

E-Collaboration Issues in Global Trade, Transactions, and Practices

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Abstract

E-collaboration goes beyond ordinary buying and selling activities. It includes information sharing and integration, decision-making, as well as process and resource allocation among people and organizations via the Internet, e-mail, web, video, and wireless devices to achieve optimal productivity and high performance. It promotes international commerce, expands trade, and facilitates financial transactions through electronic media. Even though paper transactions are now a thing of the past, most legal documents, attestations, and affidavits are still done in paper form. This paper summarizes issues involved in e-collaboration with regard to trade such as time, currency, e-transactions, tracking, security, fault tolerance, and process models. Finding effective solutions for these problems as well as identifying opportunities and challenges provides a pivotal task in facilitating, promoting, and expanding international and local trade as this summary entails.

Keywords: *E-collaboration; trade transactions; time zone; technology; globalization*

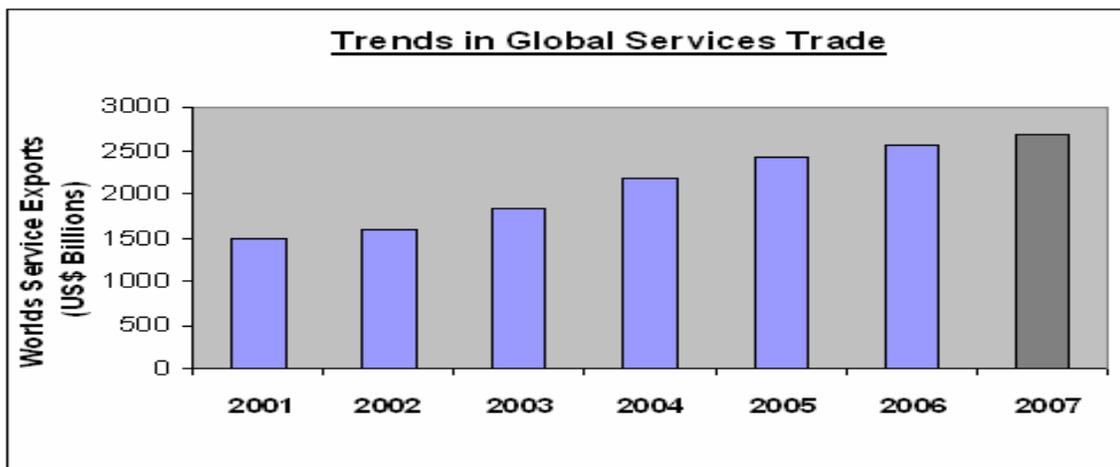
1. Introduction

The global services trade has been increasing since 2001. As depicted in Figure 1, projected exports for 2007 follow this increasing trend. Europe is the world's largest single exporter of services, representing nearly half of total exports. The current value of global trade has been estimated at \$6 trillion in goods and services crossing borders annually, of which \$2.7 trillion is projected for world services exports in 2007 (Renaud, 2006). E-collaboration is the use of Internet and related technologies to assist distant clients in exchanging information for interactions between suppliers and customers, and everyone in between to move trade forward. Preparing the next generation of e-collaboration applications to match these increasing trends will be an enormous challenge. Over the past decade private and governmental organizations have extensively applied Internet technologies to enhance global trade, transactions, and practices. The world has immensely benefited from these applications. The next step would be to see

how far we have come from these applications and what are the avenues and ways we have to improve these tasks. The Recent Trends in U.S. Services Trade, 2008 Annual Report (<http://hotdocs.usitc.gov/docs/pubs/332/pub4015.pdf>) concluded that the U.S. services overall, and infrastructure services in particular, grew faster in 2006 in terms of gross domestic product, employment, and cross-border exports than the average annual basis in the preceding five-year period. Furthermore, services supplied to foreign consumers by foreign-based affiliates of U.S. firms, including those in infrastructure services shown strong growth. In the meantime, the U.S. infrastructure service firms continued to encounter various impediments to trade in other countries. This paper attempts to identify and investigate several applications that need some attention as there is common interest in trying to quantify the way in which services facilitate fair trade, including determining the extent of service components.

