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# Meeting Global Business Information Requirements with Enterprise Resource Planning Systems

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## ABSTRACT

The number of companies operate on a global scale is on the rise seeking profitable business opportunities in the global arena. Global businesses have unique information requirements due to the integrated businesses activities in geographically dispersed business units, sourcing up to date consolidated information from numerous business processes, operating in different time zones and managing globally dispersed supply chains. Enterprise resource planning systems (ERP) are widely adopted by global businesses to meet their information requirements. This research explores the co-alignment of ERP systems capabilities to global business information requirements for improved financial, customer, learning & growth and internal business process performance outcomes. It also identified that the organization size and globalization history have an impact on global business performance.

## Keywords

Global business information requirements, ERP systems capabilities, co-alignment, global business performance

## INTRODUCTION

The world's largest global organizations are now contributing to half of the global trade and 90% of the world's foreign direct investments (Sarker et al., 2010). Every day over USD 15 trillion goods and USD 3.7 trillion of services are sold across national borders and more than USD 4 trillion foreign exchange transactions are taking place in the foreign exchange market (Hill, 2011). As a result, the number of organizations that operate on a global scale is on the rise to seek profitable growth opportunities in the global arena (Aberdeen, 2007). Many reasons including competitive advantage (Pangarkar and Yuan, 2009), availability of profitable business opportunities (Aberdeen, 2007), increased demand for goods and services (Harrison, 2010), decline in cross border trade barriers (Hill, 2011), formation of global and multi-national strategic alliances (Koren, 2010) and rapid development of information and communications technologies (Hill, 2011) have largely contributed for this unprecedented growth of global businesses (Hill, 2011).

Global businesses have invested heavily on ERP systems to support their global operations (Koumpis and Protogeris, 2010). Although ERP systems are widely adopted for supporting global business operations, do these systems adequately meet global business information requirements is unknown. The aim of this paper is to establish whether ERP systems can adequately meet global business information requirements. It includes a review of extant literature on global business, global business information requirements and ERP systems capabilities. Issues identified from literature are then carefully mapped to propose a model to achieve improved business performance by co-aligning global business information requirements with ERP systems capabilities. The model was tested by surveying 196 managers with ERP system experience in a global business background.

## GLOBAL BUSINESS

A global business is generally defined as a business that has multinational operations and exchange finished goods, raw materials, services, information, knowledge, skills and capital across national boundaries (Hill, 2009). Global organizations comprise of a network of interconnected organizations working together in the global arena (Kumar et al., 2008). Its unit of analysis is the world and their business strategies are focused on exploiting opportunities in the global arena (Susan and Steven John, 2001). These organizations generally establish their business activities in various countries mainly for

competitive advantage from low cost labour, low cost capital and unique resources (Spulber and Daniel, 2007). Global opportunities have created a new unprecedented landscape (Enderwick, 2009) enabling more and more businesses to operate in the international arena (Koren, 2010). Growth of trade in goods and services, cross border investments and the organization of production and service networks in the global arena is consistently increasing (Guy, 2009). The impact of globalization is now ubiquitous and organizations of all sizes in many different industries now can exploit global opportunities (Carter, 2010). Information and communication technologies, the Internet and the World Wide Web have supported businesses from different industries to expand globally (Subramoniam et al., 2009). Types of industries that have gone global include manufacturing, agricultural, education, mining, energy, banking, marketing, insurance, information technology, transport, healthcare, accounting and taxation (Hill, 2011).

## **GLOBAL BUSINESS INFORMATION REQUIREMENTS**

Managing business activities of global businesses is complex, expensive, challenging (Carter, 2010) and somewhat different from managing a traditional business due to the complexity created by national, cultural, organizational and technical differences (Sannarnes, 2010). Global businesses have unique information requirements (Ghosh, 2002) due to integrated businesses activities in geographically dispersed business units (Buckley and Casson, 2009), the need for sourcing up to date consolidated information from numerous business processes (PricewaterhouseCoopers, 2010), operating in different time zones (Yap, 2005) and managing supply chains (Koren, 2010). Other inhibitors to information sourcing from global operations are dealing with different cultures (Bidgoli, 2010), forming strategic alliances and partnerships with global stakeholders (Arunatileka et al., 2009), managing diversity (Parker, 2005), integration with government organizations, competitors and customers in multiple countries (Parker, 2005) and dealing with multiple currencies, accounting standards, reporting guidelines, and compliance regulations (SAP AG, 2009). As suggested by Bidgoli, (2010), up to date information plays a critical role in managing global business operations. Information requirements for global operations are discussed below.

