

# Preface

## ABSTRACT

This Preface introduces the book *Information Systems Research Methods, Epistemology, and Applications*. The book deals with the concepts and applications of information systems research. The book comprises 19 chapters organised into two main parts. The first part considers the theoretical concepts of information systems research and the second part deals with applications.

## INTRODUCTION

Within the information systems discipline, there is a strong tradition of using empirical research to conduct relevant and rigorous studies. It is recognised by many academics and practitioners that it is vital to evaluate the methods, frameworks, processes, and systems implemented in organisations. In practical settings covering many different industry sectors, evidence, in the form of surveys or multiple case studies, is accumulated to confirm existing theories and also to develop new models.

This collection features recent high-quality theoretical and empirical studies related to the concept, development, implementation, operation, and maintenance of information systems in organisations. The book includes both qualitative and quantitative studies of small, medium, and large organisations from both the public and private sectors and from a broad range of industries. The contributions include cases of innovative approaches to evaluation, as well as examples of effective approaches for analysing, summarizing, and presenting sets of empirical data and conclusions. This book provides a valuable contribution as it highlights innovative applications of information systems in organisations, and furthermore provides practical, rather than theoretical, discussion of factors which contribute to success and failure of information systems.

This book is a valuable resource for information systems and information technology (IS/IT) researchers, business managers, IS/IT professionals, and IS/IT students who are interested in empirical research, and/or evaluative studies of information systems in organisations.

In our own research and supervising students, we have found that there was little published research on these topics and felt that there was a need for a collection of recent research. The motivation for this book came from our attendance at various conferences such as the European Conference on Information Systems and the Australasian Conference on Information Systems, and international conferences of Information Resources Management Association (IRMA). We contacted authors we had met at these conferences and encouraged them to extend their research as a contribution to this collection. The call for chapters was also promoted through the ISWorld and L-IRMA mailing lists and this approach resulted in contributions from an international cohort of authors.

## STRUCTURE OF THE BOOK

This book is comprised of 19 chapters organised into two main parts; information systems research concepts and information systems research applications.

### Part 1: Information Systems Research Concepts

This part includes eight chapters organised into three sections: methodology, guidance, and epistemology.

#### Section 1.1: Methodology

This section features three chapters. In the first chapter of this section, Panagiotis Kanellis and Thanos Papadopoulos offer a journey through the spectrum of epistemological and ontological perspectives in Information Systems, offering the necessary background to the researcher who has to explore diligently the research methods toolkit available and then make a choice. It does not attempt to solve any problems in existing paradigms or present any new ones, but systematically examines and clarifies the underlying set of ontological and epistemological assumptions that underpin every research activity. After a brief discussion on ontology and epistemology, the Information Systems field and its underlying paradigms are discussed and what follows is an analysis of positivism, interpretivism, and a presentation of selected interpretive approaches. Hence, this chapter serves as a guide to be followed by researchers who would like to clarify and evaluate their views regarding epistemological and ontological assumptions, initiating a philosophical enquiry of their own. Consequently, it contributes in aiding the researcher to build a solid background upon which valid and rigorous research in the Information Systems field should be anchored.

Ontological and epistemological elements in information systems research are introduced by Francis Cua and Tony Garrett. The chapter argues that ontology, epistemology, and methodology intertwine in a dynamic way. Ontology, as well as epistemology, is both an antecedent and a consequence of methodology. This complex relationship has an impact on the methodology which will affect the outcome later on. Understanding how these three elements can be related to each other can help researchers develop better methodologies for information systems research.

#### Section 1.2: Guidelines

The next four chapters provide guidance for specific research approaches. John Loonam and Joe McDonagh to discuss the application of a Grounded Theory Methodology (GTM) in addressing enterprise systems (ES) implementation within the Irish health services. In particular, this chapter will be of benefit to researchers and practitioners endeavouring to focus on ERP implementation within health care organisations. There is a lack of empirical literature to explain the application of GTM for IS inquiry within health care organisations. This empirical vacuum is even more lacking when we turn our attention to ES implementations. This chapter will be comprised of two main sections. The first section introduces GTM, clearly illustrating its benefits to IS inquiry. The second section provides the reader with an application of GTM in practice. The chapter concludes with reflections on GTM as an approach for IS empiricism.