For most transactions, trade is rarely a face-to-face transaction between a producer and a consumer (Sernau, 2006). The free flow of information, persons, goods, money, and technology seem to be the driving force for the globalization that makes trade flourish. Trade, together with migration, has largely contributed to globalization and technological advancement enables e-collaborations. Internet and emerging technology facilitates the secure transfer of funds and confidentiality to protect and safeguard public, private, and business interests. Trading agents, banks, and regulatory authorities play a large role in e-collaborations. Regulatory authorities make sure transactions are fairly conducted and are not in violation of any fair trade agreements or practices. Moreover, a small portion of the sums exchanged each day on the world's stock markets through companies depends on financial needs and prospects. Computers carry out recognition of stock prices and arrange investments. Investing components of these transactions are mostly mathematically derived using high performance machines (Toffler & Toffler, 2006). Enterprises often are concerned with predicting future values of a time series variable, which are frequently used as a basis for the managerial decision-making process.

Figure 1: Trends in Global Services Trade



E-collaboration has had an increasingly greater impact on the management of organizations in recent years. Both the number and the variety of its applications continue to grow rapidly, showing extensive benefits. An analysis of information trade flows measures the efficiency of transports, logistics, and IT-based practices with an added emphasis on electronic commerce and electronic data exchange (EDI). IT also makes the global trade process smoother in an effort to achieve cost-effective fair international trade. Fair and on-time movement of trade is expected of every transaction. There is a sequence of events that must be executed correctly to assure that this will be the case for every transaction. The buyer needs to be assured of the quality of goods as well as of the transportation and financial dealing that complete the transaction. In every aspect of this process, e-collaboration applies greatly to safeguard the interests of the seller and the buyer. Networking provides valuable tools for

organizing the planning effort, testing alternative plans, revealing the overall dimensions and characteristics of the project, establishing management responsibilities, setting goals, and identifying realistic expectations, implementation and control. It has greatly assisted project management in almost all thriving economic enterprises.

This paper summarizes issues involved in e-collaboration. Section 2 of this paper introduces the timing issues in e-collaboration. Section 3 presents the currency and international trades. Section 4 describes the web transactions and e-banking issues. Section 5 describes financial and quality control. Section 6 discusses tracking systems in e-collaboration. Section 7 presents processes and models in global trade. Section 8 addresses security. Section 9 presents expectations. Section 10 provides a summary, conclusions and future work.

2. Time Issue: Real-Time and Time Zone Conflicts

Time is an important issue in e-collaborations. There are many time zones and clocks may run at different speeds. Timing requirements can be either hard or relaxed. Within the continental USA there are four different time zones (Eastern, Central, Mountain, and Pacific). Some countries have been modifying their time zones frequently. For example, recently, Sri Lanka has advanced their time by 30 minutes. Also, the USA has through legislative actions, extended their day-light savings time, advancing it by a three-month period. This has an impact on time sensitive file transfer operations. In outsourcing, file transfers take place almost all the time. As we update or transfer files from one time zone to another, recognition of each file at different time zones must be identified before the update or transfer can take place. If this cannot be synchronized, the transfer or the update will not produce the desired consequence.

E-collaboration must address the time issue, the needs of technological resources, and the distances between transaction points. Facilitations of these concerns are strongly welcome as managing them with web-based IT in a secured framework is always given paramount importance. Relevant management ideas help organizations strategically and operationally if they align themselves with new web-based IT (Kock, 2002). To a greater extent, exchange-rates applied to global financial market have been remedied, even though some anomalies are still prevalent. The real-time project calibration and adequate communication features are particularly valuable for any global process. These help traders overcome time-difference issues, and enhance cooperation and coordination. Real-time technologies allow collaborators to log on at the same time to conduct meetings, design products or to resolve any trading disputes. The need for expanding e-collaboration is not trivial as we expand trade beyond our boundaries, meeting international trade agreements. Synchronous tools permit us to keep track of the leaders who make decisions and are, therefore, important to establishing a supporting structure, a shared workplace, and service sequences. Overall, the rise of emerging market economies accounted for more than 50% of global output—a milestone attained in 2006 and is providing the biggest boost to both global supply and demand since the Industrial Revolution (<http://www.businessweek.com>, 3/19/07).

