Preface

ABOUT THE SUBJECT

An enterprise system has the Herculean task of seamlessly supporting and integrating a full range of business processes by uniting functional islands and making their data visible across the organization in real time. (Strong & Volkoff, 2004, p. 22).

For the last decades, it is being recognized that enterprise computer-based solutions no longer consist of isolated or dispersedly developed and implemented MRP solutions, electronic commerce solutions, ERP solutions, transposing the functional islands to the so-called island of information. Solutions must be integrated, built on a single system, and supported by a common information infrastructure central to the organization, ensuring that information can be shared across all functional levels and management, so that it lets users instantly see data entered anywhere in the system and, simultaneously, seamlessly allows the integration and coordination of the enterprise business processes.

These suites of solutions are no longer designed for large enterprises, multinationals, with high turnover, etc. They are tools for small businesses of all types and sectors of activity. This book is concerned with Enterprise Information Systems (EIS) as drivers of competitiveness for Small and Medium Enterprises (SME) of every economic sector, in their quest for agility, flexibility and responsiveness.

The topic of Enterprise Information Systems (EIS) is gaining an increasingly relevant strategic impact on global business and the world economy, and organizations of all sort are undergoing hard investments (in cost and effort) in search of the rewarding benefits of efficiency and effectiveness that this range of solutions promise. But as we all know, this is not an easy task—it is not only a matter of financial investment. It is much more, as the book will show. EIS are responsible for tremendous gains and even result in tremendous losses.

Responsiveness, flexibility, agility and business alignment are requirements of competitiveness that enterprises search for. And we hope that the models, solutions, tools and case studies presented and discussed in this book can contribute to highlight new ways to identify opportunities and overtake trends and challenges of EIS selection, adoption and exploitation, in particular targeting SME.

ORGANIZATION OF THE BOOK

This book is a compilation of 27 contributions to the discussion of the main issues, challenges, opportunities and developments related with Enterprise Information Systems as tools for competitiveness for SME from the social, managerial and organizational perspectives, in a very comprehensive way, in order to disseminate current achievements and practical solutions and applications.

These 27 chapters are written by a group of 66 authors that includes many internationally renowned and experienced authors in the EIS field and a set of younger authors, showing a promising potential for research
and development. Contributions came from USA, Latin America, several countries of Eastern and Western Europe, Asia and Australia. At the same time, the book integrates contributions from academe, research institutions and industry, representing a good and comprehensive representation of the state-of-the-art approaches and developments that address the several dimensions of this fast, evolutionary theme.

“Enterprise Information Systems for Business Integration in SMEs: Technological, Organizational and Social Dimensions” is organized in four sections:

• “Section 1 – Models, Applications and Solutions” presents the main frameworks, approaches, methodologies and models that support Enterprise Systems.
• “Section 2 – Supporting Technologies and Tools” introduces some tools associated to the development of EIS
• “Section 3 – Managerial and Organizational Issues” discusses challenges, opportunities and concerns related to the managerial, social and organizational aspects of EIS adoption and exploitation.
• And finally “Section 4 – Critical Success Factors and Case Studies” describes and discusses motivations, trends, cases studies, successful cases of EIS implementation and exploitation in SME.

The first section, “Models, Applications and Solutions,” includes ten chapters summarized below.

In the first chapter, “Measuring the Impact of an ERP Project at SMEs: A Framework and Empirical Investigation”, Maria Argyropoulou, George Ioannou, Dimitrios N. Koufopoulos and Jaideep Motwani analyze and test a novel framework for the evaluation of an ERP project. The framework incorporates specific performance measures, which are linked to a previously developed model, (the “six-imperatives” framework) and are relevant to ERP implementation. Two case studies illustrate the use of the framework in two Greek companies aiming to measure, in practical terms, the impact of the ERP project on their operations. The main results indicate that the “six-imperatives” provide a comprehensive methodology based on the profound exploration and understanding of specific business processes and objectives that should be met in order to assess an ERP project.

