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METADATA PARADIGM FOR GLOBAL INFORMATION TECHNOLOGY DATABASES

LONGY O. ANYANWU
TRINITY CHRISTIAN COLLEGE
longy.anyanwu@trnty.edu

GLADYS A. AROME
BARRY UNIVERSITY
garome@mail.barry.edu

JARED KEENGWE
INDIANA STATE UNIVERSITY
jkeengwe@mymail.indstate.edu

ABSTRACT

Multinational business expansion and competition have escalated in the recent years, particularly in Eastern Europe and the third world. Tremendous opportunities, therefore, have been created for many companies and formidable hindrances have been amassed against others. Business failure rates among these multinational enterprises have alarmingly increased beyond expectation. So has their IT implementation. The increasing popularity and use of the Internet which businesses have little control of are an added complication. This study identifies a matrix of mitigating factors, as well as information-base distribution mechanism, critical to successful GIT implementation in today's multinational enterprises. The relevance and impact of these factors on the multinational businesses are discussed. Consequently, appropriate solutions for each problem are suggested.

Keywords: multinationals, global IT, IT failures, IT and culture

INTRODUCTION

The rapid growth of information value and use, coupled with technological advances and consequent popularity of globalization of the world economy, have fostered continued growth of transnational organizations (Gollapudi [15]; Barlett [4]). See Figure 1 for obvious rapid growth of Internet economy and popularity, respectively. This new business and computing frontier is driven by a number of critical factors such as: 1) the imperative globalization of the national economy, which has become a priority in many countries; 2) the increasingly formidable national and international competition among businesses; 3) the rapidly expanding Business Strategic Alliances, resulting in the dissolution of formal corporate boundaries; and 4) the cost-driven search for information and knowledge distribution alternatives. (Betz [8]; Cornin [9]). Tremendous opportunities, therefore, have been created for many organizations and formidable hindrances have been amassed against others. Business failure rates among these transnational organizations have increased. What are the impacts of business globalization on the multinational corporation (MNC) in general, and the

global information technology (GIT) management in particular? A GIT, here, is an enterprise-based and technology fostered distributed data management system that is spread in different countries. Recent studies indicate that GIT managers are resorting to culture-sensitive client/server(C/S) technology for effective implementation of GIT (Ferreira [12]; Jeong [18]; Flynn [14], Kizior [21]). But, how can an IS manager successfully implement a C/S-based information system in a global environment? How can they be adequately prepared to do just that?

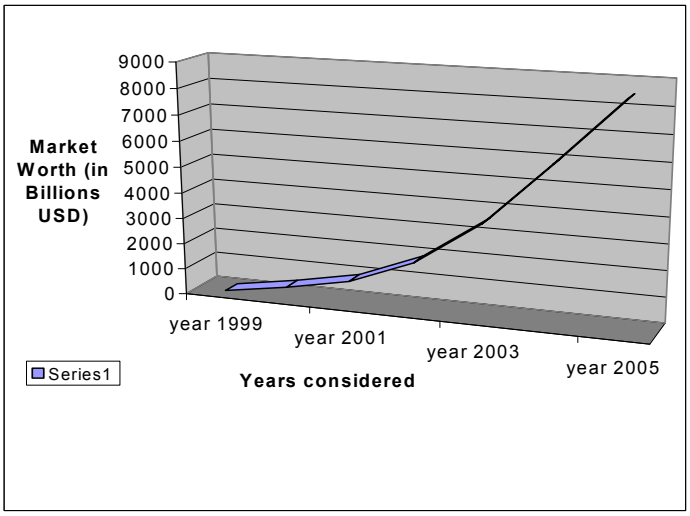

Figure 1: World e-Commerce Market (1999 – 2005)

Additionally, studies suggest that interest in the Internet will grow faster than ever. According to some studies, the number of users of on-line services and the Internet, especially the World Wide Web, will continue to rise rapidly (Betz [7]; Verity [31]). The Internet will continue to experience commercial growth. Clearly, the Internet stimulated the economic expansion in the United States. The adoption of technological innovation purposed to stimulate economic expansion has become a pattern in modern economies (RDF [29]; NUA1 [25]).

