

Management of Global Information Systems: A Review of Research from 1999-2007

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Abstract. Understanding the meaning and current status of global information systems (IS) research is essential to realize its potential in the changing business world. The purpose of this paper is to present a review of research studies in global IS during the recent years. Based on a taxonomy suggested by leading researchers, the paper explores the main themes addressed in global IS literature, and how researchers are approaching this field. Some of the main findings show that more research on IS for global enterprise management and cross-cultural research from different geographical sites is needed. Also, the paper encourages researchers to adopt new research methods in global IS research.

Introduction

Globalization of economy and advances in information technology (IT) are two trends that have dominated the business world during the last decades. Globalization is a complex phenomenon, which reflects the interconnection of societies in terms of economic, political and cultural aspects (Giddens, 2002). Information and communication technology has contributed greatly to the opportunities and feasibility of globalization, by enabling new modes of work, organization and communication across time and space (Walsham, 2001) and facilitating the coordination and movement of goods and services (Palvia and Wang, 1995).

The use and impact of global information systems (IS) are important issues for businesses today. According to Ives and Jarvenpaa (1991), a global application contributes “to achieving a firm’s global business strategy, by using information technology platforms to store, transmit, and manipulate data across cultural environments” (p. 34). In this paper, global IS is defined as the development, use and management of information systems in a global or international context. National differences, including political and economic factors, infrastructure capabilities, physical environments and cultural issues, may effect implementation and use of information systems. Thus, an understanding of opportunities and challenges related to global IS is essential to understand its importance in the changing business world.

Global IS management research takes up the challenge to advance from research limited to a single country to research spanning multiple countries. In recent years, research on global IS has received increased attention. However, the majority of research studies have been isolated studies focusing on particular aspects of global IS. A literature search conducted by Lehman and Gallupe (2004) shows that less than 1% of the published IS literature in academic periodicals deals with IS in international settings. They argue that more academic research is needed from different research stands and methodologies. It is important to understand the current status of global IS research.

Based on a research framework from Gallupe and Tan (1999), the objective of this paper is to generate insights of main issues addressed in the global IS literature during the recent years and explore examples of challenges and opportunities with global IS in organizations. Moreover, the paper aims to identify areas that have been neglected in previous research. The complexity of issues related to implementation and use of IS in international or global organizations requires a systematic review exploring different aspects of the existing literature. The Gallupe and Tan framework is based on a literature review covering the period from 1990 to 1998. Thus, the time span from 1999 till 2007 was considered appropriate for the literature review presented in this paper.

The remainder of the paper is organized as follows: The next section briefly presents former classifications of the global IS literature. The literature review methodology is then outlined, including definitions of the classifications and categories of the research literature. This is followed by a presentation of some general findings and trends. Finally, the paper discusses and summarizes the main findings and suggests areas for further research.

Related research

Information systems have played an important role in organizations' response to globalization, by contributing to the feasibility and opportunities of globalization. Also, national differences may affect the implementation and use of IS when transferring technologies in different countries (King and Sethi, 1999). Palvia et al. (1998) identified three main components of global information systems; IS/IT that are global in scope, IS/IT in different cultures and countries, and IT products and services that are built in one country and used in another country.

The high degree of diversity across several critical dimensions; culture, business practices, technical context and social mores, makes global IS a complex area (Lehman and Gallupe, 2004). Past research into global IS has been sparse and sporadic, and have focused on technical and implementation issues. More academic research is thus needed from different research stands and methodologies (ibid.).

Several articles have concentrated on key issues in the global management of IS. In an earlier study of Fortune 500 firms, Ives and Jarvenpaa (1991) identified four main areas important for successful global IT use: (1) the linkage of global IT to global business strategy, (2) information technology platforms, (3) international data sharing, and (4) cultural environments. Palvia et al. (2002) present a model, which suggests that key global IS/IT management issues are influenced by both country-specific and firm-specific factors. Country-specific or environmental issues comprise level of economic development of country, political/regulatory factors, and cultural issues, while firm-specific factors include

type of firm and global organizational strategies. The IT management issues, in turn, influence the global business and global IT strategy.

In their article, Gallupe and Tan (1999) provide a framework or manifesto for research in global information management (GIM). They define GIM as the development, use and management of information systems in a global/international context. By combining the three dimensions of research categories, research strategies, and research themes, the framework aims to identify sub-areas for GIM research. The Gallupe and Tan framework adopts the definitions and categorizations from the commonly cited model by Ives et al. (1980) and extends this model in a global environment. Together the three variable groups in the model; global environment characteristics, global process variables, and global IS characteristics, provide a number of different perspectives for global IS/IT research (see figure 1).