The chapter by Khalid Al-Mabrouk and Kieran James is a polemic which aims to draw attention to the problems associated with use of Western economic rationalist and positivistic worldviews when

studying IT Transfer issues in the developing world. In particular the authors challenge the extensive use of the term “success” in the extant mainstream IT Transfer literature, arguing that it is problematic for several reasons. Mainstream IT Transfer research portrays IT Transfer as primarily linear, incremental, and progressive in line with the economic rationalist belief that a “rising tide lifts all boats.” They suggest Marx’s theory of dialectical materialism as an alternative to the dominant hegemony and encourage researchers in IT Transfer to accept the fact that internal contradictions are part of a dialectic system. IT Transfer researchers are encouraged to view local resistance more sympathetically. Concerted efforts should be made to understand and dialog with the Other. Recommendations are made for more interview-based case study research in preference to mass-mail out surveys which may prove ineffective in reaching a broad segment of the population in non-Western locations. It is suggested that the existing literature’s preoccupation with educated urban elites and transnational corporations may also prove to be a hindrance to both our increased understanding and radical social change.

João Porto de Albuquerque and colleagues from Hamburg explain that research in the Information Systems (IS) field has been characterised by the use of a variety of methods and theoretical underpinnings. This fact recently raised concerns about the rigour of scientific results of IS research and about the legitimacy of the IS academic field. On the other hand, a number of IS researchers has argued for a view that values diversity as a strength of the IS field. This chapter supports this viewpoint and analyses the relation between IS research and concepts originating from theoretical debates around transdisciplinarity. The authors present results from a group of researchers of various disciplinary backgrounds towards an integrative platform for the orientation of transdisciplinary IS research. The Mikropolis platform provides researchers with a common language, allowing the integration of different perspectives through exchange of experiences and mutual understanding. They also discuss some practical issues that arise from the transdisciplinary cooperation in IS research.

### Section 1.3: Epistemology

This section includes three chapters focused on Epistemology. The chapter by Paul Witman and Kapp Johnson provides a set of guidelines to assist information systems researchers in creating, negotiating, and reviewing nondisclosure agreements, in consultation with appropriate legal counsel. It also reviews the use of nondisclosure agreements in academic research environments from multiple points of view, including the perspectives of both public and private sectors. Active academic researchers, industry practitioners, and corporate legal counsel all provided input into the compiled guidelines. An annotated bibliography and links are provided for further review.

Slinger Jansen and Sjaak Brinkkemper are concerned that although information systems is a maturing research area, information systems case study reports generally lack extensive method descriptions, validity defense, and are rarely conducted within a multicase research project. This reduces the ability to build theory in information systems research using case study reports. In this chapter they offer guidelines, examples, and improvements for multicase studies. If information system researchers conform to these guidelines, more case study reports may be published, improving the rapidly maturing research area of information systems.

The chapter by Erja Mustonen-Ollila and Jukka Heikkonen gives important methodological, theoretical, and practical guidelines to the information system (IS) researchers to carry out a historical study. This study shows how a new theory can be discovered inductively from historical studies using a methodological guideline from previous researchers; using multiple data collection methods, such as semistructured interviews, archival files, and published news; and using novel data analysis methods from learning and intelligent systems, such as the Self-Organizing Maps (SOMs), SOMs combined

with U-matrices, and the Bayesian network modeling. The chapter also outlines the benefits, the main problems, the characteristics, and the implications of historical research in the information system field. Finally some research directions are provided for historical research.

## **Part 2: Information Systems Research Applications**

The second part of the book includes research related to information systems applications divided into four sections: software development, ICT adoption, Web services, and e-marketing.