Information system conversion has been with us since users of punch-card tabulating systems first moved to vacuum-tube computers. However, it is often seen as an afterthought: once the “interesting” work of analysis, design and so on is done, it will somehow happen. Efrem Mallach, in the second chapter, “Information System Conversion in SMEs,” attempts to view the process holistically, from both the technical and human viewpoints, reflecting the fact that information systems have both technical and human components. It shows how ignoring one side or the other can lead to problems, which can be avoided if all aspects are considered together. It proposes a systematic approach to considering these issues and points out benefits of using it.

Nowadays, the implementation of business process management modern tools in companies becomes a matter of acceptance of an effective organization management. The first ultimate precondition for achieving this goal is a properly structured company. Vladimír Modrák, in “Business Process Management as a Critical Success Factor in EIS Implementation,” places the focus on business process reengineering due to preparing preconditions for smooth implementation of EIS. Since there are differences between tools of business processes redesign and information systems development, then a main focus was on overcoming existing semantic gaps. With the aim of solving this problem, the specific modeling method has been used that was clear for company’s staff and usable for EIS designers.

For Wai M. Cheung and Dirk Schaefer, in “Product Lifecycle Management: State-of-the-Art and Future Perspectives,” while most SMEs in general are willing to invest into Product Lifecycle Management (PLM) systems, many are still apprehensive to the sometimes large initial investment to be made in terms of both software cost and the time needed to implement and integrate such system into their digital enterprise technology infrastructure. In light of this, it is crucial for decision makers not only to understand the current PLM market, but also to become familiar with emerging trends and future developments in order to select a PLM
solution that best fit the needs of their enterprise. In this chapter, the authors summarize a detailed analysis of the PLM market with the aim of providing educators, students, and decision makers in industry with an overview of the current PLM market as a whole. In addition, emerging trends and future developments are addressed.

In chapter five, “*ERP Systems Supporting Lean Manufacturing in SMEs*” and according to Pritish Halgeri, Roger McHaney and Z. J. Pei, the explosive growth of e-business methodologies and the resulting pressure to become nimble and embrace rapid change forced many SME to rethink their production approaches, particularly in regard to where they stand in relation to these two methodologies (ERP systems and Lean Manufacturing). Over time, ERP vendors recognized the power and advantages of Lean manufacturing and developed ways to incorporate Lean-related features into their software. The main objective of this chapter is to explore how ERP and Lean methodologies can coexist in SMEs. The chapter discusses misconceptions about the fit between ERP and Lean then summarizes differences and synergies between the two methodologies. It also emphasizes how linking ERP and Lean methods can lead to competitive advantage then explores key Lean toolsets available in leading ERP systems used by SMEs. Further focus is provided with additional insight on several leading ERP vendors offering Lean-enabled software modules.

Planning and management of Virtual Organisations (VOs) depends on accurate prognosis and forecasting of several organizational aspects. New and innovative business models such as the VO offer a variety of new options for SME to do business. In the sixth chapter, “*A Forecasting Concept for Virtual Organisations Supporting SMEs*,” Jens Eschenbacher and Heiko Duin present a system-oriented view to understand planning and forecasting needs in VOs. The strategic issues in planning will be elaborated by using the cross-impact analysis. For the medium-term planning the focus lies on investigations based on the so-called collaborative network analysis. An industrial case study is introduced to demonstrate the application of the concept.

In the seventh chapter, “*Business Integration Model in Services Sector SMEs*,” Snežana Pantelić shows the importance of integration business processes and information systems for service sector SMEs and presents an opportunity of synchronous and simultaneous development of both business process integration (BPI) and enterprise information system (EIS) utilizing the introduced Business Integration Model (BIM). BIM approach is based on modeling core business processes, which are supported by modern IS. Process centric and customer centric modern organization relies on enterprise management standards like ISO 9000 family. The task is to achieve the business goal of the process measured by defined Key Performance Indicator (KPI) and to improve the processes continually. The presented “Autotransport” case describes BIM design and implementation for the core process “Transport services management.” The critical factor of the success of implementation of Business Integration Model (BIM) is undoubtedly the readiness of employees to accept a process approach in the execution of their tasks.

