

# Advanced Topics in Global Information Management



**Felix Tan**



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# **Advanced Topics in Global Information Management**

**Volume 1**

Felix B. Tan  
University of Auckland, New Zealand

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# Preface

A growing body of knowledge is being accumulated in the area of global information management (GIM). Research in this field has grown significantly in the 1990's. Not only are established information systems (IS) journals publishing an increasing amount of GIM research, but there are now journals like the *Journal of Global Information Management* that publish research specific to the field.

What exactly is global information management? GIM research can be broadly considered to be of two types—one that is global and the other regional. GIM is a field of study that examines the development, implementation, management and use of IS in a global/international context (for example, global sourcing/supply chain management, global planning in multinational companies, global e-business strategies, and cultural/language issues). At the same time, GIM research also deals with management, technological and use of IS issues in a single- or multi-country organizational environment (for example, outsourcing experiences in U.S. and U.K. organizations, national information infrastructures in less developed countries, and IS project characteristics and performance in Kuwait).

Topics of study in GIM research are therefore highly diverse. This book contains a selection of research papers on a wide range of GIM topics. It is hoped that the book will advance our understanding of the field. It is the first of a series of books on the subject. The book is organized into 2 sections—global themes and regional perspectives.

## Global Themes

The chapters in this section explore various IS issues in a global/international setting. The chapter by Gangopadhyay and Huang examine the issues relating to multilingual electronic commerce, in particular, the nature of user interactions in multilingual electronic catalogs. Galliers and Newell review and contrast the experiences of two multinational companies in attempting significant change projects incorporating information and communication technologies. Cheung and Lee develop and test a model on trust in the context of Internet shopping. Katz considers the impact of culture and business strategy on the organizational and information technology infrastructures of global competitors. Allgood discusses how the global nature of Internet-based share trading impacts the players in the competitive stock brokering environment. Moores and Gregory report on a case study that highlights the difficulties in applying Soft Systems Methodology in the development of IS in an Eastern culture. Kaye and Little argue that the assumptions of universality and

common linear pathways of development are flawed because of cultural conflicts. Westland explores the lessons Internet auction markets can learn from securities market automation by considering exchanges in Chile, Russia, and China. Mantelaers and van den Berg investigate issues relating to the development and management of transnational information systems. Usoro probes how global planning is achieved in multinational companies in the U.K. and South Africa. Dirksen calls for more cultural considerations in the study of information systems.

## **Regional Perspectives**

The chapters in this section delve into various IS issues in a single- or multi-country organizational setting. The chapter by Lacity and Willcocks detail the results of a survey of IT outsourcing experiences in U.S. and U.K. organizations. Kidd and Yau discuss the nature of computer software that has been imported from Japan to the UK to control imported production systems and /or to control management data flows. Meso and Duncan study the relationship between national information infrastructure and social development, suggesting ways governments of least developed countries may enhance their nations' growth by developing strategic plans for national information infrastructure. Kern and Willcocks present findings from thirteen UK organizations on the role of outsourcing contract and its purpose for ensuring control over the client's outsourcing destiny. Joia develops and tests a model to link effectively different information technologies in order to coordinate a metabusiness using a case study of a major engineering firm in Brazil. Scheepers and Mathiassen consider the development and implementation of information technology in South Africa based on experiences in Scandinavia. Aladwani discusses why managers cannot rely on prescriptions suggested by IS projects research in developed countries to understand IS projects in developing countries. Gottschalk presents results from a survey done in Norway on IS managers' leadership roles. Dhillon, Moores and Hackney argue that many emerging economies, like India, may face potential misalignment of interests with the advent of networked organizations. Malhotra contends that there is a need for assessing knowledge capital at the national level and discusses current and future assessment methods. Tomiuk and Pinsonneault offer a conceptual framework to better understand the assess the impact of information technology on customer loyalty in retail banking. Snoke and Underwood investigate the differences between academic and industry views of the desired generic attributes of IS graduates in Australia using a Delphi study.

# Acknowledgments

I am grateful to the authors. Without their contributions this book would not have been possible. I would also like to thank Ms. Jan Travers, Dr. Mehdi Khosrowpour, and the team at Idea Group Publishing for their efforts and assistance in getting this book to print.

Felix B. Tan  
August 2001

# **Section I**

## **Global Themes**



## Chapter I

# Multilingual Electronic Commerce in a Global Economy

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The purpose of this research is to further the knowledge required for building electronic commerce systems that operate in multiple languages in global settings. The issues in multilingual electronic commerce are presented in two parts. First we describe a bilingual electronic catalog that can be used by online retailers for selling products and/or services to customers interacting in either English or Chinese that was developed to investigate into the nature of user interactions in multilingual electronic catalogs. Second, we discuss issues in developing multilingual electronic catalogs.

## INTRODUCTION

As all of commerce is converging on the Internet, the nature of business is changing rapidly. One of the main features of business on the Internet is the ability to transcend geographic boundaries. But along with the benefits of the widespread outreach of the virtual marketplace come many challenges. An example of such a challenge is to provide cost-effective interchange across language and culture. Many organizations are confronted with the requirement of making their products or services available in multiple languages, particularly in their Asian and European markets. Internationalization of systems may involve enabling the input and display of non-English characters, changing default formats for date, time, currency, and measuring units, and using Unicode to handle the mix of European and Asian characters for complex operations such as rolling up data from multiple sites in many languages around the world<sup>1</sup>.

