ERP & Globalization: Challenges and Responses

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Abstract
Globalization, as a term which refers to the processes of international integration, has brought along a number of business and technological challenges. Supply chain applications are at the forefront of discussions that center on globalization. But ultimately, corresponding transactions are captured in the back office; and that means core ERP must be able to deal with issues such as currency exchange, multi-site and multi-company transfer of inventory, consolidation, localization, and translation. Enterprise Resource Planning (ERP) is a mission-critical component of any globalization strategy. Enterprises aiming to compete in the global marketplace need to be able to comply with international financial and legal requirements – they must be able to think globally but at the same time act (and comply) locally. Enterprises cannot focus on gaining competitive advantage if they struggle to integrate their own international operations. Internal operations must be integrated before interoperability can be achieved on a global scale. The more seamless the integration, the easier it is to manage governance, risk, and compliance. In this paper we provide an overview of business and technology challenges associated with globalization and the way that ERP system developers respond to them. The key functionalities required to support a multi-national ERP implementation are listed and different approaches to the delivery of these functionalities are compared. The paper highlights the benefits of using advanced integration technologies, such as Service Oriented Architecture (SOA), instead of traditional point to point interfaces between applications.

Keywords
ERP, globalization, SOA.

1. Globalization as a phenomenon
Regardless of how the world is seen - as flat or round, the impression one gets is that it is somehow becoming smaller. This phenomenon is not the result of a physical compression of the planet, it is a reflection of our subjective feelings arising from the substantially altered perception of time and space, as well as our awareness of the interconnectedness and interdependence of the national economic, financial, environmental, and other systems. The twentieth century brought an exemplary progress in the field of transport and communications, which gradually created conditions for easier movement and connectedness of people and goods. These tendencies, along with certain political changes, have enabled companies to expand their markets far beyond the borders of national economy. The possibility of exploiting new markets was initially seen by the developed countries as a major opportunity to increase profit through new sales. However, the economies of the developed countries were soon to face an entirely new challenge due to the increasing “invasion” of cheap products coming into their markets from countries with significantly lower labor costs. Response of the developed countries to this phenomenon is seen in the trend of moving manufacturing and other facilities to countries with cheaper labor costs (sourcing), or entrusting the execution of individual activities or complete production processes to the companies located in countries with lower labor costs (outsourcing). This enables businesses to reduce the costs of goods and services, but at the same time results in a greater
Globalization is a complex phenomenon that is now increasingly associated with the transfer of knowledge, skills and technologies at the international level (Archibugi & Lundwall, 2001). It is not difficult to see that this type of transfer is gaining prominence in the world economy over the transfer of material goods. Share and importance of knowledge-based goods (goods that are associated with intellectual property) are continuously growing in the world economy; foreign direct investments performed by transnational corporations are becoming increasingly important means of transfer of innovation around the world (UNCTAD 2001) and cross-border scientific and technological cooperation is becoming ever more demanding in terms of public and private sector resources (Gambardella & Malerba, 1999). A number of authors share the opinion that the growing body of knowledge, as a result of this transfer, opens up completely new possibilities for developing countries to reduce their backlog (Archibugi & Pietrobelli, 2003).

The impact of globalization processes on society can be analyzed from different perspectives such as people, culture, property and risks (Center on Law and Globalization, 2014). The migration of people is a phenomenon as old as mankind itself. People have migrated seeking better conditions for survival and the possibility of a better quality of life. However, migration processes today are significantly different in terms of their quality and degree than they used to be. The possibility of faster movement of people and goods which has led to the changed perception of geographic distances are features of the new vision of the world in the era of globalization. Traveling is much more individual in character than before. In the past, migration was associated with the movement of larger or smaller groups of people (e.g. ethnic groups) because in order to travel longer distances people needed protection of the family or of a larger community. Today, migration is mainly linked to the movement of individuals, mostly young people, in search of better living and working conditions.

After the “cold war” period, political barriers were reduced substantially and state borders have become more “porous” thus allowing markets to expand more freely. The fact that people are less limited by political boundaries is seen in the increasing number of people (in some parts of the world) who live in one and work in another country.

The development of information and communication technologies (video conferencing, Skype, etc.) has enabled direct interaction between people without the need for physical presence. The actual journey is now frequently replaced by a much faster and cheaper virtual journey.