Multi-project business operations in SMEs require adaptation of management processes and, consequently, revision of information systems. Present ERP solutions are not suitable in a multi-project environment. Chapter eight, “*Conducting Multi-Project Business Operations in SMEs and IS Support*” by Igor Vrečko, Anton Hauc, Vesna Čančer and Igor Perko presents a newly designed IS model that supports strategic and commercial multiple project operations. The importance of connecting business goals with project performance and upgrading operational CRM into multi-partner management technology is considered. Significant added functions of IS in a multi-project environment should support project evaluation and management of project portfolios, intra- and inter-project communication, and mastering multi-task workflow. To reduce the need to spend limited SMEs’ resources, technological development of the designed IS model must assure its simplicity for use and deployment.

In chapter nine, “*An ERP Adoption Model for Midsize Businesses*,” Fahd Alizai and Stephen Burgess theorize the development of a conceptual ERP adoption model, applicable to midsize businesses, identifying the general business factors associated with ERP implementation along with the corresponding organisational benefits. This chapter also highlights the constraints that confront midsize businesses whilst implementing sophisticated applications. The needs for ERP adoption can occur due to an attempt to be more competitive
or due to an external pressure from large businesses to adopt an ERP application. The proposed conceptual model uses a strategic approach containing; ERP implementation processes, stages, factors & issues associated with ERP adoption in midsize businesses. This research also focuses on identification of strategies in the organisational, social and technical domains that could be influential for ERP adoption.

The importance of SMEs today is far beyond any discussion in countries all over the world - in European countries as well as in Asia and in USA, in Africa as well as in Latin America. In chapter 10, “Enterprise Information Systems for Business Integration in Global International Cooperations of Collaborating Small and Medium Sized Organisations” and according to its authors, P. H. Osanna, N. M. Durakbasa, M. E. Yurci and J. M. Bauer, to meet market demands in present and future global industrial world, manufacturing enterprises of any kind and any size must be flexible and agile enough to respond quickly to product demand changes. With the support of artificial intelligence and modern information technology, it is possible to realise modern cost-effective customer-driven design and manufacturing taking into account the importance and basic role of quality management and metrology. This will be especially possible on the basis of the innovative concept and model for modern enterprises the so-called “Multi-Functions Integrated Factory - MFIF” that makes possible an agile and optimal industrial production in any kind of industry and especially in up-to-date SMEs.

Section two, “Supporting Technologies and Tools” is composed of the following four chapters.

SME have specific requirements on the software systems (SWS) they use, described by Jaroslav Král and Michal Žemlička in “Software for Small-to-Medium Enterprises.” The solution to this issue or overtaking of its consequences can be based on the variant of service-oriented architecture (SOA) discussed in the chapter. A proper use of modern software systems depends on the skills and knowledge of (end) users of the systems. The extent of a new software-oriented knowledge of the users needed to specify, install, and use the systems depends on the architecture of the system. Authors further show that a properly used SOA can substantially reduce the need to learn new knowledge at users’ side. The kernel of the solution should be based on the SOA-based generalization of the concept of usability and on a technical turn enabling agility of business processes. The solution can simplify the development of tools enabling the activation of inhibited user knowledge via flexible prototyping supporting agile business processes and learning by doing.

Justifying that more than 99% of European enterprises are SMEs, Sike Balzert, Thomas Burkhart, Thomas Werth et al., in “State of the Art Solutions in Enterprise Interoperability” state that although collaboration with other enterprises provides potential for improving business performance, enterprise interoperability research has yet to produce results which can be used by SMEs without the need for high start-up costs, e.g. learning, infrastructure and installation costs. The chapter introduces the Commius project (funded by the European Union) that aims the development of such a “zero costs of entry” interoperability solution for SMEs, allowing them to reuse existing and familiar applications for electronic communication. Based on a four layer interoperability framework, it will be examined which technical, process-based and semantic solutions for enterprise interoperability are available at the moment and which strategic motives drive or prevail SMEs to engage in E-business activities.