### **Information from all global units**

Global business activities are generally spread in a number of countries mainly to enhance organizational profitability (Infosys Technologis Ltd, 2010). Information can be processed and maintained in business units in various countries or in a centralized database (Chhai and Lan, 2005). For instance, production related data can be processed and maintained in manufacturing plant in China, accounting related data in India, inventory data in another country and sales data in many countries. Managers in global organizations generally operate from different countries (Bartlett and Ghoshal, 2003). These managers need up to date information on a regular basis to make effective business decisions (Chhai and Lan, 2005). Integrated as well as separate information covering all business activities of global businesses are required on a regular basis for effective management of these organizations (Power and Sharda, 2009).

Top management, middle management, operational management, data entry staff, shop floor workers, production units, warehouse staff and supply chain partners require different information from all business units operating in different parts of the world (Chhai and Lan, 2005). Types of information required vary from country specific legal, tax and reporting requirements (Kumar et al., 2008, SAP AG, 2009) to inventory, production and delivery records (SAP AG, 2004).

### **Real time information access**

There is a time difference between global business units and overlap in office hours as global organizations operate in many different countries. This tends to create communication and coordination difficulties among the business units without timely information (Yap, 2005). Working as a single team around the clock, sharing the views and experiences of team members is important in managing business activities of global enterprises (Yap, 2005). Making accurate and timely information extremely important to achieve business success in these organizations (Bidgoli, 2010). Real-time information on global production, sales, inventory, debtors, creditors, spending, salaries and other expenses are essential for effective management and success of all global businesses (SAP AG, 2004). This information is a necessary requirement for making better, faster and more informed business decisions (Bouquet et al., 2009) and provides the pathway to achieve higher coordination and control among global SBUs (Peppard, 1999). In order to provide real-time information, global businesses need to consolidate their multiple business processes dispersed around the world (Ghosh, 2003). Furthermore, to serve effectively in each region, SBUs of global organizations need to have flexible and reconfigurable systems that facilitate the changes in demand in their region and quickly switch between product variants (Koren, 2010). Moreover, free flow of information within (subsidiaries and departments) and beyond the organizational business units (major customers and suppliers) is imperative to leverage organizational potential in global businesses (ICMR, 2005).

### **Integrated business process information**

Integrated information from all business processes are required for the management of global sales, global spending, global profitability, global tax payments, global assets and liabilities and net cash position of the group (Mishra, 2009, Hill, 2011). For instance, in a global company if a customer places an order, this information should immediately be delivered to other business units that are in different time zones. This information is required by various business units to plan their business activities and processes, for example, the procurement department will use this to order raw materials from suppliers, production plant will use this information to plan production, human resource department will organize people resources, accounting department will need this information to invoice customers and to collect payment from the customers, and marketing department need this information to promote their products and services.

### **Supply chain information**

No company operates alone in the global business arena, all are collaborators (Friedman, 2006). Global organizations source suppliers from various countries in the world (McAdam and McCormack, 2001). All supply chain members require a smooth flow of information for timely supply of raw materials and delivery of finished goods (Koren, 2010). Management of supply chain in global businesses is more risky than that of local supply chains, due to the possibility of offshore delays and the complex nature of global business operations (Koren, 2010). Furthermore, global organizations need to maintain a close integrative relationship with business partners not only within the same organization but also with outside organizations and industries (Kimble, 2011). For instance, Nike, the world's largest seller of athletic footwear and apparel, has over 600 contract factories in 46 countries (Nike.com, 2011). It is important for this type of organizations to have real-time consolidated information with regard to material requirement, inventory levels, production scheduling, delivery schedules, employees and sales to achieve operational efficiencies.