The growing presence of companies with operations across political boundaries is primarily motivated by economic aspects but such economically motivated expansion also has its side effects, namely the dissemination of culture and law. Movement of capital across national borders is of increasing importance for the functioning of the world economy. The period following capital market liberalization that started in the 1970s, is characterized by a significant growth in private equity investments which today represent a substantial source of capital from international financial institutions. Globalization of finance and resources has different, often contradictory effects. On the one hand, the expansion of markets beyond national borders creates the need for international regulations and standards which are prerequisites for international market stability. On the other hand, private capital can both enter and withdraw from national economies in a very short period of time, which may have sudden and dramatic destabilizing effects.

According to Lawrence Friedman, globalization is closely associated with the global spread of culture and is of cultural nature in its essence. Common culture is characterized by shared assumptions and notions that allow the global spread of ideas, information and material goods. Information and Communication Technologies (ICT) have an important role in the creation of common culture. Personal computers, the Internet, mobile phones and other ICT’s have, on the one hand, enabled quick and easy access to the vast amount of human knowledge, but at the same time they allow people to independently create and globally disseminate information at a negligible cost.

2. Characteristics of global business

Organizations that aim to seize the opportunities offered by globalization processes use different strategies to achieve their goals. Bartlett & Ghoshal (1998) identify four strategies that are available to multinational corporations. In the process of becoming truly global, organizations usually take the following sequential path marked by the
following strategies: from multinational to international and then from global to transnational corporations.

In the case of a company that follows a multinational strategy, its foreign subsidiaries operate almost independently or in a loose connection, in order to be able to promptly identify and respond to different local needs and national initiatives. In this model, supply chains are duplicated and local units have a high degree of autonomy. A company that employs international strategy is engaged in the diffusion and adaptation of the parent company knowledge in its affiliated companies. The basic principle of operation in such organizations is speedy implementation of innovation in all its parts.

By contrast, in a corporation that pursues global strategy, its headquarters has central control and its activities are closely coordinated across the world in order to take advantage of a common product design, global scale production and centralized control of uniformed processes and activities which are performed in the exact same way in any part of the world. In accordance with this strategy, the company is based on centralized funds, resources and responsibilities. Decisions remain decentralized but at the same time are under strict control of the headquarters and consistent with the achievement of global efficiency and effectiveness.

The above mentioned strategies are focused on integration and control and each of them seeks to make a step forward with regard to these issues in comparison with the previous one. Bartlett & Ghoshal (1998), but also others (Iwan, 2007), find that the global model should be replaced by a more complex and flexible one due to the increasing complexity of the environment, technological changes and the emergence of large integrated markets. This new organizational solution is commonly referred to as transnational model that tries to combine the need for integration and control on the one hand, with the flexibility and sensitivity in relation to local needs on the other hand.

There are a growing number of organizations that have global character. These organizations operate in different countries and in different locations: they have their business units, manufacturing facilities, regional sales offices, distribution warehouses, national, regional and global headquarters scattered throughout the world.

When an organization expands its operations into a new country, it faces a number of operational challenges. It has to adapt to the legal and business principles of the country: legislation, reporting obligations to government and other agencies, tax system characteristics as well as employee rights. It is usually necessary to support an additional language, currency, and best practices of local character. Business operations may become even more complex because of the fact that operational units existing in different countries, under national legal provisions, must be established as separate legal entities. This may make internal transactions much more complex (for example a logistical transfer of inventory between different entities of the same company must be treated as a purchase or sale).

Apart from meeting local demands, organizations operating globally must provide a certain degree of integration of business operations that take place in different countries, with the aim of improving operational efficiency and providing support to all levels of decision making processes and compliance initiatives. It is impossible to achieve these goals without adequate business process management of such organizations and the use of information and communication technologies.