Chapter 13, “Communication Issues for Small and Medium Enterprises: Provider and Customer Perspectives,” by Mirgana D. Stojanovic and Vladanka S. Acimovic-Raspopovic, considers communication issues for SMEs from both provider and customer perspectives. SME communication infrastructure at the individual site should usually be built around Ethernet-based local area network with a remotely manageable integrated access device that enables high speed Internet access, virtual private networking, Voice over Internet Protocol (VoIP) functionality and collaborative services. The authors further address several open quality of service (QoS) issues that include: service level agreements, signaling for quality of service and management aspects. The proposed framework for service management encompasses interfaces for QoS-aware and legacy applications, generic service level specification, functional model of service negotiation and management policies.

Accomplishing creative tasks collaboratively is particularly problematic when team members who are attempting to achieve the creative results are geographically dispersed throughout the globe in a virtual team.
Therefore, sound communication tools are needed to ensure communication does not hamper team creativity. Hélder Fanha Martins and Maria João Ferro, in Chapter 14, “Selecting Appropriate Communication Tools to Support Teams’ Creative Processes in SMEs” highlight the communication tools available for doing creative work, offering a short analysis of the most relevant synchronous and asynchronous communication tools. Some rules and tips are given to allow for a better choice of the communication tools to use according to both the nature of the team and the work it is performing in terms of creative processes in SMEs. Authors also present how knowledge experts and knowledge-based companies consider whether it would be any benefits on applying “Web 2.0” in their organisational architecture to strengthen collaboration.

Section three, “Managerial and Organizational Issues” includes Chapters 15 to 19.

The implementation of Enterprise Information Systems is a difficult task, even for large companies. It can be even more so for SMEs, for most are seriously constrained in terms of time, money and skills. According to Paul T. Kidd, author of the Chapter 15, “Enterprise Information Systems: Aligning and Integrating Strategy, Technology, Organization and People,” the key to successful implementation lies in achieving an alignment between Strategy, Technology, Organization and People, and also in achieving commitment to the new technologies. An implementation method called HiSTOP, which stands for High Integration of Strategy, Technology, Organization and People, is described in the chapter. This method provides a means of adjusting all four elements so that each is appropriate and also so that all four elements fit together. Although the method was initially designed with SMEs in mind, the method is also suitable for larger companies, hence the chapter considers both types of enterprises. The method places emphasis on development of internal implementation competencies. The key foundational principles of the method are discussed along with some key findings from early trials.

From Chapter 16, “Developing and Customizing Federated ERP Systems” by Daniel Lübke and Jorge Marx Gómez we understand that SMEs need to further reduce costs and optimize their business in order to stay competitive. Larger enterprises utilize ERP systems and other IT support for reducing costs and time in their business processes. SMEs lack behind because the introduction and maintenance of ERP systems are too expensive, the return on investment is achieved too late and the associated financial risks are too high. However, SMEs would like to have IT support for their business. The authors introduce the Federated ERP System (FERP) that addresses the problems SMEs face with conventional ERP systems and offers reasonable and scalable IT support. This is done by decomposing the whole business logic of the ERP system into Web services, which are linked at run-time. The service composition is realized by a workflow system that is also responsible for creating and managing the user interfaces and the data-flow. By integrating only the Web services that are needed (possibly from third parties) the cost is reduced and the functionality can be scaled to the actual needs.

In “EIS systems and Quality Management”, Bart H. M. Gerritsen discusses the support of quality management by Enterprise Information Systems. After a brief introduction in ISO9001, one of the principle and most widespread quality management frameworks, this chapter discusses the design and implementation of a typical QMS and in particular of key performance indicators, indicating the present state of performance in the organization. While analyzing design and implementation issues, requirements on the supporting EIS system will be derived. Finally, the chapter presents an outlook onto future developments, trends and research. This chapter reveals that key performance indicators can be well integrated in EIS systems, using either relational or object-oriented storage technology.