When a company goes global, management begins to face additional problems that include multilingual and multicultural differentials, varying legal systems and governmental regulations, different political environments, and widely varied bureaucratic processes. It will find different currencies, multiple time zones and many different approaches to business information systems implementation and education. When a firm enters the global market, all managers struggle with the severe strain on the organization. However, it is the GIT management personnel, who additionally, are expected to alleviate many of these organizational problems generated by the globalization initiatives. The would-be-successful GIT managers must not only be able to cope with present problems but also must know when new technology is needed to enhance the GIT operation. Given the additional information management complications triggered by the surging demand for Internet services, the GIT professionals face the daunting task of reducing the operational failure rate of the multinational companies, which failures stem essentially from information services ineffectiveness. How can these business failures be minimized and successes maximized?

PURPOSE AND METHOD

This study focuses on identifying the dominant factors that influence the success or failure of global information technology(GIT) among the MNCs. These factors will be examined in four broad categories or zones with respect to their impacts on business and IS management, namely: general management factors, IS management factors, cultural factors, and environmental factors. Based on the analysis of dominant factors and their associated problems, this study will streamline a set of recommendations for managing them, to enable a successful GIT implementation and management in an MNC. It is postulated in this study that the identification

and analysis of these dominant factors, coupled with the GIT implementation guide, will enable a successful implementation and effective management of these GIT factors which can sometimes be the sole determinant of the success or failure of a global business venture.

SURVEY OF LITERATURE

For their inherent advantages, C/S systems have rapidly swept through the IS implementation and operation in businesses in many parts of the world. Kondratie, early in the twentieth century, was one of early investigators into the relationship between technology and economy (Betz [7]). Robert Ayers updated Kondratie's earlier empirical correlation between European industrial expansion and contraction and the occurrence of new technology-based industries (Ayers [3]). Several studies indicate that more and more businesses have either implemented or are planning to implement C/S-based distributed intelligence system within the next few years (Bentley [5]; Betz [8]; ISO/IEC [16]; Anyanwu [2]; Kim [20]; Gollapudi [15]; Pruckler [28]). However, this C/S growth has, to a large extent, been limited to national business operations (Anyanwu [2]). As corporations compete in international markets, attention has begun to shift to the utilization of C/S technology to enhance competitive advantage beyond the national borders. Now, a large number of these organizations are embarking on global business initiatives (NUA2 [26]; Flynn [14]; Aggarwal [1]; Kizior [21]). Also, there is a growing recognition in the literature that managing IS in an international environment poses unique and difficult challenges (Shroeder [30]; MARC [22]; Deans [10]). Additionally, factors such as government policies, economic structures, corporate strategies, educational infrastructures are all important to successful technological innovation and economic development, (Betz [7]). Numerous studies appear to cluster their data analyses along two concerns: the importance of globalization in organizations and the role of the information technology in its management. Nonetheless, more recent studies have proffered the metanational model as the most effective way to successfully manage a technology-based implementation of an MNC, while yet other researches have presented the metadata concept and model to be an effective method to manage the distributed databases of the technology-minded MNCs (Doz [11]; Jeong [18]; Bentley [5]; ISO/IEC JTC [17]; NOAA [24]). In this direction of GIT management, therefore, most of the existing research has so far focused on just the technical development within the knowledge base domain properties of GIT (Jeong [18]; Bentley [5]; ISO/IEC JTC [17]; NOAA [24]). This study, therefore, attempts to harness and merge the strengths of the Metanational and the Metadata models to implement an effective IS that alleviates the GIT problems triggered by the dominant influencing factors identified in Table 1 and described below.

DOMINANT INFLUENCING FACTORS

In their attempt to develop, control and directly use the information systems, the GIT users around the world interact among themselves and in their complex variety of systemic differences such as socio-cultural heritages, ideological inclinations, legal and economic environments, and levels of technological know-how. This uneven mixture of end-users increases the complexity of the problems traditionally faced in the management of end-user computing, namely, information integrity and security, information privacy and accessibility, and information management effectiveness. Based on literature, dominant factors include global information technology management effectiveness, cultural differential, communication ineffectiveness, resource availability, and system outsourcing. The inherent characteristics of these factors are delineated accordingly. Relevant suggestions are also made. These factors are detailed later in the study. Depending on management effectiveness, these factors can be hindering, motivating or both to businesses. The literature fields some GIT management approaches which in their relative effectiveness include the Top-down, and Bottom-up database architectures and management models, the Metanational management model, and the Localized Global metadata registry (LOG) management model. Nevertheless, based on the problems identified in this study, the aforementioned dominant influencing factors, and the results of the factor analysis, we will propose a Metanational Localized Global metadata registry (METALOG) model to enable a successful implementation and management of GIT-based distributed intelligence (or knowledge bases) in an MNC. The METALOG model is a natural blend of the strengths of both the metanational and the LOG models. Both of these models are described below.