Table 1: Lapse Times for the USA Time Zones and Selected World Destinations

Hyderabad, India	Hawaii, USA	Alaska, USA	Pacific Time, USA	Central Time, USA	Eastern Time, USA
4:00 am	3:00 pm	4:00 pm	5:00 pm	6:00 pm	7:00 pm
Lapse Time	11 hours	10 hours	9 hours	8 hours	7 hours

In many cases, even though real time transactions occur, they happen in only two time zones. For example, Table 1 provides some lapse times for the USA time zones from a selected world destination, Hyderabad, India, as a reference point. International trade should not have any barriers or be hindered due to this time issue. E-collaboration provides much-needed relief in accurately

calculating rates and minimizes the effects due to these lapse times. One advantage of differences in time zones between world destinations is that the organization can benefit from working “24/7”.

3. Currency Markets and Foreign Investment

This section provides an example to exhibit the extent of e-collaboration in foreign investment. The currency market requires frequent intervention from e-collaboration as considerable empirical evidence for the time-varying volatility of foreign exchange rates needs documented (Abraham & Taylor, 1993). Central banks determine the currency market, including spot market interventions and affect exchange rate behavior if they communicate information through virtual sites to inform each other of the market characteristics, potentials, and weaknesses.

The *Transactions of the USA Banking Affiliate with Foreign Parent* is a document assembled by the USA Department of Commerce to provide reliable up-to-date information on foreign direct and indirect investment in the USA. Figure 2 depicts a summary of transactions of the USA banking affiliate with foreign parent. A USA affiliate, in which a direct ownership interest and an indirect ownership interest are held by different foreign persons, should not be fully consolidated into another USA affiliate, but must complete and file its own BE-605 BANK report. Except in some cases, the USA affiliate Y may not be fully consolidated into the USA affiliate X because of the 30% direct ownership by a foreign person B.

Figure 2: Direct and Indirect Ownership Interest Held by Different Foreign Persons
(BE-605 Bank Instructions, Rev. 2/2007)

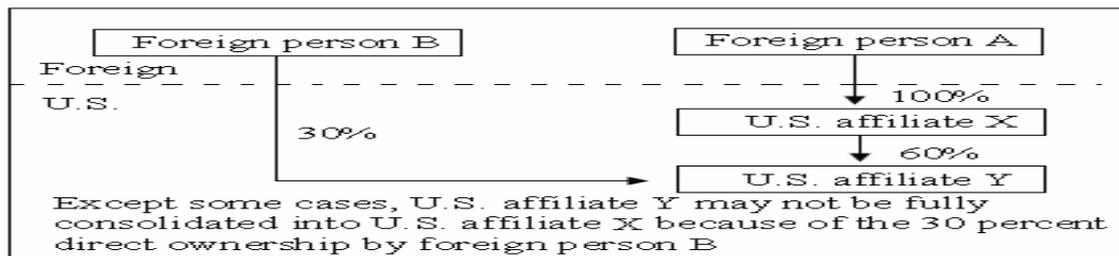


Figure 2 also shows that USA affiliate X must treat its 60% ownership interest in USA affiliate Y as an equal investment. E-collaboration assists to keep these records of direct and indirect ownership separately in order to provide accurate information of investments to the appropriate reporting authorities.

4. Web Transactions and E-Banking Performance

The Credit Card Transaction Performance Index measures the performance and availability of going to a selected credit card site and logging in/signing out to conduct the intended financial transaction. The e-banking also shows the total execution time and success rate. Table 2 shows information for selected sites for the week of July 9, 2007 from Monday through Friday between 8:00 am and 12:00 am (EST). These measurements are taken from the ten largest USA metropolitan areas. Clearly, some of the response times, success rates, and outage hours are not acceptable.

Table 2: Credit Card Web Transaction Performance Based on Response Time (Sec), Success Rate (%), and Outage Hours (Digital Transactions: July 23, 2007)

Target	Response Time (sec.)	Success Rate (%)	Outage Hours
Dinners Club	3.56	100.00	0
US Bank	4.77	97.73	3
Chase	6.09	99.50	0
American Express	7.64	99.87	0
National City	8.32	99.75	0
Capital One	8.52	94.85	4
Providian	9.13	99.75	0
Citi Bank	10.13	100.00	0
Discover	10.54	99.49	0
Wells Fargo	10.60	100.00	0
HSBC	11.69	97.20	3
Bank of America	16.77	98.74	1

Table 3 provides the e-banking weekly index report for the week of July 9, 2007 for selected sites from Monday through Friday from 8:00 am to 12:00 am (EST). These sites were based on publicly available published market-share information (Web Transaction Performance Indexes). None of the target institutions meet the 100% success rate. An improvement in response times is, therefore, sought. Outage can even reach three hours, and an action plan is clearly needed to prevent lengthy outage hours.