In Chapter 18 “e-Impresa: A System Dynamics Strategic Model to Evaluate SME Marketing On Line Investment,” Habib Sedehi introduces a System Dynamics (SD) model developed to give a support in better understanding the process of the Web marketing and so to have more elements to decide to “dive” into the virtual world. The model has the aim to support strategic decisions, for a SME involvement in E-commerce, pointed out to guarantee sustainable growth and medium-long term success. The project of e-Impresa analyses the whole process of the investment in building and maintaining a web site, taking into account the main variables of the E-commerce. Through a case study, a SD business game model has been developed. The
model gives the opportunity to users to evaluate different what-if analysis through the simulation period time (2 years) at each model step time (4 weeks). The chapter will explain the overall architecture of the model and will present some results of use of the model in different conditions.

In “Preparedness of Small and Medium-Sized Enterprises to Use Information and Communication Technology as a Strategic Tool,” Klara Antlova emphasizes issues connected with adoption of information and communication technology (ICT) as a strategic tool contributing to further organizational growth. This understanding is based on the results of a qualitative analysis of a group of SMEs. Gradual development of a group of 30 organizations has been monitored over the last fifteen years during their co-operation with the Technical University of Liberec. The research focused on SME management’s approach to ICT, its utilization for competitive advantage and its relation to and defining of business strategy. Other aspects of the study looked at the effect of ICT on organizational performance, knowledge and skills of the employees, training and organizational culture. The results indicate that successful and growing companies have gradually established business, information and knowledge strategies and make strategic use of ICT.

The last section of the book, section four “Critical Success Factors and Case Studies” integrates eight chapters.

The factors that lead to business process re-engineering (BPR) success in SMEs are not clearly understood. In Chapter 20, “Process Re-Engineering Success in Small and Medium Sized Enterprises,” Jeffrey Chang, Margi Levy and Philip Powell review the main contributing factors to BPR success using a framework that considers culture, structure, technology and resource. Eight Taiwanese case studies are used to explore issues contributing to, or impeding, successful process re-engineering in small firms. The analysis shows that BPR success is empowered by innovation, employee empowerment, top management commitment and strategic direction and is dependent upon customer relations, IS involvement and financial resources.

“Challenges and Trends Towards an Effective Application of ERP and SCM Systems in SMEs” by Dimitrios Gagalis, Panayiotis Tahinakis, Nicolaos Protogeros and Dimitrios Ginoglou, has as purpose to present international trends and challenges on the field of ERP and SCM systems, thus to: (a) record background information on legacy and current supply chain IT systems for SMEs, (b) discuss the importance of both ERP and SCM systems and the complementarities of ERP and SCM systems, (c) present survey conclusions of ERP and SCM systems adoption in various industries and countries, mainly in Europe and reveal the most prominent trends and barriers, (d) identify the technologies that are used to provide integrated view of information for SMEs, with emphasis on both technological and organizational dimensions and recommendations to SMEs and (e) provide future trends, possible future areas of work and conclusions. Contemporary SMEs must carefully examine integration approaches and their technological and organizational issues such as hidden integration costs and management of change considered with human organizational concerns, cultures and business objectives. Application Service Providers, Web Services and Service Oriented Architecture as well as ERP and SCM application’s maturity and Open Source software solutions, especially for SMEs requirements, are amongst the anticipating future trends in the field.

Chapter 22, “Contrasting Approaches to Preparedness: A Reflection on Two Case Studies” by Lorraine Warren and Ted Fuller, reflects on ongoing research in SMEs in the manufacturing and service sectors. It contrasts different approaches to the issue of preparedness from an organisational and social perspective in two cases where new enterprise-wide business processes were implemented and integrated in different settings. In both cases, the emergence of new systems presented a huge challenge to companies hard-pressed to marshal the resources to mount effective change and implementation projects on this scale. The cases presented enable a comparison of different strategies used, one firm responding to organic growth, and the other to rapid industry-driven change. The chapter focuses not on the implementations per se, but instead on the issue of preparedness for change. The chapter concludes by drawing out general lessons concerning how to support and maintain organisational preparedness for enterprise wide change in different industry settings.