Research frameworks provide a guideline for other researchers to structure their own research and focus on specific areas for further research. In this paper, the Gallupe and Tan framework is adopted to categorize and analyze recent global IS research. Also, by using the same categories, it is possible to compare main findings from this study to earlier research, and discuss how research in this area has developed in terms of research themes addressed and research methods used.

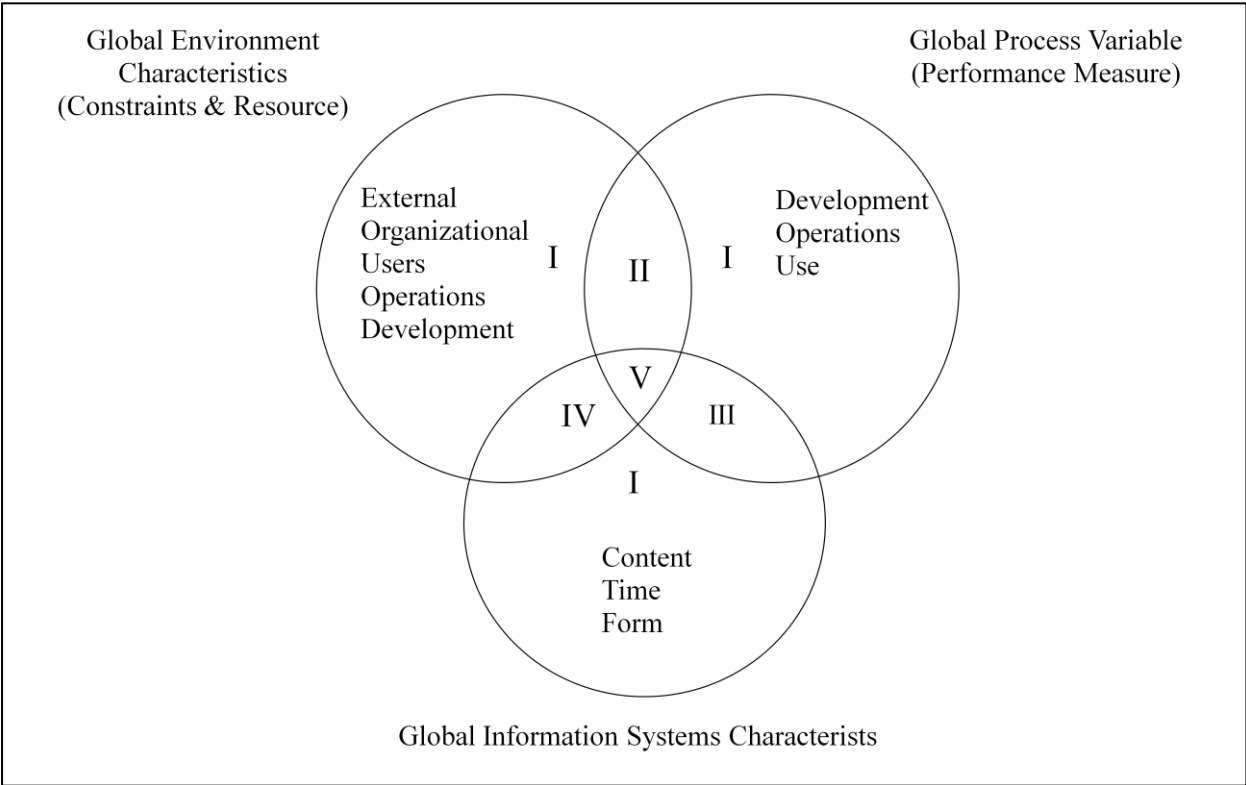


Figure 1. Five Categories of Global Information Management Research (Gallupe and Tan, 1999).

Methodology

Literature review is a source for getting a solid foundation for further research and for suggesting areas that need particular attention (e.g. Cooper, 1998; Webster and Watson, 2002). Within interdisciplinary areas such as global information systems, there clearly is a need for accumulation of knowledge to learn from former research and support theory building.

The review aims to locate relevant research articles published in peer-reviewed academic journals during the period 1999-2007. To accomplish this, the literature review was conducted in several steps to provide a systematic and explicit method.