### **Information security**

Information security is a very important concern for all digital information transmitted electronically via different networks (Kajava et al., 2006). The absence of a sound information security system is a major risk for any organization (Broadbent and Kitzis, 2005). A sound information security procedure will ensure credibility of all business transactions in the global arena. Ensuring information security in the global environment is challenging. As organizations become more and more interconnected and electronically linked to larger supply chains, a lack of information security in one organization will risk all organizations in the value chain (Luftman and Kempaiah, 2008). The vulnerability for many kinds of frauds and threats are high when organizations are interconnected and data is stored in an electronic form (Laudon and Laudon, 2010).

The above discussion indicates that although information requirements of all businesses are pretty much the same, global operations have an added level of complexity due to the large number of entities operating in different time zones and the need for secure information transmission from different business units in all regions of the world. The complex information requirements of global business operations are increasingly managed by ERP systems (Koumpis and Protogeris, 2010) for effective management of information and improved business performance (McGaughey and Gunasekaran, 2009).

### **ERP SYSTEMS CAPABILITIES**

An ERP system is a type of information system (IS) (Malhotra and Temponi, 2010, Sammon and Adam, 2010) that includes a large number of modules supporting a suite of business operations. Since ERP systems are multi module software packages, they easily integrate cross-organizational information (Sharif et al., 2005, Gleen, 2008) and support a seamless flow of information between various business functions (Subramoniam et al., 2009). These systems are capable of providing accurate and timely information (Subramoniam et al., 2009), integrating business processes, creating value and reducing costs (McGaughey and Gunasekaran, 2009). Seddon et al., (2010), extended ERP capabilities to manage business processes, information flows, reporting and business analysis within and between organizational business units. Capabilities of ERP systems that can meet the information requirements of global businesses are discussed in the following section.

### **Support multi suite business processes**

ERP systems comprised of various modules that are capable of supporting a suite of business operations (Sammon and Adam, 2010). These modules are essential for the smooth functioning of business activities of large businesses such as management reporting (Davenport, 2000), production management (Esteves and Pastor, 2001), maintenance of plant and equipment, transportation management (Rashid et al., 2002), materials management, manufacturing management, quality management (El Amrani et al., 2006), access controls (SAP AG, 2007), human resources management, procurement management, accounting and financial management (Chang et al., 2008). Other modules offered by ERP systems support

project management, advanced planning and scheduling, e-commerce, m-commerce, sales force automation (McGaughey and Gunasekaran, 2009), investment management, collaborative commerce, business intelligence, knowledge management (Subramoniam et al., 2009), customer relationship management, supply chain management and data warehousing (Seddon et al., 2010).

### **Support stand alone and integrated operations**

ERP modules can either work as stand-alone units or several modules can be combined to form an integrated system (Rashid et al., 2002). ERP systems can also be customized based on the business requirements and industry best practices (Newman and Westrup, 2005). In addition, ERP systems have the capability to operate under several operating platforms such as UNIX, MS Windows NT, Windows 2000, IBM AIX, and HP-UX (Rashid et al., 2002).

### **Support global operations**

ERP systems can also facilitate transaction processing (Beard and Sumner, 2004), business process integration (Gunter and Andrea, 2009), enable global reach (McGaughey and Gunasekaran, 2009), operate on a web enable architecture (Siau, 2004), integrate multi enterprise operations (Sane, 2005), provide real time data and information, incorporate legal and tax reporting needs of different countries, support multi languages and multi currencies, intra and inter organizational communication (Subramoniam et al., 2009), and eliminate duplication of data (Kwahk and Ahn, 2010).

From the above discussion it is inferred that ERP systems are popular, real-time, large-scale, integrated software packages that have the capability to support business activities of large businesses. They help businesses in integrating various business processes and provide the right information to the right people at the right time for sound business decisions (McGaughey and Gunasekaran, 2009). These systems are capable of providing a holistic view of the organization integrating all the business activities into one system (BPP Learning Media, 2009). ERP systems successfully support manufacturing, retail and service organizations (Moon, 2007). Furthermore, these systems support faster information transactions (Kamhawi, 2009), better financial management (Esteves, 2009), e-commerce (Mishra, 2009) and business reporting (Subramoniam et al., 2009). Over the years the scope of ERP systems has changed from single-site, single-enterprise to multi-site, multi-enterprise and web enabled architecture (Siau, 2004). These systems can also be used to support performance measurement such as balance scorecard and strategic planning (BPP Learning Media, 2009).