Table 1: GIT Analysis and Implementation Guide

Factor	Zone[1]	Characteristic concern(s)	Suggestion(s)
GIT Management Effectiveness	I, E, M	• Parochial management of IT • Management of technological transfer & integration • Variant standards & regulations in host countries • Information accessibility • Threats to information integrity & system security	• Adopt management. through coordination style • Consider themes from a global perspective • Use workable local solutions • Customize application to local needs & regulations • Utilize user-friendly systems • Monitor violations to security regulations • Develop global data dictionary • Batch transfer of files, etc. should be used often • Use messaging systems between sites • Update data & technology frequently
Cultural Differential	C	• Cross-cultural dominance in management teams • Differing user value/belief systems	• Take advantage of the strengths of cultural diversity • Plan for cultural diversity • Acquire/dev. Multi-culturally sensitive or adaptable systems
Communication Effectiveness	C	• Incomplete or misinterpreted communication	• Learn other cultures & languages • Develop language-independent programs • Seek alternate communication channels
Resource Availability	I, E	• Country-wise differential availability of resources (human, data, technology, etc.)	• Use country-specific or country-adaptable applications • Be prepared to accept less than perfect products/solutions in some countries
System Outsourcing	I, M, E	• Outsourcing needs in systems acquisition/development (e.g. for purposes of economy)	• Where feasible, develop systems in-house • If outsourcing is used, incorporate organizational information system architecture (ISA) • Develop enterprise-wide integrated data resource systems • Acquire/dev. Multi-culturally sensitive or adaptable systems

[1] "Zone" indicates the major area of user-work-life in which the dominant influencing factors exist. C -for cultural factors, E -for environmental factors other than cultural, I -for information systems factors, and M -for basic management factors. In some instances, there is a domain overlap. In such cases, the domain factors are listed in order of dominance.

THE METANATIONAL MODEL

The metanational ideal is an organization finely tuned to sense, mobilize, and leverage pockets of specialist knowledge dispersed around the world. These capabilities will open the door to new and powerful sources of value-creation and competitive advantage that traditional multinationals are not able to harness. The metanational will be able to innovate in unique ways, to leverage this innovation for higher sales revenues and greater profits, and thus to create more shareholder value than its rivals. So what kinds of organizational structures and processes must be put in place to build metanational advantage? What would a coherent metanational look like? Three levels of competition in the global knowledge economy are identified as: 1) the competition to identify and access new competencies, innovative technologies, and market knowledge that are scattered around the world; 2) the competition to innovate by mobilizing and integrating this globally dispersed knowledge; and 3) the competition to leverage this innovation through an efficient and flexible network of operations. Tomorrow's metanationals will need to build organizations that can win in all three of these competitive arenas. Each arena requires different units, locations, roles and responsibilities, processes, performance measures and incentive systems, and skill sets. Therefore the metanational organization must be designed around three distinct planes (or suborganizations), each focused on one of these competitive areas. These areas are generally termed the *sensing plane,* the *mobilizing plane,* and the *operating plane.* This set of "planes" provides a way of visualizing the basic framework around which a metanational can be built (Doz [11]). In this study, the metanational concept is basically used to functionally reorganize the enterprise into three main subunits to ensure that the enterprise ably meets the demands of these competitive arenas.