Table 3: E-Banking Transaction Performance Based on Response Time (Sec), Success Rate (%), and Outage Hours (Digital Transactions: July 23, 2007)

Target	Response Time (sec.)	Success Rate (%)	Outage Hours
E*Trade Bank	3.20	99.75	0
US Bank	4.84	97.57	3
Washington Mutual	5.22	99.62	0
Chase	5.26	99.75	0
Wachovia	5.67	98.61	2
PNC	6.98	99.62	0
National City	9.84	99.24	1
Well Fargo	10.56	99.87	0
Bank of America	10.69	98.86	1
Citi Bank	19.14	98.86	0

5. Financial Instruments and Quality Control

International bids and tenders are facilitated through e-collaboration. Wide ranges of shipping goods are normally arranged through establishment of financial instruments such as letters of credit (LCs). LC is a financial instrument, often created through banks for international movement of goods and other shipments. The quality of moving goods through international boundaries is subjected to vigorous quality control inspections. Through e-collaboration, one can be assured that the quality of goods received is the one promised. The assembly lines are main features during the movement of a product item from one work station to the next. A unique characteristic of these tasks requires the finished product will be divided and assigned to several workstations so that each can carry out the specific tasks of operation on every unit of the sub-product. Suppose that units of a product must be subject to n sequential independent-quality tests. Each unit is tested in a specific sequence until it either fails to meet the standards of the test to be rejected with no further test being necessary or until it meets the n^{th} quality test and is, therefore, accepted. This provides a systematic representation of the quality control process known as the Least-Cost Testing Sequence Problem (Johnson & Montgomery, 1974). Dynamic programming is a very useful technique for making a sequence of interrelated

decisions similar to this quality control procedure to work. Formulating an appropriate recursive relationship for this control procedure is a daunting task. Dynamic programming assures great computational savings over an exhaustive numeration in finding the best possible decisions, especially for large organizations that involve many components. In addition, storage is meant to hold the inventory until it is sold or used. The holding or storage costs represent the costs associated with storage. They include the cost of capital tied up, space, insurance, protection, and taxes related to storage. Optimal results require keeping tabs on these items

6. Tracking System, Satellite, and Robotics Technology

Both the shipper and the consignee should be able to track the shipment/consignment from the port of entry to the port of delivery in an ideal situation. This is partially happening nowadays, when we ship a package through FedEx or UPS. The barcode of the package is scanned at every transit point to notify both shipper and consignee. A single tracking station, as in Figure 3 gathers the necessary information to be passed on to the parties involved. The global positioning (GPS) and geographic information systems (GIS) technologies have been great for managing trade fleets. Solutions designed to provide accurate fleet data and route information may be hindered because of limited capabilities of these technologies. GIS technology involved in tri-model delivery facilitates the most useful information for efficient and cost-effective procedures. The use of satellite technology is helpful in tracking a shipment even in transit until it reaches the final destination. Certain goods need to be kept at a specific temperature during their shipment. E-collaboration can make sure this is being done properly. Wireless technology in land transportation is limitless. Wireless technologies always pose a threat. For the trucking industry, from data communication to dispatch, maintenance, toll collection and weighing station activities, fueling, and even monitoring truck stops, the benefits of wireless technology are enormous.

Figure 3: Tracking System for Transportation of Cargo



Enhanced tracking systems, equipped with adequate e-collaboration, provide an advantage for the reaping benefits of increased transportation opportunities. For greater aviation market competition, Europe and the USA entered into an open skies agreement to open the \$18 billion Trans-Atlantic aviation market within the expectation that this will lead to growth in the global economy (<http://www.aircargoworld.com>, 3/9/07). Time is of significance in ascertaining the results of this joint venture.