### **Section 2.1: Software Development**

This section comprises four chapters. Large-scale systems development is a complex activity involving number of dependencies that people working together face. Only a few studies concentrate on the coordination of development activities in their organizational context. Paivi Ovaska's research study tries to fill at least part of this gap by studying how systems development process is coordinated in practice. The study uses a multimethodological approach to interpret coordination of systems development process in a contemporary software organization in Finland. The methodology is based on the empirical case-study approach in which the actions, conceptions, and artefacts of practitioners are analyzed using within-case and cross-case principles. In all the three phases of the study, namely multisite coordination, requirement understanding and working with systems development methods, both the qualitative and quantitative methods were used to an understanding of coordination in systems development. The main contribution of this study is to demonstrate that contemporary systems development is very complex and more driven by opportunity than is currently acknowledged by researchers. The most challenging part of the research process was the combination of qualitative and quantitative methods, because of the lack of multimethodological work done in IS discipline.

Usability Evaluation Methods are plentiful in the literature. However, there appears to be a new interest in usability testing from the viewpoint of the industry practitioner and renewed effort to reflect usability design principles throughout the software development process. In this chapter, Judith Symonds and Andrew Connor examine one such example of usability testing from the viewpoint of the industry practitioner and reflect upon how usability evaluation methods are perceived by the software developers of a content driven system and discuss some benefits that can be derived from bringing together usability theory and usability evaluation methods protocols used by practitioners. In particular the authors use the simulated prototyping method and the "Talk Aloud" protocol to assist a small software development company to undertake usability testing. They propose some issues that arise from usability testing from the perspectives of the researchers and practitioners and discuss their understanding of the knowledge transfer that occurs between the two.

Soft Systems Methodology (SSM) has been employed to increase the effectiveness of organizational requirement analysis in software development in recent years. Various forms of SSM for software development have been developed and examined in different environments by different researchers. There is little research or application that can be identified of the use of SSM in software maintenance. Ivan Lai and Joseph Mula develop a SSM model for software maintenance, so that further research can be undertaken using this conceptual model.

Recently, many organisations have become aware of the limitations of their legacy systems to adapt to new technical requirements. Trends towards e-commerce applications, platform independence, reusability of prebuilt components, capacity for reconfiguration and higher reliability have contributed to the need to update current systems. Consequently, legacy systems need to be re-engineered into new

component-based systems. This chapter, by Valverde and colleagues, shows the use of the design science approach in information systems re-engineering research. In this study, design science and the Bunge-Wand-Weber (BWW) model are used as the main research frameworks to build and evaluate conceptual models generated by the component-based and traditional approaches in re-engineering a legacy system into a component-based information system. The objective of this evaluation is to verify that the re-engineered component-based model is capable of representing the same business requirements as the legacy system.

## Section 2.2: ICT Adoption

Three chapters are included in this section addressing diverse adoptions such as supply chain logistics, business intelligence, and EDI.

Logistics activities in a company consist of a wide scope of processes ranging from planning and implementing material flow and storage, services and information starting from the point of origin and ending at the point of consumption. If ICT could be used to support these activities, logistics cost would decrease over the long term and the efficiency of logistics activities would increase substantially. In this chapter, Shaligram Pokharel and Carman Ka Man Lee explain a method to study the impact of ICT in logistics companies. This type of study is useful to devise a long term business process improvement policy in a country or a region. The authors suggest methods for collection of data and presenting them through descriptive and statistical analysis. They suggest the use of T-statistic method to test relationship between various variables and ICT implementation. They provide a hypothetical case study to show the steps in the analysis. The chapter would be useful to researchers conducting studies on the impact and suitability of information and communication technologies in logistics and other service providing sector. The results obtained from this type of study can help the decision makers to understand the opportunities and hurdles in achieving greater efficiency in the organizational processes through the use of modern information technology.

Engineering asset management organisations (EAMOs) are increasingly motivated to implement business intelligence (BI) systems in response to dispersed information environments and compliance requirements. However, the implementation of a business intelligence (BI) system is a complex undertaking requiring considerable resources; yet, so far there are few defined critical success factors (CSFs) to which management can refer. Drawing on the CSFs framework derived from a previous Delphi study, William Yeoh and colleagues use a multiple-case design to examine how these CSFs could be implemented by five EAMOs. The case studies substantiate the construct and applicability of the CSFs framework. These CSFs are: committed management support and sponsorship; a clear vision and well-established business case; business-centric championship and balanced team composition; a business-driven and iterative development approach; user-oriented change management; a business-driven, scalable and flexible technical framework; and sustainable data quality and integrity. More significantly, the study further reveals that those organisations which address the CSFs from a business orientation approach will be more likely to achieve better results.