THE LOCALIZED GLOBAL METADATA REGISTRY (LOG) MODEL

The metadata concept and model have been severally proffered as an effective method to manage the databases of the technology-minded MNCs (Jeong [18]). Metadata, which is descriptive data on data as to how it was collected, processed and organized, improves interoperability between databases or knowledge bases (Bentley [5]; ISO/IEC JTC [17]; NOAA [24]). The database domain properties include: data level –degree of specialization of data; user level –degree of specialization of users' knowledge about corresponding domains, e.g. general knowledge users and expert knowledge users; and data usability. While the metantional approach focuses on the business enterprise reorganization for effectiveness in global markets, the global metadata registry approach centers on ensuring an effective implementation and ditributivity of the databases and knowledge bases of the MNCs. This arrangement results in herarchically layered metadata registries. Global Metadata Registry (MDR) can be used as a global guideline that includes a set of common and standard data specifications over all data sets within the MNC. With the highest priority, global MDR is at the top of visibility level in the organization.

Until now, many researchers have integrated databases based on metadata, because of these advantages, but these efforts were exerted on data integration without regard to the domain properties (e.g., data level, user level, data usability). In follow-up studies, all data were classified into several data sets hiearchically by the relationship between data and users. In other words, users are interested only in a part of data on the entire data set. For example, the general users (non-experts) are just interested in the simple and easy data with low complexity, and the experts are interested in more specialized and complicated data as well as simple data. As a result, there is no need to create a guideline on the entire data at first integration step. A minimized global guideline is built to integrate the most common and general data at the beginning, and then the guideline may be extended progressively according to domain properties. These scalability and data definition properties of the metadata now become the infrastructural building blocks of the proposed METALOG system.

THE PROPOSED METALOG MODEL

As highlighted previously, in this paper, the term "domain properties" means data level, user level, and data usability. We focus on the relationship of data level, user level and data quantity, since data usability is integral to data quantity. Data level indicates the specialization degree of data. In general, the more specialized data is, the more detailed and complicated it is. User level means the specialized knowledge degree of users about corresponding domains. The experts, on higher intellectual level, are interested in more profound and complicated data including general data. Because the experts utilize more data than the general users, the data quantity can be grouped hierarchically by the relationships among the other domain properties. Here,

we defined this concept as data visibility. A metadata registry (including a set of standard data elements and its quantity) is generally affected by the quantity of source data. Therefore, we can build metadata registries hierarchically. And they are classified into global metadata registry and local metadata registry. As a result, both data sets and data quantities are hierarchical according to user level and therefore, we can integrate data progressively based on the visibility.

In Figure 2, all of data sets are created hierarchically according to data specialization and user specialization. Global MDR can be used as a global guideline that includes a set of common and standard data specifications over all data sets for the MNC. It has a set of data elements that is used by most users. So it is on top of visibility level (i.e., it has the highest priority for integration). On the other hand, Local MDRs have a common data specification set for each partial data set respectively. Therefore, the more localized MDRs are, the lower their visibility values. Consequently, the global MDR must be created at the first integration step, because the visibility of the corresponding data set is highest. Then, the local MDRs are created progressively as the results of integration over the corresponding data sets.