3. It and globalization

Information technology is considered one of the most important driving forces of globalization, which is also recognized in expert literature focused on information systems through emphasis on interconnectedness between information technologies (IT) and globalization (Hanseth, Ciborra, & Braa, 2001). Technological development in the field of hardware, software and telecommunications in the early 1990s has led to significant advances regarding information accessibility and the growth of economic potential in all sectors of the economy. IT provides a communication network, which is the basis of the spread of products, ideas and resources between economic and other entities irrespective of their geographical location. By creating efficient and effective channels of information exchange, IT has become a catalyst for global integration. While most authors emphasize the importance of IT in terms of the origin and development of global processes, there are those who point to the retroactive effect: globalization processes have largely contributed to heavy investment in the IT sector and the spectacular development of IT technology in the last two decades. Therefore, some authors have concluded that IT and globalization processes should
be seen as two sides of the same coin due to the extent to which they are interconnected (Sunarno, 2001).

In their study on IT management and global companies Ives & Jarvenpaa (1991) have identified four generic approaches for managing global IT, which they find to be aligned with the strategies of Bartlett & Ghoshal.

One approach is an independent global IT support, according to which subsidiaries use independent systems and undertake independent initiatives while shared systems are an exception. The influence of local suppliers and national communication standards is largely reflected in the choice of technology, which usually results in a low degree of hardware and software integration at the corporate level. This approach has features that are similar to the multinational strategy, with focus on local resources, solutions and patterns of behavior, and portfolio of applications tailored to local requirements.

The second approach is a global IT managed from a single location, and within which all parts of the global organization use the same IT solutions. A number of global companies are forced to implement global system solutions by actual business needs and the desire to maximize the benefits of economies of scale. This approach is in line with the global strategy and is the preferred choice of many corporations that have opted for this type of strategy. What Ives and Jarvenpaa also point out in their study is that such centralized global IT approach often leads to serious problems if not stemming from actual business needs.

These two approaches can be seen as two extremes, each of which has its advantages and disadvantages. The first approach makes it easier to comply with local requirements but provides little support to global networking of corporate business flows and processes. In contrast, the second approach emphasizes the unity and uniformity of solutions which makes the integration of operations and data consolidation much easier, but at the same time makes it difficult to promptly adapt to new local conditions. In an attempt to combine the benefits of both of these approaches to the greatest possible extent, the matrix approach has been developed, which is considered to be the most suitable one for the implementation of the transnational strategy.

4. The role of ERP systems in globalization

As noted above, globalization has brought a number of business and technological challenges. Overcoming the barriers of national markets and their integration into the global market along with significant shifts relating to competition require strategic responses from organizations. Efficient and targeted use of all available organizational resources is gaining more importance than ever before and this cannot be achieved without business process management and the use of the global network. Global networks have become an infrastructural platform that connects individuals, corporations and the public sector in all business processes. Information and communication technologies, particularly ERP systems, are to ensure flexibility of the company and create the environment for achieving strategic advantages of integration processes in general.

ERP systems are considered the backbone of any organization's information system and critical component of corporate globalization strategies. Organizations that strive to compete in the global market need to coordinate their operations with international financial and legal regulations – they need to be able to think globally and act locally at the same time, in conformity with national rules of business. An organization cannot focus on achieving competitive advantages of globalization as long as there are difficulties in integrating the operations conducted in different countries. Bartlett & Ghoshal (1998) agree with this view and believe that organizations operating in the global market may be put at a serious strategic disadvantage unless they are able to control their international business and manage their business operations in a globally coordinated manner. Global interoperability can only be achieved by ensuring the integration of internal business processes and their activities.

In discussions on IT globalization support, it is commonly associated with supply chains and their software support (Ahmed, Qadri, Shahzad, & Khilji, 2011; Johnson, 2006). Even though the importance of the supply chain management systems is undeniable, they can only be effective if supported by adequate ERP systems that comply with the requirements of international business. A good ERP system is a necessary foundation for building an efficient supply chain management system, which represents a kind of an upgrade of the ERP system. An ERP system that aspires to meet the demands of globalization must
support functionalities such as multi-currency operations, intercompany stock transfer, data consolidation, software localization, overcoming language barriers, and more.

Companies with business operations in different countries are compelled to function as multiple entities. Differences in the way of keeping the ledger, different currency systems and other specific characteristics of individual countries pose a major challenge for ERP systems in terms of meeting the needs for consolidated presentation of the results of operations, both through financial and non-financial performance indicators. According to a survey conducted by Aberdeen Group (2007), two major priorities of global companies are the ability to use the same version of the ERP system in a variety of financial and legal systems and global data consolidation support of multiple installations.

