Association for Information Systems
AIS Electronic Library (AISeL)

AMCIS 1997 Proceedings

Americas Conference on Information Systems (AMCIS)

8-15-1997

A Study of Global Information Technology Key Issues: Influence of a Nations Level of Economic Development

Prashant C. Palvia
University Of Memphis

James E. Whitworth
University Of Memphis

Choton Basu
University Of Memphis

Paola Bielli
Bocconi University

A Study of Global Information Technology Key Issues: Influence of a Nations Level of Economic Development

Prashant C. Palvia, James E. Whitworth, Choton Basu;
University Of Memphis
Paola Bielli; Bocconi University

Abstract

The objective of this study is to aggregate the published data and information on global information technology (GIT) issues in various nations around the world to gain some insights into common factors or determinants that may have significant impact or influence on their ranking. Using cluster analysis on a sample of ranked IT issues from 16 different countries and regions of the world a model of the global IT environment suggested by Palvia and Palvia (1996) is partially supported. The data basically suggests an alignment between the level of economic development of a nation and the importance of various types of IT issues.

Introduction

Over the last few years there have been an increasing number of studies and articles published around the world that have identified and ranked global information technology issues in various countries. There is even a web page on the Internet today on the subject of GIT issues (ISWORLD.COM). Most of these studies have focused on individual countries although a few have attempted to look at the subject from a broader perspective (Palvia and Palvia, 1996). However, to date no one has attempted to analyze the data and information that has been collected and published. The objective of this paper is to aggregate the published data and information on GIT issues in various countries and regions of the world to gain some insights into common factors that may be important underlying, latent constructs. Cluster and principal component analysis techniques are used to analyze the data. A total of 22 different lists of IT issues (423 issues) were found for this study from 16 different countries and regions of the world. A common objective of the studies was the identification, analysis, and ranking of key management issues, concerns, and challenges that face information systems executives in a global or international environment. Starting in the mid-80's a series of articles started appearing in the MIS Quarterly that listed MIS management issues for US domestic corporations. (Dickson et al, 1984; Brancheau et al, 1987; Neiderman et al, 1991; Ball and Harris, 1992) In the last three or four years many studies following a similar approach, have appeared addressing international/global IT management issues The most recent study on this subject (Palvia and Palvia, 1996) is basically a compilation and ranking of global IT issues from previously published and unpublished studies over the last ten years. It provides the most comprehensive and up-to-date information on the subject. The most unique aspect of the study is the separation of issues identified into different regions of the world. A ranking of IT issues is postulated for:

- Developed/ Industrialized Nations

- Developing nations

- Newly industrialized nations

- Underdeveloped Nations

A model of the GIT environment is proposed that relates the level of economic growth of a country or region to the level of IT adoption and the types of IT issues faced. Also, a model is described for a GIT environment that relates three exogenous variables:

Level of economic development; Political system; Culture to two endogenous variables:

Key IT management issues; Global business and IT strategy

The major focus of this paper is to address the question:. Does the data collected to date on the subject of global IT issues support the hypothesis that there is a correlation between the ranking of issues and the level of economic development of a nation?

Data Collection and Analysis

The data used in this study was collected from previously published and non-published lists of IT issues in various countries of the world. Most of the data was found on the global IT issues ISWorld web page on the Internet. A complete list of the original source documents for the data is provided in the references. The issues and ratings are from 16 different countries or regions of the world. The data spans the period from 1987-1995. To make the analysis manageable the data was reclassified into the following seven categories of issues:

Business Relationship Issues including strategic planning, IT architectures, IT alignment, and data resource issues. This categorization of various strategic issues was suggested in Niederman et al (1991).

Human Resource Issues. This category was judged to be important in many of the countries and was kept as a separate category.

Quality and Reliability Issues. This was an important category for several countries.

Internal Effectiveness Issues. A grouping again suggested by the Niederman, et al study (1991) includes effectiveness measures and application portfolios. They also included software development and human resource issues in this category but they were kept separate for this study.

End-user Computing Issues. A category that did not always make the top of the list but was judged very important in several countries and regions.

Technology infrastructure Issues. A third category mentioned in the Niederman, et al study (1991) that includes telecommunication, EDI, IT infrastructure and distributed systems issues.

Systems Development Issues. This also included such items as concern for better project management and IS department productivity.

The following rules were followed in reclassifying the data:

- If a category consisted of multiple items the ranking from the highest ranked item was used.

- If a country or region did not have one of the seven categories on its list the item was given a rank of 20.

- The ranking is in decreasing order of importance, i.e. 1 is the most important, 20 is least important.