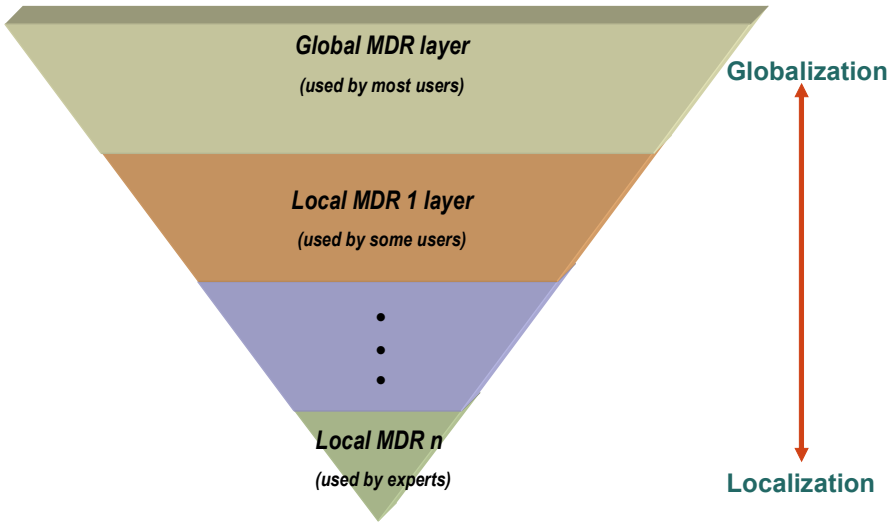

Figure 2: The METALOG's Hierarchical MDR and Data Visibility

The Metanational Localized Global metadata registry (METALOG) method supports the mechanism to extend the existing metadata registries progressively. The generalized data element can be created directly from source databases in the data resource layer. As described already, each metadata registry can be placed in the local MDR layer dependently and locally. Therefore, a new metadata element can be registered into the corresponding local metadata registry respectively. New data elements are also created from metadata registries. Thereafter, they can be registered into the global MDR in the global MDR layer. The system architecture of the METALOG method shown in Figure 3 basically consists of five layers: the user interface layer that provides services such as searching, viewing, etc. Below this user interface layer is the Global MDR which attends to specialized user needs. The GMDR layer has four components that include GMDR agent which manages and controls the GMDR and the global repository. The Local MDR layer, consisting of four components, attends to the general user needs. Between the GMDR and LMDR is the Distributed Access Interface. Finally, at the bottom is the actual database set. The metadata registries must be updated to extend the guidelines whenever a new standard data (data element) is generalized. That is, we must reflect the changed situations to the metadata registries for the progressive integration of all data.

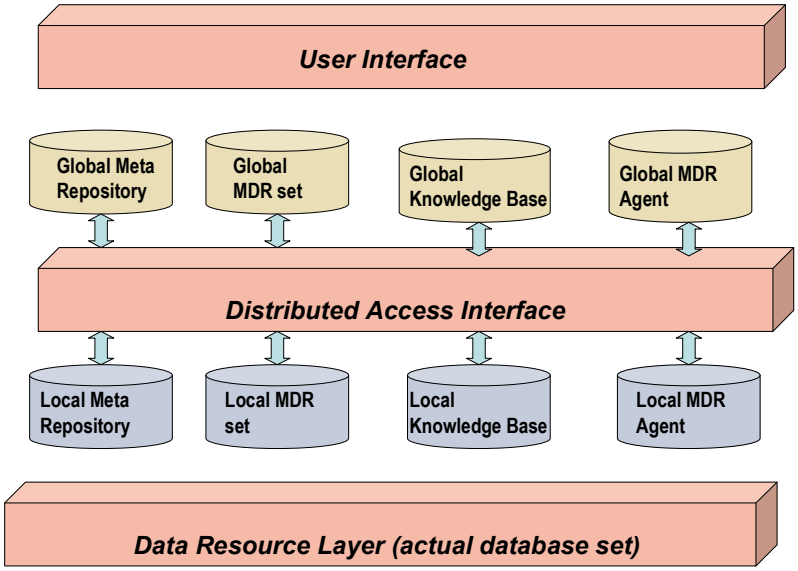

Figure 3: The System Architecture for the METALOG Model

By utilizing progressive data integration that reflects domain properties, the METALOG method overcomes the problem with prevalent static integration approaches. Figure 4 below shows the design and functional implementation of the METALOG system.

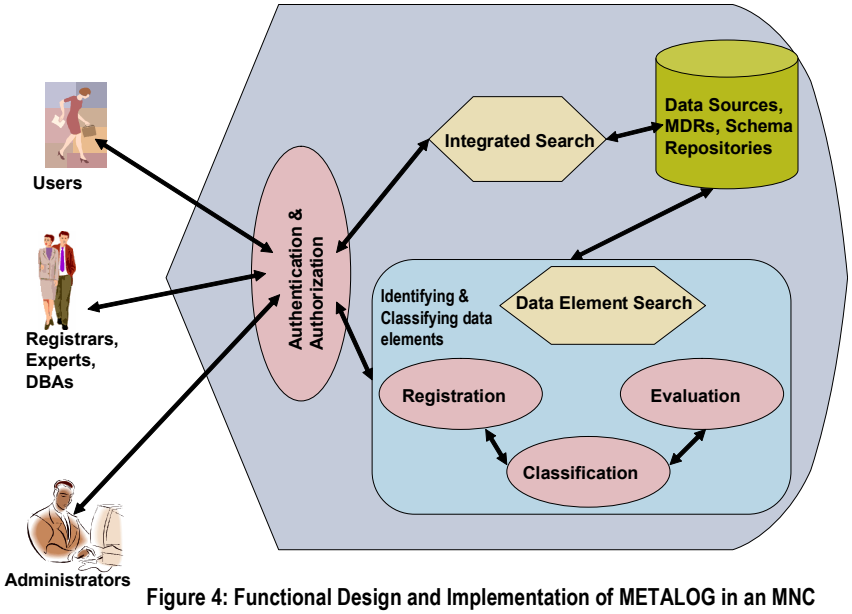

Figure 4: Functional Design and Implementation of METALOG in an MNC

HOW IS THE METALOG A BETTER AND MORE EFFECTIVE SYSTEM?

