Preface

Technology will continue to be invented to assist humans at work, and even more apparent now, in their daily lives. The fundamental benefits to be derived from technology adoption are with respect to speed, precision, as well as convenience. Unless any technology is not diffusing well, it only seems logical for humans to want to exploit the use of it to their best interests and motivation. Perhaps the root cause is in the way humans manage change. Paradoxically, change is normal for any individual or organization – the absence of change, external or internal, is unnatural. With the new economy driving change throughout any business organization, a paradigm shift is taking place from traditional business models that work to attain low cost or highly differentiated products to neo-classic models that stress the deployment of Information Technology (IT) to create a customer-centric environment where business processes must be accelerated, flexible, responsive, always improving, and focused. Over time, humans assume new roles through continuous organizational learning and effective knowledge management enabled by IT.

As a strategic resource, IT is regarded not only as providing a means for functional integration but an opportunity to enhance the competitive capability of a business organization. In other words, it is a major enabler of strategic competitiveness. The importance of strategic alignment is evident where, in the context of Porter’s generic strategies, businesses choose to use IT to achieve cost leadership, or support differentiation or niche strategies. Consequently, without this alignment, businesses may end up deploying technology for the sake of technology’s or for the sake of some future promise rather than for current business needs. It often translates into the business not having derived real benefits from IT to justify further investments, whether they are measured in productivity or profit terms. While technology suffers the blame, a deeper understanding of the problem might point to a lack of coordination between the (strategic) role of the technology and the (strategic) need of the business. Therefore, the main theme of this book is centered on this problem. In the context of the construction industry, the problem exacerbates. Most of the businesses are small, do not strategize much, and lack motivation for investments in long-term innovations. In other words, they still practice traditional “brick-and-mortar” business models and as such are relatively slow in adopting technological innovation for change.

In concept, strategic alignment is about performing the primary and secondary functions within the business organization. The primary function in alignment for a business is always the customer or marketplace. Following that, the business scope, internal functions, internal processes, and suppliers are the secondary functions to fulfill. For the IT function to achieve a state of alignment with the business, it must align with the business scope, and through that, business scope enables all business functions and processes to serve the customers in a superior manner. The marketplace leads, the business follows, and IT enables the business to align with the marketplace for best advantage. The optimum alignment of IT
and the business occurs when business strategy and IT strategy are developed together, so that each can influence the other to create the ideal state. Perfect strategic alignment occurs when the implemented IT infrastructure meets business needs and goals, and where processes and organizational infrastructure adapt to it accordingly so that IT can be used to create maximum business opportunities.

This book covers the essential concepts to guide a traditional construction industry to become one that is strategically IT-enabled. The book has four distinct sections. They begin with topics about understanding business strategy and competitive advantage, explaining why they are important to businesses and how they can be applied to achieve phenomenal success for some construction firms, to topics that justify the need for change in the construction industry, covering standardization of information and technology-based innovation to enable the greater use of IT. Moving on to the next section, which focuses on management approaches and technology for improving the efficiency of the construction industry, the essentials of knowledge management and business process re-engineering are explained with the aid of case studies. The current and emerging technologies are also introduced by laying down the fundamentals and providing appropriate illustrations of their applications. In the final section, topics that cover the implementation of the strategic IT-enabled construction industry are dealt with first by describing the basic concepts of alignment and then workings of some existing models for strategic alignment. Specifically on applying the Strategic Alignment Model (SAM) proposed by Henderson and Venkatraman, a study of Singapore’s construction industry firms is illustrated. An earlier study has set out to examine the viability of creating a strategic IT-enabled environment where firms can interoperate via integrated databases and interactive applications and, based on the findings, established the strategic alignment perspectives of the firms, which become key to explaining what kind of business strategy has to be used. In essence, firms must build IT into their business and operational processes in order to fully utilize their information and knowledge resources for exploiting competitive strategies to the fullest. While the main illustrative examples are based on the Singapore study, there are also examples from the US, as well as the major countries in Europe like the UK, Sweden, Finland, and The Netherlands, included in the book to give readers a wider range of case studies to apply their understanding of the topics included.