Literature search

A systematic literature search was conducted to identify a substantial and representative sample of articles on global IS management, involving the following steps:

- (1) Keywords were identified based on earlier relevant research on global IS (e.g. Ives and Jarvenpaa, 1991; Palvia et al., 2002; Gallupe and Tan, 1999). In the literature, variations of the term global information systems have been used. The following keywords were chosen as search parameters: global information systems/technology, transnational information systems/technology, multinational information systems/technology, and cross-border information systems/technology (including the abbreviations IS and IT).
- (2) A literature search was conducted during January-February 2008 in two online databases; EBSCOhost and Web of Science. The search included research published between 1999 and 2007, thus extending the former review by Gallupe and Tan (1999) covering the period 1990-1998. The search procedure was restricted with filters that limited the search to articles where the combination of keywords occurred in the title, abstract or keywords. The aim of the paper is to illuminate global IS research from a research based stand. Thus, a further filter was added, limiting the search to scholarly journals and peer-reviewed articles only, which excluded conference proceedings, book chapters, and newspaper articles. The initial search resulted in 136 unique articles.
- (3) Subsequently, based on an initial screening of the articles editorials of special issues and articles with peripheral relevance to the research focus were excluded, leaving 88 articles as the basis.
- (4) Based on the full text, and in some cases the abstract, the publications were then coded according to the classification model described in the next section. During the coding process, further exclusion of less relevant articles was conducted, resulting in a final sample of 74 articles

Classification of the papers

Webster and Watson (2002) state that, “an effective review creates a firm foundation for advancing knowledge. It facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed.” (p. xiii). Classification of the

materials included in a review is one of the challenges with respect to making a literature review.

The review aims to explore what are the main topics addressed in recent global IS literature, and provide examples of challenges and opportunities with global IS. It does not seek to report any correlation between the categories by identifying independent, dependent and intermediate variables. For such a discussion, see the framework suggested by Palvia et al. (2003).

The classification model is based on the analysis and framework from Gallupe and Tan (1999), supplemented with other commonly referred taxonomies in MIS research. It consists of four dimensions; research category, research design, global IS theme, and type of organization.

Research category

The first dimension, *research category*, defines the combination of research variables addressed in the articles. The variables can be grouped into three main groups as depicted in Table 1. A more thorough description of the different variables can be found in Ives et al. (1980).

Table 1: List of research variables (Gallupe and Tan, 1999)

Research variable group	Research variables
Global environment characteristics (constraints and resources)	External environment
	Organizational environment
	User environment
	IS operations environment
	IS development environment
Global process variables (performance measures)	Development process
	Operations process
	Use process
Global information systems characteristics	IS content
	Time of presentation
	Presentation form

Researchers can examine one or more variables within the same group or between different groups, which provides a number of research perspectives in global IS research. Based on this, the following five research categories can be identified (Gallupe and Tan, 1999):

- Type I: involves variables within a single variable group
- Type II: relationship between process and environment variable groups
- Type III: relationship between process and IS characteristics variable groups
- Type IV: relationship between environment and IS characteristics variables
- Type V: relationship between environment, process and IS characteristics variable groups

Research design

The second dimension, *research design*, refers to how the researcher(s) have approached the global IS research field. The literature review adopts the research design categories suggested by Chen and Hirschheim (2004), which resembles the research strategies in the Gallupe and Tan framework.

Table 2. Definition of research design (Chen and Hirschheim, 2004)

Research design	Definition
Survey	Studies that gather data by means of questionnaires
Case study	Studies that are involved with a single site or a few sites over a certain period of time
Laboratory experiment	Studies that take place within a designed, controlled environment and usually involve special treatments of different groups to contrast the precise relationships among variables
Field experiment	As laboratory experiment, but conducted in a real-world setting
Action research	Studies in which the researchers are an integral part of the phenomenon under study
Others	Articles that are conceptual, descriptive/argumentative, and research with secondary data such as public records or existing datasets

Research theme

In the third dimension, the articles are classified according to the global IS theme addressed. Based on a content analysis of the publications in their review, Gallupe and Tan revealed six distinct global IS research themes (see table 3). They found that, although the global IS research field has a number of similarities with other MIS studies, there are several distinct themes for global IS research.

Type of organization

The fourth dimension, *Type of organization* or industry, is often used as a variable in MIS research. The review classifies organizations into manufacturing, service and non-profit (Niederman et al., 1991).