The METALOG will be well suited particularly to business organizations with cost restrictions (and most MNCs are). Additionally, this proposed method provides

a progressive integration mechanism adaptable to the presently popular distributed intelligence that includes data- and knowledge-bases, e-Commerce, e-Government, and network resource management, etc. Given that the METALOG concept has many advantages in the aspects of interoperability, dynamic metadata management, and standardization, in most real applications, a standard guideline indispensably includes relations to existing legacy databases. Although, comparatively, the ontology-based model of the past provides strong expression to represent the relationships between the data, and supports the mechanism to integrate the legacy databases, there is no international standardization for registries and management. Additionally, the initial cost is increased exponentially in proportion to the increase of database size, because all of the target databases should be analyzed in order to create the guideline. Consequently, its extension and maintenance require an excessively high cost. Finally, the proposed METALOG model provides many advantages when compared with the two other models (the Top-down and the Bottom-up), because it is based on ISO/IEC 11179 and it provides an integration mechanism for the legacy databases. The proposed model requires less initial build cost than the ontology-based model due to incremental integration of the legacy databases considering data visibility. Furthermore, because new databases are created according to the MDRs that include the standardized data elements, the extension cost is less than the ontology-based model. Transborder business success rate of MNCs with METALOG-based GIT will certainly increase with increased GIT management effectiveness.

GIT MANAGEMENT EFFECTIVENESS

One of the traditional functions of the IS manager is to protect the information system, make information available to authorized users, and maintain high information integrity. This goal has not been an easy one to C/S-GIT managers generally. Complicating this problem further is the introduction of the multinational factors into the equation. The battle against the threats to information integrity while assuring local autonomy and user accessibility to information has always been a big headache to MNC C/S-GIT managers. The progressive integration of the database and knowledge-base hierarchies of the METALOG is well suited for scalable implementation of secure networks across national borders. For the economy and efficiency of employee communication over the network, the rules of thumb are: 1) utilize batch transfers of files, reports, orders, etc. between countries and major cites; 2) insure seamless interactive mechanisms between central database and local applications in responses to requests; 3) use messaging systems that include e-mail and electronic data interchange(EDI) between employees, sites and business partners. The guiding principles should always be to reach out to every user; establish a people network (friendly, culturally sensitive and adaptable); install culturally and legally localizable systems (conformable to local rules and policies); persevere to succeed even in the face of adversities or minor failures; and maintain a tight security within and without the C/S-GIT system. Update data and technology frequently. Develop a global data dictionary for all users to follow. A solution to these problems may involve a balance of the strengths of both the centralization and decentralization of the METALOG system, rather than one or the other. To effectively coalesce and implement these principles, the progressive integration of localized knowledge-bases and hierarchical adaptability of the METALOG model to various user levels become an asset to both the GIT manager and the enterprise. Table 2 below illustrates the comparative characteristics of the popular C/S-GIT control strategies.

Table 2: Global Information Technology Control Strategies

Business Strategy / Structure	Coordination / Control Strategy	Coordination/Control Mechanisms	C/S-GIT Structured Strategy
• **multinational / decentralized federation**	• **socialization**	• ***hierarchies*; material & services flow determined by managerial decisions**	• **decentralized/standalone C/S-GIT database & processes**
• **global/centralized federation**	• **centralization**	• ***hierarchy*; decision made & control exacted by same managerial unit**	• **centralization/centralized C/S-GIT databases & processes**
• **international &**	• **formalizat**	• ***markets*; material & services**	• **linked C/S-GIT databases &**

inter-org. coordinated federation	**ion**	**flow determined by market forces**	**processes**
• **transnational integrated network**	• **co-opting**	• ***network of units*; representative participation in decision making**	• **integrated architecture/shared C/S-GIT databases & processes**