The book contains 10 chapters. Chapter 1 provides an understanding of why strategies are important to businesses and presents an overview of strategic planning as well as the process of managing it. Chapter 2 defines what competitive advantage means to a company and describes the traditional types of competitive advantage that a company may possess. Chapter 3 describes the traditional practices of the construction industry and covers the various types of information that is generated and exchanged and how they can be standardized to establish a common language among users. Chapter 4 explains the nature and process of innovation, the role of technology in innovation, and the importance of technological innovation for the construction industry. In addition, it emphasizes innovation as an enabler for construction businesses to gain competitive advantages through continuous improvement and customer (or client) orientation. Chapter 5 explains the concepts and process of knowledge management in general, followed by those that are specific to construction. Project knowledge is discussed in the context of construction industry. In addition, it emphasizes innovation as an enabler for construction businesses to gain competitive advantages through continuous improvement and customer (or client) orientation. Chapter 6 defines business process re-engineering from the perspectives of what it is, what it is not, and what it should be. The basic types of business process are described, including a general description of the entire spectrum of business processes typical to organizations. The chapter also covers the enabling role of IT in business process re-engineering in relation to how it is crucial to process
innovation for e-business, as well as process integration for supply chain management. Construction applications of 3D/4D models or BIM are cited as relevant illustrations of process improvements through innovative use of technology. Chapter 7 explains the need for the construction industry to embrace new technologies for the management of information and documentation from the perspectives of an organization, as well as a project whereby the stakeholders from different organizations are involved. The tools and applications that are described include the EDMS, ERP, project extranet, 3D/4D CAD for visualization, virtual reality technology for virtualization, mobile technology, and sensor technology. Chapter 8 explains the purpose of strategic information systems planning and describes the commonly adopted methodologies and the six broad process dimensions that characterize it. The basic concepts of alignment are also explained, including the review of some proposed models for strategic alignment. In particular, the SAM proposed by Henderson and Venkatraman is focused on and described to emphasize the critical need for organizations to achieve strategic fit and functional integration. Chapter 9 provides a background to explaining why there is a general lack of strategic application of IT among SMEs and how the concept of strategic alignment can be applicable to enhancing the competitive capability of firms in the context of Porter’s generic strategies. As an illustration, the state of business and IT alignment in Singapore’s construction industry is studied through an industry-wide survey with respect to the practices of designer-SMEs and builder-SMEs, and the findings are discussed. Appropriate recommendations are also provided to address the main issues facing construction industry SMEs. In conclusion, Chapter 10 describes the common problems associated with implementing IT business strategy and provides a basis for all companies to pursue strategic alignment practices to improve organizational performance when using IT-based resources. The critical success factors of implementing IT business strategy are discussed, as well as the essential traits of successfully aligned organizations. As a guide for construction industry firms in Singapore to implement their IT business strategy, the findings and recommendations of the related studies are put together in a framework to present the established strategic alignment perspectives for the respective types of firms and projects based on the distinct characteristics of each. The entire process of implementation is also described in stages to further guide the firms in defining their goals of implementation, adopting an effective plan, measuring the results, and managing change. The kind of strategy that has to be implemented by the different firm types in both “designer” and “builder” domains to achieve success is stated and explained.

The scope of the book is broad. There are aspects of strategic company (or business) management, information and knowledge management, construction project management, and IT relevant to construction covered in the 10 chapters. It provides a valuable text for students reading construction IT subjects at both the undergraduate and graduate levels. It also offers useful insights into the complex workings of the construction industry for researchers, policy-makers, and practitioners who have a special interest in strategic IT-enabled change. In particular, the case studies in the chapters on business process re-engineering, strategic alignment of IT and business, and implementation of IT business strategy will provide practitioners, educators, and students with important examples of successful strategic applications, as well as lessons that can be learned from the problems encountered in some of the implementations.

Goh Bee Hua
National University of Singapore, Singapore