Table 3. Global IS research themes (Gallupe and Tan, 1999).

Research theme	Description
Single country studies	The development, operations, management and use of IT in a domestic context
Comparative study of nations	The comparisons of IT development, operation, management and use between two or more countries
Culture and socio-economic issues	The effect of national culture on IT development, operations, management and use
Research frameworks and issues	Conceptual research offering frameworks, theory and research agendas on various aspects of global IS management
Global information resources management	The development, operations, management and use of IT in a global context
Global enterprise management	Functional management of enterprises across national boundaries using IS/IT. Includes the management of multinational and transnational operations.

Limitations of the review method

The method applied has several limitations. Relevant research may not be included due to lack of categorizing and indexing in the online databases approached in this review. Other valid sources could be conference papers, book chapters, online media, and so forth. However, it can be assumed that empirical and conceptual research is more likely to be found in journals than other forms of publications, and that high quality research in global IS would be published in academic journals.

Furthermore, the search is limited to two literature databases that only accept English-language publications, which may put some limitation on the countries studied. There is no quality assessment made regarding research methods in the studies or reported findings. It is expected, however, that editors and reviewers are guardians of the quality assurance.

The analysis is based on 'quantity' evidence, which may not reflect the influence of the different articles. An alternative approach could be citation analysis for an emphasis on quality, or a focused search in a selection of high-ranked IS journals and niche journals with focus on publishing global IS/IT research. However, the sample was considered appropriate for the objective of this literature review.

Findings

This section presents the results of the analysis of the 74 articles in the sample, and compares the main findings to earlier research in this field. As illustrated in Figure 1, there is an increasing number of publications during the period from 1999 to 2007, with most articles found in 2007. This trend has been emphasized in earlier studies on global IS literature (e.g. Palvia et al., 2002).

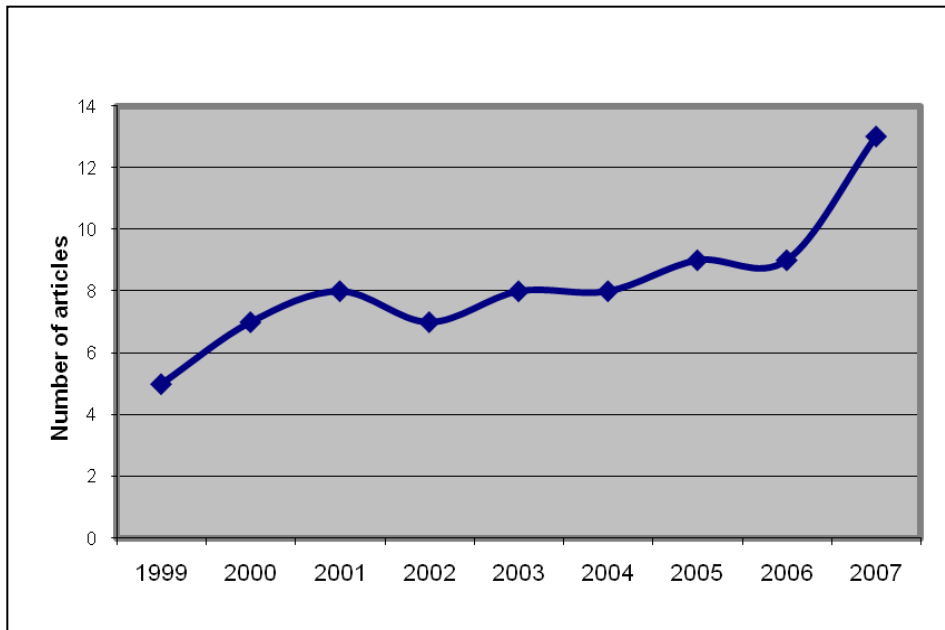


Figure 1. Number of articles published per year

Categories of global IS research

The articles were categorized into the five categories of global IS research defined by Gallupe and Tan (1999). The distribution of research per category is summarized in Table 4. Most publications focus on the relationship between process variables and environment variables. In Gallupe and Tan's analysis of IS research published during 1990-1999, most publications were found in the single variable group, which is the second largest category in this review.