THE CULTURAL DIFFERENTIAL (IMPLEMENTING A CULTURE-SENSITIVE SYSTEM)

The degree of cultural homogeneity or heterogeneity in the C/S-GIT professional/user team affects the dynamics of the team and its ability to achieve results. Cultural factors affect the perceived relevance of the task facing the team and how it uses available resources such as time, money, information, technology, etc. People interpret messages and instructions in the context of their cultural heritages. Cultural diversity can be a complex problem as well as critical strength in the survival of a business organization. Additionally, disregarding valuable characteristic of a nation can lead to considerable collateral social effects such as progressive loss of cultural identity of the people who use the product. In order to minimize this problem, systems in their design must be culture-sensitive, particularly in their user interfaces.

A culture-sensitive system is often language-independent. Undoubtedly, language is often the main medium of communication. It is said that only about one tenth of everyone's culture (the major reason why each person behaves the way he does) is "visible" on the surface. When cultural diversity is properly managed in the GIT environment, most problems are avoided or at least minimized, and strengths in diversity are exploited to the maximum advantage of the organization. A C/S-GIT manager must have a global perspective. The key is the recognition of diversity. Understanding cultural differences among C/S-GIT professionals and users is essential. Coordination of tasks involve: 1) the analysis of how similar or linked activities are performed in other countries; 2) management of the exchange of information and information technology; and 3) the sharing and using of information on the firm by its different facilities. The target objective in the C/S-GIT management by coordination should be to enable: i) flexibility in response to competition in different countries, ii) effective scanning of markets around the world, iii) operational effectiveness in the business organization, and iv) preservation of diversity in final products and production location. Recent advances, such as Network/Internet technologies, have greatly reduced the coordination costs by reducing the communication and information processing, and delivery time and costs. Additionally, the METALOG's differentially hierarchical metadata registries are well suited to cultural adaptability with minimal costs. With the METALOG, as well as with any other multinational business implementation, the GIT manager must think global. Any theme must be considered from diversity and global perspectives. The factors are not necessarily mutually exclusive, and neither are their solutions

COMMUNICATION EFFECTIVENESS

Another dominant factor that influences the success of GIT management is communication. Although, communication has some overlap with culture, it is a critical managerial skill, and even more so for the GIT manager. Effective communication is critical to the functionality of the C/S-GIT team and the over-all business productivity. The lack of much of it has become a problem recently with many MNCs that battle with marginal operationality in the environment of users or employees of mixed cultures. Interpretations of the elements of communication are often superficial without a knowledge of the underlying culture. The ability or inability to communicate in the local language alone can determine the success or failure of a business venture, since communication, whether internal or external to the organizational environment, is not only key to management success but to business success as well. It is impossible to penetrate another culture, to comprehend the differences in values and beliefs, without knowing the culture's language. Otherwise interpretations of communications are parochial. The language variations carry with them unique implications on the information exchanged. Computer programs should be written to be language independent. Alternative communication channel(s) may be sought for more effective telecommunication. A culture-sensitive GIT will identify prevalent: global information relevant to, or appropriate in, many cultural contexts without modification; cultural metaphors, rhetoric, and figures of speech, which, if not properly used, can lead to misunderstanding and cultural

mistakes that can offend or mislead (Ferreira [13]; Ferreira [12]).

RESOURCE AVAILABILITY

Following communication in its relative degree of influence on GIT management effectiveness, is resource availability. Unlike the national distributed information systems, the GIT covers more than one country; it is exposed to a wider variety of business environments; faces differing levels of resource availability; and much more encompassing technological and regulatory environments such as standards and transborder data flow. In many countries data may not either be reliable or even available. IS architecture, which often is a function of economic buoyancy may be scarcely available. How does a manager cope with the disparaging technological (hardware/software) platforms and compatibility often found across borders? To what extent will a national deficiency in technological know-how be compensated without the introduction of foreign cultural dominance in the users? How can a C/S-GIT manager maximize efficient use of resources by minimizing wastes, while availing user resource flexibility to meet their various information needs? The lack of balance in, and sensitivity to, country-specific business practices (usually reflecting past IT investments) renders the shareability of product and business operational information impossible. More particularly, the frustration of C/S-GIT managers in finding country-specific applications of IT has emerged as a barrier to a successful IT implementation. A business approach in testing, accepting and adapting new technologies is essential for a competitive edge in C/S-GIT. Reorganization of data processing to conform with country-specific applications may become advisable. You should be prepared to accept less than perfect solutions in some countries that develop a GIT.