Significant growth in robotic automation was recorded recently; in the areas outside classical automobile and electronic goods manufacturing that use industrial robots aimed at general handling tasks for cost effective management and flexible production capabilities. Shipping order services, airport handlings, and postal services, increasingly call for robot systems for flexible and reliable

logistics automation. Uncertain production volume and product lifespan, especially in consumer appliances which have to be produced in large quantities subjected to these applications, due to their increasing connections to lifestyle and fashion as demanded by uncertain market conditions. Robotics has begun to appear in the operating room. Consequently, much progress has been made in integrating robotic technologies with surgical instrumentation thanks to the thousands of successful robot-assisted cases. As a result there is full potential for surgical robotics in the future to facilitate the needs of surgeons, engineers, entrepreneurs, and healthcare professionals. Robotic surgery has demonstrated clear, much-needed benefits for healthcare industry (Camarillo, Krummel, & Salisbury Jr., 2004). The robots have been used in Mars exploration and fire fighting as well.

The expansion of robotic technology is somewhat parallel to that of e-collaboration. Non-automatic orders accounted for 44% of the total orders in 2006, compared with 30% in 2005. North America robotics companies showed a record year for non-automatic orders in 2006. It is estimated that some 166,000 robots are now in use in the USA factories (<http://www.mhonline.com>, 3/12/07). In addition, manufacturing technology consumption totaled \$297.48 million which corresponds to an increase of 30.9% recorded in January this year as compared to 2006 (<http://www.industryweek.com>, 3/14/07). Most people think of IT outsourcing as a threat; however, the booming manufacturing sector will overcome any concerns this may have caused. This factor is oriented toward science and technology. The advances in IT outsourcing have worsened this estrangement. In some cases, applications of IT in entrepreneurial needs, especially when it is innovating, is still a trial process with limited standards. Technology is ever-changing and is subject to innovation, which can confuse IT professionals. Robotic technology could someday be a clear alternative to IT outsourcing.

7. Inventory Processes and E-Models

The inventory process is another example of the heavy use of e-collaboration. Let us consider multi-period production planning under the demand of assembly lines as products are purchased from subcontractors. We consider the problem of planning the procurement of a single item when there is one opportunity to reorder in each sequence of identical-length periods and demand in any period at any given time. The effective use of e-collaboration tools in supply chain management, similar to the above, is vital for this purpose (Ovallea & Marquez, 2003). Inventory decisions are made on certain general criteria. The material flow is subjected to these decisions: maximize revenue from sales; minimize procurement, production, and distribution costs; provide a good level of customer service; stabilize employment levels; and hold down investment in the facilities. A simple model can represent this situation where stock levels are depleted over time. They are replenished by the arrival of new product items. In this case, the production cost per cycle is given by $\begin{cases} 0, & \text{if } Q = 0, \\ K + cQ, & \text{if } Q > 0, \end{cases}$ where items

ordered in equal amounts at Q , K is the setup cost at one time, and c is the production cost per item. The information of Q , K , and c are changed rapidly and are needed to compute production cost. This is a well-known economic lot-size formulation in inventory control. A significant role of e-collaboration is necessary to keep tabs on every segment of the process. Multi-product models with carry-over of resources will always benefit from extensive uses of e-collaboration. Monitoring the production process in real-time is something that will need to happen. In global terms, real-time collaboration in today's trading, is required for the project groups to work at a single location or time zone. Almost all enterprises are now faced with the reality of managing time and optimize projects with the support of technology all over the world. The ability of keeping track of the manufacturing progress globally in real-time can be executed using the e-collaborative products. A simulation approach has been proposed to meet the market demands that have been changing rapidly. For example, cellular manufacturing technique can possibly be employed to avoid the capital costs of keeping finished products at unnecessarily high levels (Chan & Chan, 2007). Other issues need to be dealt with as they become more important to the success of the individual project.

8. Security and Insurance Measures

The issue of security is important in e-collaboration. Constant vigilance is necessary to address concerns in networks that controls shared data. More importantly, matters such as intrusion must be confronted directly as we facilitate e-collaboration technology. However, growing concerns over security complicate the task of complex integration. Additional precautionary measures must be taken when dealing with companies that have not adequately invested in security. Sharing data would not only reveal business secrets, but also can cause economic losses. The expansion of e-collaboration has resulted in these unintended consequences. These IT related applications are vulnerable from electronic attacks. Hackers constantly target secured networks and keeping the network free from attacks is a challenge. Due to growing reports of security breaches, worm attacks, data theft, and electronic privacy violations, the federal, state, and local authorities require all network facilitators to obtain insurance or at least third-party coverage to safeguard any potential losses. Various levels of coverage can be designed, depending on the extent of the losses anticipated and financial damages which could occur due to theft of sensitive company data. Companies across North America (Kalinich, 2005) are grappling with how best to protect customer data and mitigate associated network risks. First-party insurance of network risk policies covers all costs and damages sustained by others as a result of the failure of the insured's own network and its software applications. Variations of extended coverage may be tailored to fit the individual needs of customers, bearing in mind other possible anticipated losses; individuals, groups, and types of network systems; the nature of the business; software capabilities and potential perils. However, on the basis of network risk assignment, it is the responsibility of network management to eliminate all possible risks and outside exposure to unscrupulous acts, damages, losses, and sabotage so as to entirely benefit from e-collaboration.