Table 4. Publications distributed in the five categories of global IS research

Research category		No of articles	Percentage
Type I	A single variable group	22	30 %
Type II	Relationship between global process and global environment variables	40	54 %
Type III	Relationship between global process and global IS characteristics variables	5	6.7 %
Type IV	Relationship between global environment and global IS characteristics variables	4	5.3 %
Type V	Relationship between global environment, process and IS characteristics	3	4 %
Total no of publications		74	100%

Type I research:

Approximately one third of the articles addressed only one of the three research categories; global environment characteristics, global process variables or characteristics with the global IS. Publications in this category were typically descriptive or conceptual. Some of the articles discussed cultural, political, economic or legal variables. For example, Koong et al. (2007) provide a taxonomy and assessment methodologies for evaluating outsourcing decisions. Other studies emphasize characteristics of the information system, like the study of Carrao and Guindon (2000) which describes issues related to a global IS for tobacco control. In the Gallupe and Tan study, approximately 80 percent of the global IS research publications were single variable group research.

Type II research:

The majority of the articles, more than 50 percent, explore the impact of variables from the environment variable group on process variables – development, operation and use. In this category, the emphasis of research appears to be on the relationship between operation process variable and external/organizational environment variables.

A large portion of the research studies in the sample describes cultural issues, which supports earlier research arguing that national culture is an important factor in global IS research. For example, Avison and Malaurent (2007) describe a research study of an unsuccessful implementation of an ERP project in a Chinese subsidiary, suggesting that China has particular cultural factors that include language, governance, political and legal issues. Katz and Townsend (2000) examined the impact of culture on the organizational structure and IT infrastructure, and the study by Lai and Wong (2003) in foreign affiliates operating in several countries found that local culture, local regulation, and local competition had a moderating effect on the relationship strategy-effectiveness of a global information system.

Type III research:

Research within this category focuses on the influence of global IS characteristics on process variables. Five of the 74 articles in the sample (6 %) were classified in this category. For instance, Caseau (2005) analyzed the relationship between the quality of service of a global information system and business processes.

Type IV research:

This category of global IS research addresses the relationship between environment characteristics and global IS characteristics. Four of the articles, about five percent, fall within this category. One example is the research study from Bourma and Kamp-Roelands (2000), which seeks to explore how an environmental global information system could be designed to meet the expectation of external stakeholders.

Type V research:

Finally, the fifth category examines the relationship between variables from all three categories; environment, process and global IS characteristics. Only three of the 74 articles analyzed (4 %) were classified in this category. Braa and Hedberg (2002), for example, describe a research project to develop health information systems in South African districts.

The research takes cultural and economical factors into account, and describes a reform process which translates into standardization of health data.

Research design

The analysis also seeks to disclose the types of research design or research approach applied in global IS research. This is a frequently studied subject matter in MIS research (e.g. Chen et al., 2004). Figure 2 illustrates the breakdown of articles by research design. A significant number of the articles were descriptive, which is common in a new research area. Some conceptual frameworks were also found. Survey and case studies were the most preferred empirical research design, while only one action research study and one lab experiment were found in the sample.