Although in the aforementioned research most companies marked the use of a single instance ERP system as a preferred way of operation, this solution is not considered the ultimate requirement of standardized global ERP implementation. The research of Aberdeen Group that focused on ERP topology of companies operating globally also indicates that this indeed is not the standard. As seen in Figure 1, only 22% of globally operating companies use a single instance ERP that supports all global locations which obviously suggests that it is not to be considered standard solution. The next 22% of companies have a single instance of ERP package but, unlike the previous group, this instance does not support all international locations of operation. The conclusion of this study is that more than half of the companies use the topology of the global ERP support which is not considered optimal and which includes multiple instances of the same ERP package or even different ERP packages in different locations.

The most common reason for using different ERP packages within a global company is in connection with the manner of its growth which is the result of mergers or acquisitions. This kind of growth implies that the ERP system of a “newcomer” is inherited along with its other resources.

For some companies this is not really a problem, because regional business units are permitted to self-select a system that suits them best. In the case of such companies, their local offices have their own accounting (and other) systems that correspond to their local business practice. These systems rarely communicate with each other while global business relies on external systems such as electronic spreadsheets or electronic reports, which are used to consolidate the management and financial information. The research conducted by Aberdeen Group indicates that 71% of large companies have implemented more than one ERP package, while 26% of them use as many as 4 or even more different ERP packages in some of their units.

The advantage of the strategy that enables business units to independently select ERP (and other IT) solutions is that each unit can select an application that suits their needs (given their role, size, and other specifics). Most specialized systems have a simple, generic kernel tailored to the specific needs of the user. This kind of system design that fits the user provides a high degree of concordance between software solutions and business needs (like custom-made clothes and ready-made models). Local systems (services of their suppliers) may prove significantly cheaper in terms of implementation and maintenance in comparison with large systems that support global organization.

The lack of multiple applications in some business units is seen in different data formats and identifiers that often refer to different time periods; there is no consistent master data and a whole range of other problems that make easy data integration virtually impossible. This rather complicates the provision of consolidated indicators for the needs of global business decision-making and data follow-up to the level of individual transactions. Consolidation can only be achieved through subsequent data integration, which is a kind of an upgrade of autarchic systems but the costs of this type of integration are usually very high. Another major drawback stems from the fact that local systems are not an environment in which the advantages offered by standardization at the global level can be exploited to the maximum.

Organizations are becoming ever more aware that internal operations must be integrated...
globally in order to achieve global visibility and transactional interoperability as well as to enable more efficient management of the global corporation and its business risk. As a result, a growing number of medium-sized and large companies are trying to consolidate their applications and in doing so, many of them aim to have their worldwide operations based on a single ERP solution. This strategy promises the formation of a single (or at least uniform) data repository for all business units and their processes, as well as the advanced capability of financial and other reporting and analysis.

Some of the main advantages of consolidation based on a single ERP solution are the integration of resources and elimination of redundancy. A unified database for all business functions enables the generation of consolidated information from the level of the headquarters to the level of its lowest affiliates. This allows managers to drill down to the level of the headquarters to the level of its lowest affiliates. This allows managers to drill data from consolidated indicators to individual transactions regardless of the place of their origin.

Even though operation based on a single instance ERP system is the most desirable option for most of the global companies from the research of Aberdeen Group, less than half of them (44%) actually use this topology. Cost and complexity of application are some of the most common reasons why companies are reluctant to start to use single instance ERP systems. If the branches are located in the same region or country, the problems are not so big. If a solution can be standardized in all operations with the same structure of financial reporting, it may be installed fairly quickly and inexpensively. But, if the same ERP solution must be applied in different countries with different currencies, fiscal, or legal requirements, majority of organizations hold the stand that the costs of product configuration and its ongoing operational support exceed the expected benefits of moving to a single ERP solution. Another thing that should be noted is that many ERP solutions are too complex and, as such, unfit to support less complicated needs of certain units, especially those in remote countries. Therefore, despite best intentions, organizations are often faced with long periods of single ERP implementation in all of their global units.