From the above literature review it is clear that information from all global business units, real time information access, integrated business process information, supply chain management information and information security are essential requirements of global businesses. It also indicates that the ERP systems are capable of supporting multi-level and multi-purpose information of global business units, real time information, integrated information for managing global business processes and supply chains and secure information. Therefore it is inferred that if ERP systems are aligned to global business information needs global business can achieve improved performance. Global business performance improvements in this paper refer to improvements in financial, customer, learning & growth and internal business processes.

### **Aligning ERP systems to global business information requirements**

The trend toward globalization of the business environment remains unabated (Gunter and Andrea, 2009). In the twentieth century, production became globalized and in the beginning of twenty-first century retailing, service and other major industries became globalized (Kunz and Garner, 2007). In this competitive business environment, global organizations must strive for closer relationship with customers, suppliers and other business partners across the world. Information plays a major role in maintaining this relationship (Bidgoli, 2010). Smooth flow of information among business activities is critical to achieve business success (Koren, 2010). Information is the mechanism through which business activities are linked in order to improve operational effectiveness (PricewaterhouseCoopers, 2010).

As discussed earlier global businesses have unique information requirements that are different to traditional businesses. ERP systems possess capabilities that are useful in managing information requirements of global businesses. Although, a considerable number of academic studies on ERP systems and the alignment of IT/IS to business have been undertaken, to date alignment of ERP systems to global business information requirements as discussed above remains a gap in the extant literature. To achieve improved global business performance it is thus proposed that the co-alignment of global business information requirements and ERP system capabilities will lead to improved financial (FINP), customer (CUSP), learning & growth (LGP) and internal business process performance (IBPP). Accordingly the following hypotheses have been formulated:

H<sub>1</sub>- The co-alignment between global business information requirements and ERP system capabilities positively influence financial performance of global businesses.

H<sub>2</sub>- The co-alignment between global business information requirements and ERP system capabilities positively influence customer performance of global businesses.

H<sub>3</sub>- The co-alignment between global business information requirements and ERP system capabilities positively influence learning and growth performance of global businesses.

H<sub>4</sub>- The co-alignment between global business information requirements and ERP system capabilities positively influence internal business process performance of global businesses.

**Moderator variables - Organization size/ Globalization history**

Extant literature provides two moderator variables, organization size and globalization history, that would have an impact on the co-alignment of global business information requirements and ERP systems capabilities. Organization size indicates the scale of the organization (Batenburg and Constantiou, 2009) and it might have an impact on success of ERP projects as well (Sedera et al., 2003). Organization size in global organizations can be measured using measures such as number of employees (Johnson and Lederer, 2010), sales volume (Carpenter and Fredrickson, 2001) and total assets (Carpenter and Fredrickson, 2001). Several academic studies have identified that there are significant differences between small and large global organizations (Madapusi and D’Souza, 2008). Thus, there is a need to view the ERP systems employed by small global organizations as different from those of large global organizations (Madapusi and D’Souza, 2005).

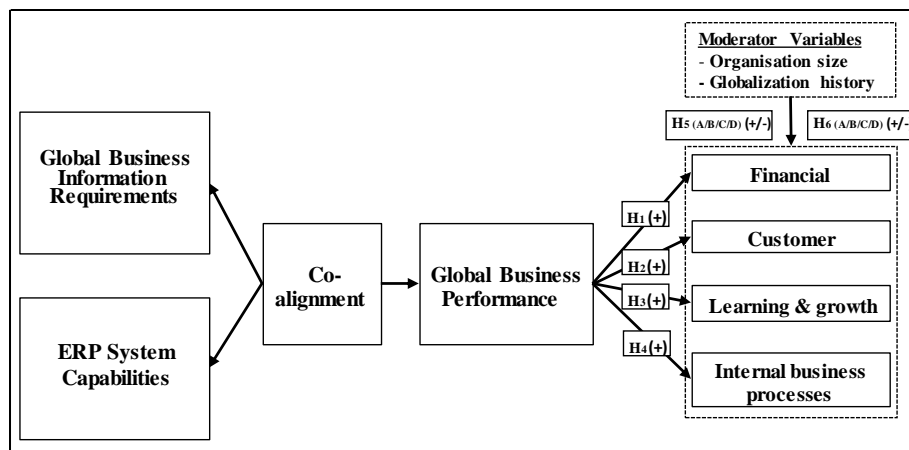
Globalization history is represented by the number of years an organization is operating in the global market (Kim and Oh, 2000). Globalization age can be determined from the year when the first foreign subsidiary was established. The IT/IS effectiveness can be influenced by a firm's prior experience with IT/IS use, which in turn can be embodied by the globalization history (Kim and Oh, 2000). A study done by Yadong Luo, (2001) found that there is a strong relationship between globalization history and global business performance due to better understanding of local and global business issues with ongoing experience. The above discussion indicates that organization size and globalization history may have a moderated (control) effect on global business performance. Therefore, it is hypothesized that:

H<sub>5A/B/C/D</sub> - Financial, customer, learning & growth and internal business process performance of global businesses are moderated by organization size.

H<sub>6A/B/C/D</sub>- Financial, customer, learning & growth and internal business process performance of global businesses are moderated by globalization history.

**PROPOSED RESEARCH MODEL**

Based on the hypotheses formulated from the above literature review, the following research model is established.



**Figure 1: Proposed Research Model**

The above model aims to test the co-alignment of global business information requirements and ERP system capabilities identified from literature discussed above for improved global business performance. Global business performance will be measured using balance scorecard performance measures of Kaplan and Norton, (1998). This research model adopts the Venkatraman’s (1989) conceptualization of fit as co-alignment/co-variation, where fit is described as a “pattern of co-

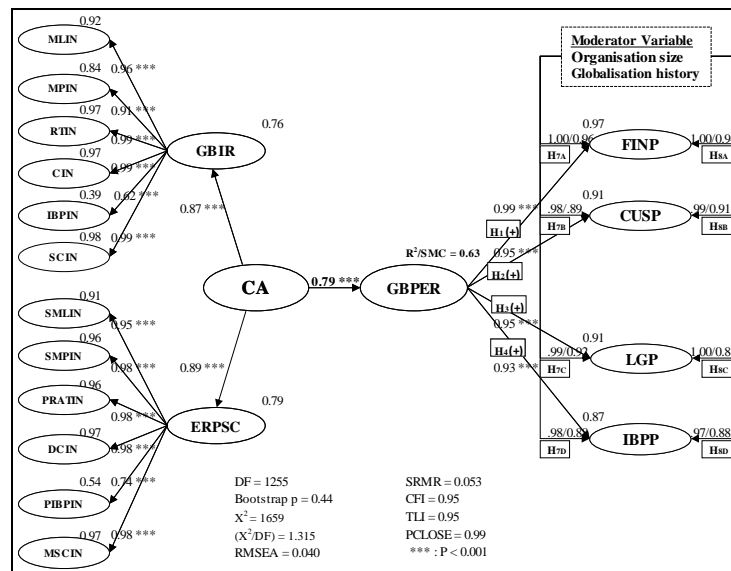
variation or internal consistency among a set of underlying theoretically related variables”. In this research co-variation perspective has been adopted because it is assumed that both ERP systems capabilities and global business information requirements are assumed to be consistent and mutually dependent in their effect on global business performance.

**METHODOLOGY**

The proposed co-alignment model was developed from the analysis of data collected from 196 people who worked in a managerial role in global businesses that use ERP systems. Structural equation modeling (SEM) technique was used to analyze data as the co-alignment model of this research involves a testing of multiple relationships of dependent and independent variables. It employed two-step modeling approach, development of measurement model followed by the structural model, proposed by Anderson and Gerbing, (1988). The measurement model specifies the relationships among measured (observed) variables underlying the latent variables. The structural model specifies relationship among the latent variables as postulated by theory (Schumacker and Lomax, 2010). Research findings are discussed in the next section.