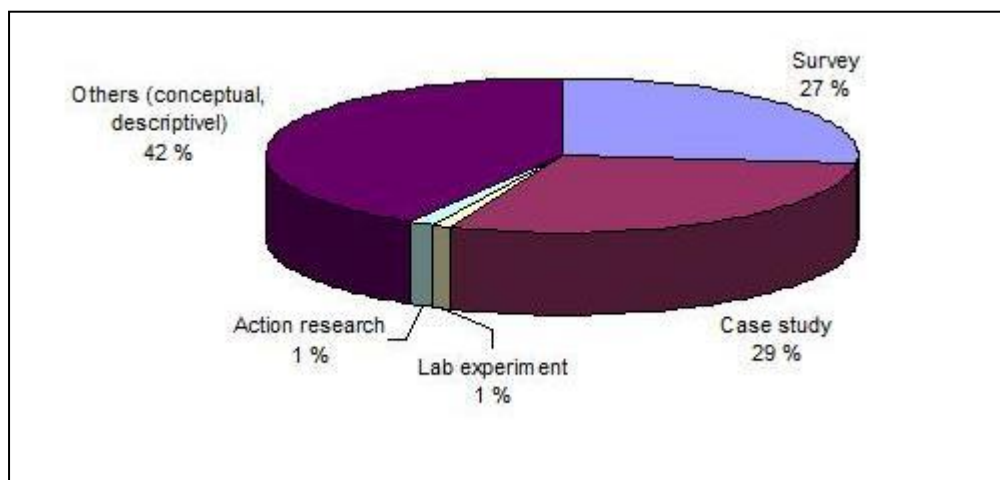


Figure 2. Research design used in the articles

Research Themes

Moreover, another objective of the literature review was to explore the research themes in recent global IS literature, by using the taxonomy suggested by Gallupe and Tan (1999) (see Table 3). Four of the descriptive articles did not easily fit into one of the categories in this framework. A typical example would be the article by Mabert et al. (2001), who present a view of enterprise resource planning systems as a management tool for companies to meet challenges faced by global businesses. Table 5 shows the results of categorizing the remaining 70 articles into the six global IS research themes. If an article described multiple research themes, it was classified according to the most dominant research theme.

Table 5. Global IS research themes in the sample

Research theme	Research theme count	Research theme percentage
Single country study	12	16.3 %
Comparative study of nations	13	17.6 %
Culture and socio-economic issues	8	10.8 %
Research frameworks and issues	14	18.9 %
Global information resources management	21	28.4 %
Global enterprise management	2	2.7 %
N/A	4	5.4 %
Sum articles	74	100 %

Single country studies:

Twelve of the articles in the sample are single country studies, focusing on different aspects of IS research in a domestic context. Most of these studies are conducted in developing countries or from the eastern part of Europe. For example, Bada (2002) argues that even though IS studies are beginning to examine the importance of adapting global IT-based practices when implementing in developing countries, the nature of these adaptations and the factors that shape them are still poorly understood. His article explores how a Nigerian bank implemented and adapted a global IT-based technique and the factors that influenced the adaptations. These single country studies are important since they add insights on global IS from different regions of the world. In the Gallupe and Tan study, nearly half of the studies fell into this category.

Comparative studies of nations:

There are also several studies comparing implementation and use of IS in different countries or regions. One examples of the thirteen research publications in this category is the study by Gottschalk and Khandelwal (2002), who present a global comparison on the growth of local and international IT management. Welch and Wong (2001) examined the impact of global information technology on the openness and accountability of bureaucracies.

Culture and socio-economic issues:

The results of the analysis suggest that cultural factors play an important role in global IS management. The main research theme in eight of the articles deals with the effect of culture on development, operation, management and use of global IS, like the global ERP-study from Sheu et al. (2004) and cultural influence on IT infrastructure in the study from Png et al. (2001).

Research frameworks and issues:

Nearly 20 percent of the articles are classified as conceptual research offering frameworks, theory and descriptions of various aspects of global IS management. Examples of articles in this category are the description of key data management issues in global executive

information systems (Kumar and Palvia, 2001) and the measurement model to evaluate the impact of IT in a global environment (Whitworth et al., 2005).

Global information resources management

An increasing number of studies deal with development, operation, management and use of IS in a global context, like studies of global IS management in multinational organizations. In his paper, Grant (2003) explores the impact of global enterprise system (ES) deployment on strategic IS alignment. Another example is the research study from King (2006), suggesting that the main drivers for global IT capabilities are human resource and information exchanges. The global information resources management theme accounts for 28 percent of the articles, and is at the top of the global research theme list. Compared to the study from Gallupe and Tan (1999), the findings suggest that this research theme has gained more attention during the last ten years.

Global enterprise management:

The most neglected global IS research theme in the sample period from 1999-2007 seems to be research into aspects of global enterprise management. This research theme focuses on use of IS to manage different cross-border aspects of the enterprise. Only two studies in the sample, less than 3 percent, were found in this category (Joshi et al. 2007; King et al. 1999). Multinational organizations are required to operate in different contexts, and more research is needed to provide insight into the role of global IS spanning national and organizational boundaries.

Type of organization

The majority of the global IS studies report from empirical studies in manufacturing. However, there are also several studies from non-profit organizations and service industry, as figure 3 illustrates.

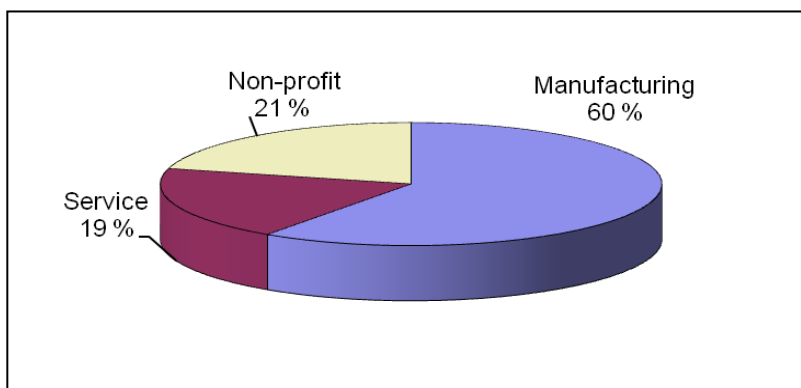


Figure 3. The distribution between different industries.