For the applications in business-related issues, there are four premium determination methods which can be stated in terms of models that incorporate expenses: natural premiums, fund objectives, rate of return objectives, and risk-based objectives which are studied in a priority order related to increasing economic sophistication of the profit objective, and subsequent losses in terms of current losses and anticipated losses. E-risk is defined as the possibility of an electronic event, where occurrence causes loss to e-commerce. These include all possible compromises such as the compromise of network security components, the compromise of the organization of the web server, incorrect or indecent material posted to the web site, as well as service provider failings. A premium calculation model for an insurance company using the Collective Risk Model evaluates the expected loss in terms of stochastic variables (Bowers et al., 1997 & Dubendorfer et al., 2004) to address the issues of premium calculations. If adequate financial safeguards are taken, this provides a basis for such models, methods, computations, and future expansions of trade.

9. Entrepreneurial Expectations

Trade secrets are expected to be kept confidential. Violation of this is a punishable crime in the global marketplace. The interests of both the seller and the buyer are such that they may be exposed through e-collaboration, and must be protected. Online activities, processes, and research activities can be designed to benefit bilateral interests, exchanges of trade opportunities, and the proportion of science and technology to enrich its purposes. As the traders are not only confronted with whether their network systems are functioning, but also with whether they are working correctly, safety is a paramount concern for all of them and Fault Tolerant Computing (FTC) plays a significance role in dealing with this issue. Given that this has many faceted outcomes and extends to a broader research field, it involves the application of varieties of modern technological techniques of a different kind towards the effort to make systems fault tolerant, modeling and testing helping with system development, and benchmarking to evaluate, analyze and compare the system's capabilities. These concepts, models, and methodologies of fault tolerant computing drew much needed attention. Most of the time we deal with real-time critical systems as embedded systems in every trading transaction as system development and the operational processes of the entire world depend heavily on FTC.

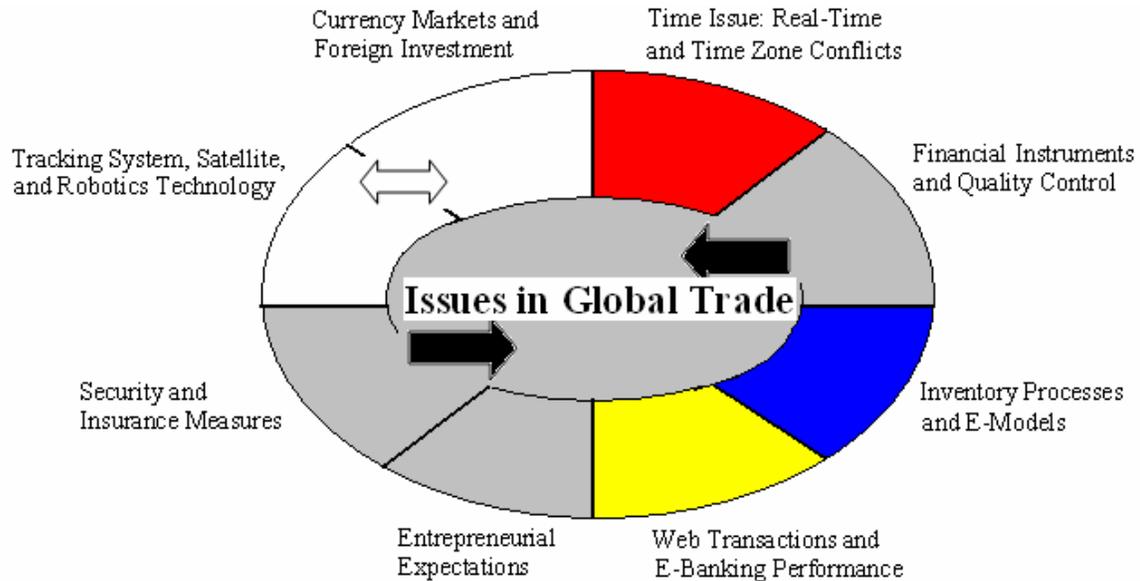
Collaborative research projects, international conferences and educational forums -even war games- are the byproduct of IT in the 21st century. The vacuum of the educational gap among different age groups is addressed stressing e-collaboration. Potential impact areas of technology for education in developing countries are vast and may hinder e-collaboration. Four potential work areas have already been identified: resource sharing, distance learning, teaching tools and applications, and the impact of technology (Jaimes, Kinshuk, & Sow, 2003). Through these avenues trading communities, future entrepreneurs and the general public can be adequately informed of the importance of these expectations. Network systems have evolved so that global trading partners can interact with one another. Internet-based technologies provide reliable communication architecture that sustains global-trading connectivity.