The data was analyzed using two different types of cluster techniques. A statistical package available as shareware on the Internet called Xl stat was used to perform: 1) a hierarchal cluster analysis using Wards clustering technique and 2) a non-hierarchal technique using the centroid method. The results of the hierarchical technique indicate that the data is best categorized into three groups. The make up of the three groups was defined using the centroid method. The results using the centroid method are summarized below:

Results of Cluster Analysis

Group 1	Group 2	Group 3
Africa	Hong Kong	U.S.
Poland	Singapore	North America
India	Slovenia	Europe
Gulf States	Taiwan	Great Britain
Estonia		Canada
South Korea		
Australia		

Again using xlstat a principle components analysis was performed. The results of this analysis also support the idea of three groups or factors. The first three components, with eigenvalues greater than 1.0 explain 67% of the variance.

The data seems to indicate that:

Developing countries tend to rank technology infrastructure, quality/reliability and human resource issues as most important.

Newly industrialized countries rank management and control issues such as human resources and end-user computing as most important.

Developed countries rank strategic business relationship issues (strategic planning, IT alignment, data resources), systems development and quality/reliability as most important.

Since there was not sufficient data to do a factor analysis another method of analysis was used. The countries and regions sampled were categorized as either developed, newly industrialized or developing and the average GDP per capita was calculated for each category. This categorization was basically a subjective judgement based on the gross domestic product GDP per capita for the country or region. The average GDP per capita for the cluster analysis groupings was then calculated. A t-test of the significance of the difference of the means between the cluster analysis groups and categories, i.e.:

Group 3 compared to developed countries

Group 2 compared to newly industrialized countries

Group 1 compared to developing countries

failed to reject the null hypothesis that they are from the same population. Therefore the data does support the hypothesis that the way the countries rank IT issues may be correlated with their level of economic development (See Table 1). This is also supported by an analysis of the average ranks for each type of issue for each group of countries. The three highest average rankings for the developed countries was for Business Relationship Issues, Systems Development Issues, and Human Resource Issues, just as postulated. The three highest rankings for the newly industrialized countries was for Human Resource Issues, End User Computing, and Business Relationship Issues. The three highest rankings for the developing countries was for Technology Infrastructure, Quality/Reliability, Human Resources, and Business Relationship Issues. These results are basically as postulated with the exception that Human Resources and Business Relationship Issues were ranked high by all three groups, not just the developed countries.

The classifications based on the cluster analysis, although not perfect, does demonstrate a close alignment between the three economic country categories and how they rank important IT issues. A cluster analysis was also performed to test the proposition that the data could be grouped into four instead of three economic categories as suggested by Palvia and Palvia (1996). The fourth category would be underdeveloped countries. The limited amount of data does not support a grouping of four. The hierarchical clustering analysis and the principal component analysis both show three groups are a better match.

Results and Conclusions

In a recent study (Palvia and Palvia, 1996) it is suggested that global IT issues may be significantly different for different countries and regions of the world and that one of the factors that may impact the ranking of key issues is the countries level of economic development, ie:

- Developed or industrialized nations

- Developing nations

- Newly industrialized nations

- Underdeveloped nations

The objective of this paper was to aggregate the published data and information on IT issues in countries and analyze the data to basically test this hypothesis. Using cluster analysis on a sample of ranked IT issues from 16 different

countries and regions of the world the model of the global IT environment suggested by Palvia and Palvia (1996) is partially supported. The data better supported an earlier suggested three way classification of countries (advanced, developing, underdeveloped) Palvia et al (1992); than the more recent four categories (advanced, newly industrialized, developing, underdeveloped).

References

Available upon request from James E. Whitworth

Table 1: Economic Data Comparison Based on Cluster Analy sis

Country	Categorized as:	GDP Per Capita		Average GDP Per capita For category	Results of Cluster Analysis	GDP Per Capita	Average GDP Per Capita for Group
					Group 3		
U.S.	Developed	$23,220			U.S.	$23,220	
Canada	Developed	$20,970			Canada	$20,970	
Australia	Developed	$18,500			N. America	$17,352	
North America	Developed	$17,352	(Avg.)		Europe	$17,359	
Europe	Developed	$17,359	(Avg)		Gr. Britain	$16,302	
Gr. Britain	Developed	$16,302					
				$18,951			$19,041
					Group 2		

Hong Kong	**Newly industralized**	**$21,034**			**Hong Kong**	**$21,034**	
Singapore	**Newly industralized**	**$16,736**			**Taiwan**	**$8,063**	
Taiwan	**Newly industralized**	**$8,063**			**Singapore**	**$16,736**	
S. Korea	**Newly industralized**	**$7,251**			**Slovenia**	**$4,500**	
Poland	**Newly industralized**	**$4,907**					
				$11,598			**$12,583**
					Group 1		
Gulf States	**Developing**	**$4,500**	**(Est.)**		**Australia**	**$18,500**	
Slovenia	**Developing**	**$4,500**	**(Est.)**		**S. Korea**	**$7,251**	
Estonia	**Developing**	**$4,500**	**(Est.)**		**Estonia**	**$4,500**	
India	**Developing**	**$1,633**			**Gulf States**	**$4,500**	
Africa	**Developing**	**$1,712**	**(Avg.)**		**India**	**$1,633**	
					Poland	**$4,907**	
					Africa	**$1,712**	
				$3,369			**$12,583**