Discussion and implications

During the time period covered in this literature review an increasing number of global IS publications were found, suggesting that global IS continues to receive increased attention. In this section, some of the key findings from the analysis are discussed.

Limited number of variables addressed

The majority of the studies explore the impact of environment variables on process variables. Compared to the Gallupe and Tan study the global IS research field seems to be more sophisticated regarding the number of variables addressed. This finding may not be surprising as the global IS research field matures. However, the fact that 30 percent of the studies still address only one variable group may illustrate that research across multiply variable groups is complex to deal with in global IS research.

As emphasized in earlier studies, lack of research across variable groups may lead to research that does not take into consideration the many factors that make global IS particularly challenging (Gallupe and Tan, 1999). The findings suggest that research on the relationship between global IS characteristics and global process variables, and between global environment and global IS characteristics variables are areas that deserve more attention. In particular, comprehensive studies addressing the relationship between all three categories of variables are missing in the research field. According to Walsham (2001), diversity needs to be a key focus with respect to globalisation and IS.

Research approaches in global IS research

A large number of the articles were descriptive or conceptual frameworks, which is common in such relatively new research areas. However, there are also a considerable number of empirical research studies, and there is a balance between surveys and case studies in this review. Only a few articles used alternative research methods such as action research and lab experiments, which may indicate that questions and problems suitable for action research and lab experiments are lacking, or not in focus in the body of global IS research.

Themes of studies

Benbasat and Weber (1996) have characterized management of IS research as being fragmented. The detailed analysis of issues addressed in the articles suggests that global IS research is also characterized by diversity. However, a noteworthy point is that the most commonly studied theme is global information resource management. During the last decade an increasing number of studies have addressed issues related to development, management and use of IS in a global context. Compared to the study by Gallupe and Tan, the findings suggest that this research theme has gained more attention during the last ten years. This finding is consistent with a recent study on key issues for IT executives (Luftman and McLean, 2004).

The theme of global enterprise management seems to have been neglected by the majority of global IS researchers during 1999-2007. An increasing number of organizations are expanding their operations globally, and these organizations are required to operate in

different contexts. Thus, more research is needed to provide insight into the role of global IS spanning national and organizational boundaries. Also, cross-cultural studies from different geographical sites should get more attention as cultural differences may introduce additional problems to implementation and use of global IS.

Multiple and single-country studies

Another interesting finding is that the distribution among single country studies and comparative studies of nations appears to be very even. The single country studies typically reports from research studies in developing countries or newly industrialized countries from the eastern part of Europe. These “first generation” studies in different countries have laid the foundation and helped defined global IT (Palvia and Wang, 1995). Thus, an increased understanding of global IS issues in developing and newly industrialized country is needed. The multiple country studies typically focus on cross-cultural issues and are important for improving our understanding of opportunities and challenges with information systems in various cultural settings.

Limitations of the framework

For some of the articles in the sample, the categorizing into different research themes was not straightforward. Four of the articles did not naturally belong to any of the predefined research themes. Moreover, some of the articles addressed more than one of the research themes in the Gallupe and Tan framework. For example, some of the articles describing comparative studies of nations also addressed cultural issues. Alternatively, multiple versus single country studies could be used as a fifth dimension in the classification framework.

Conclusion

Based on a framework that classifies global IS publications into central aspects of IS research in a global context, the objectives of the research were to explore what are the focal themes in global IS research studies and identify areas in which more research is needed.

The findings from this literature review support the arguments from previous studies that the field of global IS research as a whole has not yet progressed from research in one or a few countries to research in multiple countries, and from use of traditional research techniques to also applying alternative research techniques such as action research. The analysis has also identified several gaps in the global IS research literature. There is a limited number of studies addressing global IS from a global corporate management perspective. Also, more cross-cultural research is needed from different geographical sites. A positive trend is that several studies were found dealing with development, operation, management and use of IS in a global context.

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