An International Convention on Simplification and Harmonization of Trade and Customs Documents using international standards is currently taking place (UNCTAD, 29/03/2006). It is estimated that overall, a typical international transaction can cost between 5-40% of the total transaction cost and requires 20 or more forms and 60 days to execute them. Trade documents mostly comprise purchasing orders, pro forma invoices, commercial invoices, letters of credit (LC), ocean and airway bills of lading, calculation of transportation costs, applicable taxes, import/export duties, shipping tariffs, transfers of ownership, license/handling fees, currency conversion, language translation, evidence of ownership, and government regulatory compliances. E-collaboration offers a unique opportunity to simplify the present complexities and barriers to global trade into basic functions needed to sustain a proper supply chain distribution of goods.

10. Conclusions

A carefully planned organizational structure is the cornerstone of any successful business enterprise. IT plays a greater role in e-collaboration technologies in achieving that. As IT expands rapidly, innovative techniques, tools, and electronic communication accommodate these applications for the extended use of e-collaboration. Much needed IT personnel should be provided with adequate training to secure various transaction capabilities generated from all e-collaboration applications. Ongoing research and development requires adequate public and private funding. Intel's experimental computer chip has 80 separate processing engines that will soon be in standard computers. This new technology will revolutionize IT technology (<http://www.nyt.com>, 2/12/07).

Developers need to create innovative e-collaborative systems that facilitate conducting transactions safely. As technology improves so do the hackers. Some argue that it is relatively easy for a sophisticated attacker to learn the distribution of some attributes (such as protocol-type, TCP-flag pattern, and packet-size) from publicly available data of Internet traffic characteristics (Kim, Wing, Chuah, & Chao, 2004). However, the limitations and difficulties of the first generation of attacks could prompt the attacker to search for new techniques to plan and devise more extensive attacks (Kumar, 2004). In many instances, the damage of an intrusion would not be assessed until the criminal prosecution is complete and forensic work has begun. Once detected, the damage is already done and assessed to be enormous, thus, leading to the loss of assets, properties, and savings, possibly resulting in debts and even bankruptcy filings.

Figure 4: Model in E-Collaboration Issues to Facilitate Global Trade, Transactions and Practices

The model, which comprises these eight issues, is illustrated in Figure 4. This examines the process of each issue that is interrelated. The issues that share the same color exhibit similar contribution, where as the issues matched with a double arrow similarly contribute to the global trade. It further asserts that the various tasks in hand for entrepreneurs to undertake in order to flourish global trade. As e-collaborative efforts are underway, adequate precautionary measures need be taken to prevent any intrusions, and policing each transaction should begin. The community is aware of the fact that each e-collaborative transaction is protected by secured networks. Financial consequences are the result of business dealings and market performance. With the support of e-collaboration, there is a bright future for imaginative entrepreneurs with challenging trading prospects and life-changing immersive trading opportunities. Regulatory reforms are needed in facilitating services trade, particularly for commercial area. In certain cases, the presence of regulations can act as an impediment as some have argued. These experiences prepare entrepreneurs to succeed in the real world and to make a difference in communities across the world. E-collaboration is a journey that will never end, but it must be undertaken for the growing demands of global trade. Every step provides in long-term trading with a single objective in mind: to improve the lives of each and every human being.

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