While language technology (Nirenburg, 1992; Onyshkevych & Nirenburg, 1995; Sheremetyeva & Nirenburg, 1996) is making rapid progress, much research is needed in managing and accessing multilingual information in order to reach full potential of global electronic commerce (e.g., Malhotra, 1997, 1998).

The purpose of this research is to further the knowledge required for building information systems that operate in multiple languages. Specifically, we focus on studying user behavior in performing various tasks in a multilingual system. In order to study user behavior and performance in a multilingual electronic commerce setting, we have designed a bilingual electronic catalog which can be used by online retailers for selling products and/or services to customers interacting either in English or Chinese.

An electronic catalog is a graphical user interface that presents product and/or service information to users, typically using the World Wide Web. An electronic catalog is a key component of electronic commerce that has been used for business-to-consumer commerce as well as business-to-business commerce (Adam et al., 1998). Although the term “electronic catalog” might sound like an electronic extension of chapter catalogs, it offers features that are far beyond those found in chapter catalogs. Such features include computational services such as efficient browsing and searching, online order processing such as checking out products using shopping carts and secure payment mechanisms, and backend processing such as integration with company databases (Segev et al., 1995). These features have extended the role of electronic catalogs to the point of being used as electronic storefronts.

With the rapid proliferation of electronic commerce both in local and global markets, there is an increasing need to provide support for internationalization such as foreign currencies, different date and time formats, sort order, and multiple languages (Broin, 1999). The need for providing multilingual support is echoed by the rapid increase of non-English speaking users in the Internet.

The rest of the chapter is organized as follows. In the next section we describe the electronic catalog and its components. Next, we discuss issues related to language preferences by bilingual users, based on an experimental study. Next we discuss various issues in designing multilingual systems. The last section contains our conclusions and future research directions.

## A BILINGUAL ELECTRONIC CATALOG

### Description of the Catalog

A prototype electronic catalog has been implemented in the World Wide Web using ColdFusion 4.0 as the front end, which is connected to a Microsoft Access database at the back end, using an ODBC driver. The catalog is composed of two identical interfaces in two languages: English and Chinese. Following the unified content model (Doherty, 1999), the English interface has been translated element by element into the Chinese interface, with the only difference being the order in which the products are sorted.

The purpose of using the unified content model was to eliminate any presentation bias in user preferences. The front-end interface is shown in figure 1, which shows two language options (English and Chinese) and two separate applications (Office Supplies and Food Market). Figures 2a-2b show the second-level interface that is invoked once a user selects

Figure 1: The front-end interface



Figure 2a: Three modes of search in English

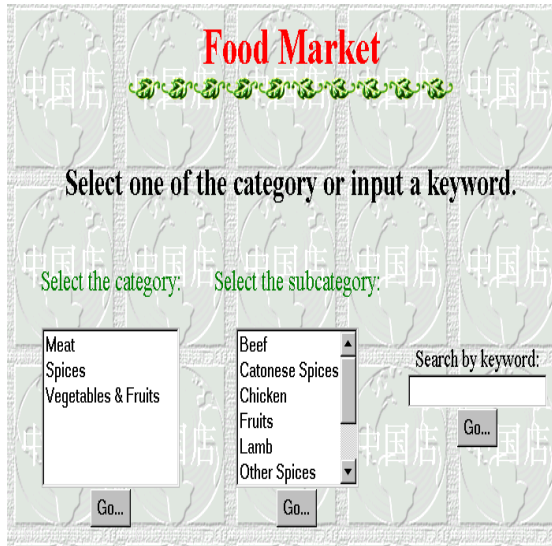


Figure 2b: Three modes of search in Chinese



the Food Market application in the English and Chinese versions, respectively. There are three modes of operations that a user can select in order to interact with the system: browsing mode, searching mode, and matching mode. In browsing mode, the user is looking at the products available in the catalog without having any specific item in mind, which is supported by the list box “Select the category:” in Figure 2a. In searching mode, the user is searching for a product class without having a specific item in mind, which is supported by the list box “Select the subcategory:” in Figure 2a. In matching mode, the user has a specific item in mind,



which is supported by the text box “Search by keyword:” in Figure 2a. Once the user selects a category, all products in that category are listed at the next level interface, an example of which is shown in Figures 3a and 3b for the English and Chinese versions, respectively.