ERP solution implementation is a complex process, that requires substantial resources and efforts, and yet the results are very uncertain. The ERP hype has already reached SMEs, so Simona Sternad, Samo Bobek,
Zdenko Dezelak and Ana Lampret in “Critical Success Factors (CSFs) For Enterprise Resource Planning (ERP) Solution Implementation in SMEs: What Does Matter for Business Integration” examine the strategies, methods and critical success factors from SMEs point of view. The results of their survey of SMEs in Slovenia have shown that SMEs have to pay attention to different critical success factors in different phases of the implementation process. Moreover, there are differences in implementation process as opposed to large companies. Case studies of two SMEs have shown similar results. The chapter also includes recommendations for future SME implementations.

In Chapter 24, “Enterprise Resource Planning (ERP) Embedding: Building of Software/Enterprise Integration,” Dominique Vincen, Igor Rivera-Gonzalez and Bernard Penz analyse the mutual processes according to which the tool (ERP) and the organization adapt to each other. The chapter documents the live experience of technological change during the introduction of ERP in a medium-sized enterprise. Focusing on the election of the new tool and its appropriation by firm members, it does not simply reduce the process to a handful of factors (of success or failure), but analyses the different negotiations between actors leading to the reconstruction of both the tool and the organisation. It thus takes an in-depth look at the role of technology rather than just resorting to a simplistic and deterministic search for causal connections. Tracing the construction and meshing of the performance of both organisation and tools within the company, it reviews a set of dichotomies between technology and society, initial project and “impact,” but also action and submission to constraints. Hence, the chapter explores the learning processes and the redefinition of actors, organisation and tools.

The new communication and information systems have significantly increased the possibilities offered to professional companies for developing and maintaining long-term customer relationships. However, technology alone cannot ensure the success of CRM strategies. The implementation of a customer-centred culture, shared by the entire professional organisation, requires the combination of human resources, expertise and technology in order to identify and satisfy the needs of the existing customers. Considering a sample of French and UK professional SMEs, Călin Gurău in “The Management of CRM Information Systems in Small B2B Service Organisations: A Comparison between French and British Firms” investigates the type of CRM strategy implemented by these firms, as well as the usage intensity of various communication channels, both by companies and clients. The satisfaction of client organisations is analysed from a multi-level perspective and a diagnostic procedure is proposed in order to identify the gap between the perceptions service provider firms and clients on various dimensions of the CRM process.

Chapter 26, “Elements that Can Explain the Degree of Success of ERP Systems Implementation” by Carmen de Pablos Heredero and Mónica de Pablos Heredero, discusses that the implementation of an ERP is a risky and high cost action, even more when we are dealing with SME. Although many studies have shown the importance of paying attention to critical success factors in ERP implementations, there is still a high degree of failures and bad experiences around ERP implementations. Most literature review has shown experiences of success and failure coming from big sized firms. But there is a lack of information of what has happened in the area of small and medium size firms, and for some economies, they are essential. The authors show a model containing the main elements that can better explain the degree of success and of failure in ERP implementations by providing examples mainly affecting to the circumstances of small and medium size firms. In the model the authors propose five main groups of variables affecting final results in ERP implementations,

SMEs differ from large firms in terms of environmental uncertainty, dependency, centralization, specialization, strategy, systems, resources and flexibility. Because of these distinguishing characteristics, the results of research carried out in large firms cannot be transferred directly to small firms. This is particularly true for the critical success factors for change management and technology implementation. The case study in Turkey, presented and discussed by Vayvay, Derman and Beceren in “Change Management Strategies For ERP Implementation in SME and a Case Study in Turkey: ABH Success Story” represents the change management activities on ERP implementation by a consultancy firm (ABH) on an international corporation (a SME) located in Turkey.
EXPECTATIONS

The book provides researchers, scholars, professionals with some of the most advanced research developments, solutions and discussions of Enterprise Information Systems adoption in SME under the social, managerial and organizational dimensions.

This book is expected to be read by academics (teachers, researchers and students of several graduate and postgraduate courses) and by professionals of Information Technology, IT managers and responsible, Information Resources managers, Enterprise managers (including top level managers), and also technology solutions developers.

Maria Manuela Cruz-Cunha
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REFERENCES