**DISCUSSION AND FINDINGS**

Although this research confirmed global business information requirements, ERP systems capabilities, co-alignment and performance outcomes, the focus of the discussion in this paper is on the co-alignment. The proposed research model adopts (Venkatraman, 1989)’s fit as co-alignment/co-variation perspective. The fit (co-alignment) among factors is specified as an unobservable theoretical construct on a higher plane than individual factors (Venkatraman, 1989, Wang et al., 2008). Thus, there are no directly observable indicators for this construct (Venkatraman, 1989). Co-alignment is a higher (second) order construct, derived from a set of first order constructs as suggested by Venkatraman, (1989, 1990) and Croteau and Raymond, (2004). Hence, co-alignment is derived through a second order construct, derived from two first order constructs, global business information requirements (GBIR) and ERP systems capabilities (ERPSC). GBIR construct consists of six variables namely multi-level (MLIN) and multi-purpose (MPIN) information of global business units, real time information access (RTIN), consolidated information (CIN), integrated business process information (IBPIN) and supply chain information (SCIN). ERPSC construct contains six variables: supporting multi-level (SMLIN) and multi-purpose (SMPIN) information, providing real time information access (PRTIN), delivering consolidated information (DCIN), providing integrated business process information (PIBPIN) and managing supply chain information (MSCIN). Co-alignment between global business information requirements and ERP systems capabilities is captured as a separate unobservable construct that has no direct observable indicators. Business performance is also linked to the co-alignment through a second order construct, derived from four first order constructs namely financial, customer, learning & growth and internal business process perspectives. The co-alignment model and its statistical results are shown in figure 2.



**Figure 2: Co-alignment model**

As shown in figure 2, co-alignment model achieves an acceptable fit. Normed chi-square (1.315) is within the accepted range of 1 and 2. RMSEA (0.040) is well below the recommended threshold of 0.08. SRMR (0.053) is well below the

recommended threshold of 0.09. CFI (0.95) and TLI (0.95) are well above the recommended threshold of 0.92. PCLOSE (0.99) is well above the recommended value of 0.05 (Hair et al., 2010). The co-alignment model explained 63% (SMC/R<sup>2</sup>) of the global business performance outcomes achieved from the co-alignment of ERP systems capabilities and global business information requirements. Observed variables of all three constructs (GBIR, ERPSC and GBPER) are approximately the same indicating that they are parallel measures of those constructs (Holmes-Smith, 2011). Furthermore, results suggest that all three latent constructs account for about 90% of the variance in many of the indicators and they are very good measures of those constructs (Holmes-Smith, 2011). The model achieves a high reliability, convergent validity and discriminant validity. Cronbach's alphas, co-efficient Hs and average variance extracted (AVEs) of all the variables are higher than the recommended thresholds of 0.7, 0.7 and 0.5 (Hair et al., 2010, Holmes-Smith, 2011). Chi-square different test also revealed that the co-alignment model achieved sufficient discriminant validity (p-value 0.00).

### Results of moderator variables - Organization size/ Globalization history

The multi-group confirmatory factor analysis (MGCFA) was used to test the effect of moderator variables. Path estimates, chi-square different test, change in GOF statistics and effect size were examined to evaluate measurement invariance of moderator variables. The results indicate that both, organization size and globalization history, moderate the relationship between co-alignment and global business performance. Path coefficient analysis indicates that large and established global organizations achieved better financial, customer, learning and growth and internal business process performance than small and newly established global organizations. The chi-square different test revealed that the moderator variable of organization size is not significant ( $p = 0.007$  more than 0.001) and globalization history is significant ( $p = 0.0007$  less than 0.001). The results of the effect size indicate that moderator variable of organization size has a medium to large effect (0.24) and globalization history has a large effect (0.42). Thus, it is concluded that the financial, customer, learning and growth and internal business process performance of global organizations are moderated by organization size and globalization history.

### CONCLUDING REMARKS

This research supported the conceptualization of fit from the co-alignment/co-variation perspective, confirming that the co-alignment of global business information requirements and ERP systems capabilities leads to improved global business performance. The findings confirmed that the global organizations have unique information requirements somewhat different to local businesses. ERP systems have capabilities that are indispensable for supporting global business information requirements. Findings indicate strong evidence that the co-alignment of global business information requirements with ERP systems capabilities improve financial, customer, learning and growth and internal business process performance of global organizations. Results also confirmed that financial, customer, learning and growth and internal business process performance of global organizations are moderated by organization size and globalization history.

The key contribution of this research is the development and validation of a co-alignment model, extending theories of IT/IS alignment into the alignment of specific information systems application (ERP systems) in the global business arena. The model developed as an outcome of this research provides a pathway for aligning specific types of information systems with specific organizational requirements. It is a major contribution to the IT/IS alignment theories, ERP systems literature and global business literature.

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