Figure 3a: Category selection in English

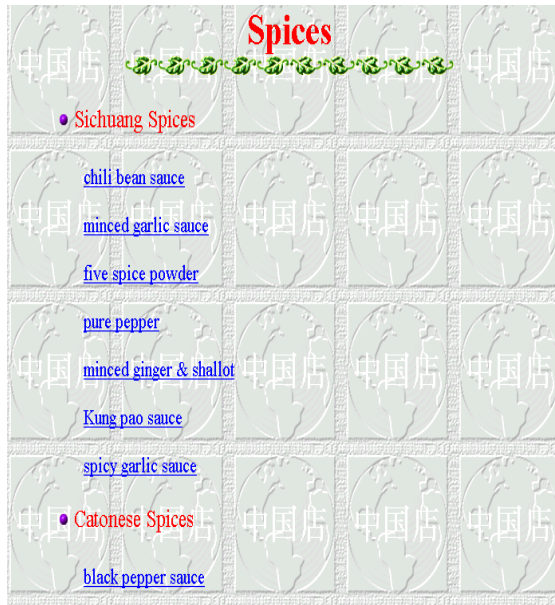


Figure 3b: Category selection in Chinese



When an item is finally selected, the product information is displayed. At this point the user has the option to include the product in the shopping cart, continue to shop, or go back to the initial interface, as shown in Figures 4a and 4b for the English and Chinese versions, respectively.

The second level interfaces for the Office Supplies application are shown in Figures 5a and 5b for the English and Chinese versions respectively.

## Language Preferences

The system described above was used in an experiment to study how bilingual users exhibit language preferences in interacting with system. The details of the experimental design and test results are described in Gangopadhyay and Huang (2000). From these experiments we developed several implications for future research and practice in global electronic commerce. Firstly, users clearly indicated that they preferred to use their ethnic language (Chinese, in this case) when searching for ethnic products because it is difficult to translate them into another language such as English. Hence although the unified content

Figure 4a: Product information in English



Figure 4b: Product information in Chinese

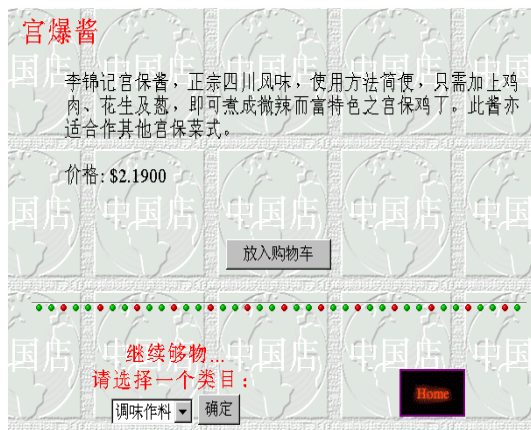


Figure 5a: Office supplies application–English



Figure 5b: Office supplies application–Chinese



model (Doherty, 1999) is easier to implement in a global electronic commerce system, it may not be a good strategy, from a user interface standpoint, for all product categories.

Another closely related issue is the level of understanding of the information presented for bilingual users. The experimental results indicate that the subjects performed tasks equally well in both Chinese and English when dealing with structured information. However, when dealing with unstructured information, there was a significant improvement in their performance when the language of interface was Chinese as opposed to English. While it will take more research to establish a relationship between language preference and

information complexity, such research can render significant insights into the design of multilingual interfaces for global electronic commerce.

In multilingual systems that depend on word-for-word translation from one language to another, a lot of information may be lost during the translation process. For example, it is hard to tell the differences between “table” and “desk” in Chinese. In these cases, images may be helpful to present product information. It is also worthwhile to study the effect of multimedia information on user performance and satisfaction in global electronic commerce.

## DESIGN ISSUES IN MULTILINGUAL SYSTEMS

One of the major problems in global electronic commerce stems from differences in language and format, disparity in catalogs, lack of flexibility in the way information is organized, and case-to-case translations (Leger et al., 2001). Typically, there are several groups of users interacting with a multilingual system in global electronic commerce: manufacturers, content providers, and users. Manufacturers and content providers add new products, delete and modify existing product information, and maintain articles, descriptions, and other information about products. Users are the customers that interact with the system to gather information, search for specific products, and perform business transactions, including purchases and returns. In a system that supports multilingual electronic commerce, the content providers would like to manage the content in their own language but reach customers from many different nationalities, without having to deploy large translation resources. The users, likewise, would like to interact with the system in their own native language without having to worry about the location of the organization housing the system and their language preferences. There are several functions that have to be supported in this context:

1. Natural language interface: Since both content providers and users interact with the system in their native language, the system contains a natural language processor. In addition to extracting the meaning of the requests made by the users and content providers, the system must also be able to integrate and classify new product information using domain knowledge.
2. Maintaining multilingual catalogs: Since the products and services that are offered must be made available in many languages, an automated language translator must be available to create and maintain catalogs in multiple languages.
3. Business support: In addition to the above, support for special business transactions must be provided in multiple languages. Examples of such transactions include contract negotiation, product liability information, and copyright protection.

### Ontology-Based Multilingual Support

Most of the recent developments on machine translation and natural language support in multiple languages make use of ontologies for modeling domain knowledge (e.g., Agnesund, 1997, Leger et al., 2000) as well as linguistic knowledge (Mahesh et al., 1995; Bateman et al., 1994; Simons et al., 1995). In addition to natural language support, ontologies are also being used in adding semantics to structured languages such as XML (e.g., Erdmann et al., 2001). The main advantage of using ontologies is that knowledge can be captured in a language-independent manner. Agnesund (1997) raises two fundamental questions for developing