SYSTEM OUTSOURCING

Finally, outsourcing is considered the next dominant factor. Outsourcing is a critical factor in transnational business and global information technology management. Because of the increasing number of businesses facing tougher competition in national and international markets, outsourcing has become such an important factor for managers of information systems and technology. Many organizations have become sensitive to efficiency and bottom-line results because the market share is dwindling while global pressures are increasing, and product life cycles are getting shorter (Khosrowpour [19]). Additionally, there is tremendous shortage of skilled IS professionals, and this shortage is projected to increase even more sharply in the foreseeable future. If outsourcing is the approach to systems development, then C/S-GIT management strategy with corporate information systems architecture (ISA) is very valuable in providing a guide for systems development. It also facilitates the integration of, and data sharing among, applications. The progressive integrability of the METALOG's architecture becomes a major asset. Another benefit is that it supports the development of enterprise-wide integrated data resource systems. In this area, the responsibilities for the C/S-GIT manager will include: 1) awareness of the firm's business challenges and sharing of the leverage of the IT for them; 2) articulating C/S-based global information systems development environment that reflects the firm's multinational posture; 3) preparing applications development portfolio that aligns with the firm's global objectives; 4) reflecting the firm's strategic global aspirations in the systems development project goals; 5) acquisition of multi-culturally adaptable IT; 6) leading in the automation of the firm's internal and external data communication linkages; 7) designing C/S-GIT databases derived from the firm's value-chain activities; and 8) facilitating corporate restructuring through the provision of flexible business services. Each software should be developed to enable easy fine tuning to local needs while maintaining the same data processing and file format consistency throughout the enterprise.

Because all the problems may not necessarily manifest in any one MNC or business venture, the discussions and recommendations are individualized to each factor. Although the individualized solutions are adequate remedies for each problem, holistic thinking is the approach. In Table 1 the problems are classified so that managers may make appropriate selection of solution types.

CONCLUSION

Although, most of the existing studies have focused on just the technical development within the knowledge base domain properties of GIT, this study uniquely harnesses and merge the strengths of the Metanational and the Metadata models to implement an effective IS that alleviates the GIT problems triggered by the dominant influencing factors. The METALOG is application driven, and is well suited particularly to business organizations with cost restrictions (and most MNCs are). Its progressive integration mechanism renders it adaptable to distributed database integration, e-Commerce, e-Government, and network resource

management, etc. The METALOG concept has numerous advantages that include interoperability, dynamic metadata management, and standardization, and in most real applications, a standard guideline indispensably includes relations to existing legacy databases. Based on the analysis of the identified dominant factors and their associated problems, a set of GIT solution alternatives have been suggested. As a result, GIT managers will become more aware of the problems that face GIT management, as well as their associated solutions. The success rates of GIT implementation and management will certainly be improved and costs reduced. Consequently, transborder business success rate of MNCs with METALOG-based GIT will certainly increase with increased GIT management effectiveness.

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AUTHOR BIOGRAPHY

Longy O. Anyanwu is Professor of Computer Science and Fellow of Computer Science and Information Systems Program at Howard University in Washington, DC. He is the author of over 36 published articles and book chapters. His work focuses on Communications and Network Systems, Information Technology Management and Decision Support Systems and Business Information Systems Analysis and Design. Currently, he is working on Global Network Architecture and design.

Gladys A. Arome is Assistant Professor of Educational Computing and Technology at the Adrian Dominican School of Education. Barry University, Miami Shores, Florida. Her current work focuses on the use of technology tools to support technology integration in the classroom.

Jared Keengwe is ABD in Instructional Media technology at Indiana State University. He has presented a number of papers at several different national conferences. His presentations focus on the integration of educational technology into classroom instruction to support meaningful learning. Keengwe is the recipient of 2004-2006 College of Education Adams Graduate Scholar Award. He is cited in the 60th Edition (2006) of who is who in America as well as the 7th Edition (2006-2007) of who is who in American Education.