A review of the literature showed that there appears to be very little research undertaken on EDI adoption by SMEs particularly in Singapore. The study by Ping Li and Joseph Mula is a preliminary attempt to quantify this area. Using a survey-based methodology, the research examined EDI adoption. Results indicate that Singapore SMEs confirm finding by some researchers that EDI adoption is significantly associated with a firm's annual sales but is not significantly associated with employee size as other studies have shown. This study is at odds with previous single-dimension EDI adoption studies indicating a significant relationship between firm size (annual sales) and EDI depth. Organization size showed a



significant relationship with the volume and diversity of EDI use but not with the depth and breadth. The most important reason for Singaporean SMEs to adopt EDI was pressure from their EDI-capable trading partners, treating pressure from their competitors as the least important.

### Section 2.3: Web Services

The focus of this section is on the development and use of Web Services. Using geographical information systems (GIS) has been of great interest lately. A lot of GIS applications are being introduced to regular and noncomputer-expert people through their everyday used machines such as cars (GPS), mobile (location systems), Internet (locating systems and direction guiders), and others. Google Earth, a free online application, is one of those online geographical systems that provide users with a variety of functionalities towards exploring any place on the earth. The software uses Internet to connect to the online world database and travel in seconds between cities. In this chapter, Hatem Halaoui briefly explores Google Earth and presents a possible future view and an extension of this GIS application by adding a time feature that gives Google Earth the ability to store the history of the geographical information that leads towards a new Google Earth: A History of Earth Geography. For this purpose, the chapter presents storage and indexing approaches to be used for the storage, indexing, retrieval and manipulation of geographical data used by the geographical database of the world used by Google Earth.

Web technologies are being even more adopted for the development of public and private applications, due to the many intrinsic advantages. Due to this diffusion, estimating the effort required to develop Web applications represents an emerging issue in the field of Web engineering since it can deeply affect the competitiveness of a software company. To this aim, in the last years, several estimation techniques have been proposed. Moreover, many empirical studies have been carried out so far to assess their effectiveness in predicting Web application development effort.

In the chapter, Sergio Di Martino and colleagues report on and discuss the results of the most significant empirical studies undertaken in this field.

### Section 2.4: e-Marketing

The final section of the book concentrates on e-marketing and comprises two chapters related to cellular phones and online auctions.

Recently, cellular phones capable of accessing to the Internet are prevailing rapidly in Japan. First, Kazuhiro Takeyasu examines their functions and features. The chapter considers classification of the services offered, the characteristics of cyberspace communication tools and their comparisons with mobile instruments, and strengths and weaknesses of mobile phones. Then, mobile marketing is discussed from various perspectives including the ability to use real-time marketing, online coupon marketing, ease of customer navigation, seamless purchase procedures, and retrieval and utilization of information without time and spatial restriction. The author analyzes the differences in meaning between so-called four Ps in real commerce marketing and those in cyberspace marketing. Finally, several cases using cellular phones are analyzed.

Online auctions are an increasingly popular avenue for completing electronic transactions. Many online auction sites use some type of reputation (feedback) system—where parties to a transaction can rate each other. However, retaliatory feedback threatens to undermine these systems. Retaliatory feedback occurs when one party in a transaction believes that the other party will leave them a negative feedback if they do the same. Ross Malaga examines data gathered from E-Bay in order to show that retaliatory feedback exists and to categorize the problem. A simple solution to the retaliatory feedback problem—feedback escrow—is described.

## **BOOK DEVELOPMENT PROCESS**

A double-blind review process was used for all chapters submitted to the editors. Authors of selected chapters were invited to act on the reviewers' comments and resubmit their chapters to the editors. Chapters were checked and final revisions applied.

We have enjoyed the process of compiling this book and in particular working with the contributors who provided such wide-ranging contributors on the topic of information systems research. It is up to you, the readers, to decide whether the perspectives offered here are relevant to your research or to the practical application of the concepts in your organisations. We would be delighted to hear your feedback on the usefulness of this collection.

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