Even if reluctant to start to use a single ERP solution, organizations generally tend to reduce the number of simultaneously used ERP solutions in order to enhance interoperability of their transactions. At the same time, the preferred ERP solutions are those that offer scalability and adequately support global implementation. Regardless of the number of ERP solutions used, there is a consensus that organizations cannot ensure global growth without building an architecture that supports global visibility and transactional interoperability. Integration technologies and service-oriented architecture (SOA) are frequently overlooked as a criterion in the selection of ERP solutions. In fact, the emergence of SOA reopened the question of how purposeful and justified it is to insist on implementation of a single ERP solution in global organizations and led to the emergence of the matrix approach which allows, in certain cases, the use of less complex (or more appropriate) ERP solutions besides the “standard” ERP solution, while integration is achieved through SOA.

4.1. ERP globalization support as a set of specific functionalities of the system

Globalization support has become a standard set of functionalities most of the well-known ERP solutions. This support should enable users all around the world to use the same ERP solution while showing them the content in local languages and in accordance with local preferences. Multilingual applications with multilingual database content are a prerequisite for the global implementation of ERP solutions.

For an ERP solution to be multilingual, it has to rely on a database management system (DBMS) that supports storing, updating and retrieval of multilingual data. In order to make this possible, modern DBMSs support Unicode standards; provide advanced techniques of data sorting and indexing (linguistic sorting/indexing in addition to binary ones) and have the ability to show data in accordance with local preferences in terms of data display format, delimiting signs and other national characteristics.

National Language Support (NLS) within the DBMS implies that the error messages, as well as the monetary, calendar and other conventions automatically adapt to the user language. When it comes to correct sorting, multilingual ISO standard (10464) specifically developed to simultaneously support multiple languages is of special importance.

By relying on these DBMS possibilities, developers of ERP solutions have raised globalization support to a higher level. An ERP system with pretensions to be used as a global solution must offer user interface (with labels, messages and other software objects) in different languages and
with the possibility of localization in terms of national numerical, calendar and other preferences. Along with a growing number of implementations in different countries, ERP system developers have become more familiar with the specifics of national legal, financial and other systems and offer extensions of their standard modules that are tailored to fit their use in particular countries. For example, SAP ERP Globalization Extensions 607 includes localization projects for the following countries (SAP, 2014):

- China
- Kazakhstan
- Kuwait
- Qatar
- Russia
- Saudi Arabia
- United Arab Emirates

that provide additional functionality for the following applicative components:

- Accounts Payable
- Accounts Receivable
- Asset Accounting
- Flexible Real Estate Management
- Funds Management
- General Ledger Accounting

A detailed description of new and enhanced functionalities by country can be found in relevant documents (SAP, 2014). These “nation-oriented” extensions aim to achieve statutory compliance, which is considered to be the biggest challenge for ERP globalization support and it implies conducting business operations in accordance with the local (national) legal, tax and accounting rules.

What should be kept in mind is that globalization also creates the need for other types of functionalities within ERP systems that do not relate to national specificities but are in connection with business regulations among legal entities from different countries despite the fact that they belong to the same multinational corporation. Globalization support enables ERP system to recognize and treat accordingly the transfer of inventory between subsidiaries, depending on whether they are located in the same or in different countries. In the case of different countries, subsidiaries are considered separate legal entities and the transfer is to be treated as a regular transaction.

**Conclusion**

Globalization is a complex phenomenon with a number of driving forces and implications for society. Regardless of whether you are a proponent or opponent of globalization, it cannot be ignored. ERP system developers are fully aware both of this as well as of the dual role of their products. ERP technology is now considered a basic IT technology and, as such, is one of the drivers of globalization, but at the same time it is also subject to the impacts of globalization processes. ERP system developers need to meet the new demands of their users who aim to exploit the potentials of globalization in terms of maximizing profits.

Global operations of an organization can be supported by a variety of topologies of ERP support, each of which has its own advantages and disadvantages and may be suitable to a certain category of organizations. There is no a priori the most adequate topology, as it needs to be chosen by taking into account the specificities of a particular organization. If an organization aims to achieve its competitive advantage through the economy of scale, it necessarily needs to standardize its business processes and is a good candidate for implementation of a single ERP solution for the entire organization. Advanced data integration technologies along with the emergence of SOA have, in the case of these organizations, challenged the imperative of a single ERP version, and there are a growing number of those who advocate the matrix approach, which is much more flexible than the traditional centralized and decentralized systems. This is why one of the basic criteria for ERP system selection should be its SOA support.

**References**


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