have shared their concerns and problems with me, and of a number of supportive respondents to the five-times large-scale surveys of SEE and IME. The author is particularly grateful to the Ministry of Economy, Trade and Industry (METI); the Software Engineering Center, Information-Technology Promotion Agency, Japan (SEC, IPA); Dr. Seishiro Tsuruho (former head of SEC); the Japan Information Technology Services Industry Association (JISA); Kozo Keikaku Engineering Inc.; and the Management Science Institute Inc. (MSI). Additionally, this research was partially supported by grants-in-aid for scientific

research from the Japan Society for the Promotion of Science (JSPS; B:20310090; C:24530497). I am also grateful to Professor Alan Stoke for his skillful editorial work. I also want to thank Springer Japan. And, last but not least, I thank my family—my wife, Yoshimi, and my son, Yuki—for all of their help and support.

Tokyo  
August 2014

Yasuo Kadono



<http://www.springer.com/978-4-431-55611-4>

Management of Software Engineering Innovation in  
Japan

Kadono, Y.

2015, XIII, 173 p., Hardcover

ISBN: 978-4-431-55611-4