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## eTransformation of the Silk Road: Rejuvenating a Historical Trade Network

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### **Abstract**

*The Silk Road was a historical trade route that was most active in the 7<sup>th</sup>-9<sup>th</sup> centuries. The old Silk Road is little more than history now, but the cities and countries spread out across the old networks have not entirely disappeared. Contemplating a new Silk Road oriented around electronic commerce invokes a paradigm shift in terms of the societal framework for changes to be enacted. In this paper we seek to describe the current status and identify opportunities for the cities of the Silk Road to build on the successes of the past, thus creating e-commerce opportunities for the future. Through research in progress, we aim to discover if the former glory and success of the historical Silk Road can be reborn in a new eSilk Road. We draw on data gathered from published academic and government sources as well as from academic, government and business leaders in key Silk Road cities in Western China and Central Asia. In addition, we contribute our own personal findings and reflections based on site visits to key localities and interviews with local residents. We explore how a socio-technical approach to e-commerce development might be undertaken so as to maximize sensitivity to local norms and*

*simultaneously involve local participants. Conclusions on the viability of an eSilk Road are drawn.*

## **1. Introduction**

The Silk Road was a historical trade route that was most active in the 7<sup>th</sup>-9<sup>th</sup> centuries. It served to link Asia and Europe, thereby changing the nature of commerce in the medieval and renaissance world (Neville-Hardy, 1997; Bonavia, 2002). In essence, the Silk Road was a network that enabled the exchange of a wide variety of goods including silk, precious stones and even rhubarb, as well as information. The old Silk Road is little more than history now although the cities and countries spread out across the old networks have not entirely disappeared. In this paper we seek to describe the current status and identify opportunities for the cities of the Silk Road to build on the successes of the past so as to create opportunities for the future.

In many cases, it is not the goods, products and cultures that have changed. Rather, advanced logistical and technological 'solutions' have acted to bypass the significance of these places with the consequence that broad-based commerce has become little more than a distant memory. Notwithstanding these changes, the Internet may provide an opportunity for these regions to rejuvenate their former success, to redevelop their ability to provide goods and services, thus contributing to a renaissance of the historical Silk Road. Such a rebirth will not be easy, given the numerous economic, political, e-business and cultural considerations that are involved, but it may nonetheless extend a lifeline to the currently isolated communities scattered along the tendrils of the old Silk Road. Similar developments in other parts of the developing world that involve leapfrogging directly into the digital age have been documented (e.g. Davison et al., 1999), for example Grameen Bank's support for mobile phone kiosks in villages in Bangladesh ([www.Grameenbank.com](http://www.Grameenbank.com)).

Contemplating a new Silk Road oriented around electronic commerce invokes a paradigm shift in terms of the societal framework in which changes will be enacted. The new paradigm will focus on remote access to information services and products, as well as more general information exchange. This is not essentially new, as similar activities revolving around products and information also characterized the historical Silk Road. However, little is known about what the impact and implications of introducing electronic commerce might be in this region. A number of salient dimensions emerge addressing aspects of awareness, access, service availability, mastery of technologies, experience, skills, attitudes (motivation), culture, and empowerment of civil society. These are relevant at various levels including the individual, community, region and country. Integrating consideration of these dimensions with local societal networks and contemporary technology will be critical if relationships between organizations, people and governments are to be realized.

In this paper we explore the introduction of electronic commerce in the formerly famous regions and cities of the historical Silk Road. Through research in progress, we aim to discover if the former glory and success of the historical Silk Road can be reborn in a new eSilk Road. We draw on data gathered from published academic and government sources as well as with academic, government and business leaders in key Silk Road cities in Western China and Central Asia. In addition, we contribute our own personal findings and reflections based on site visits to key localities and interviews with local residents. We explore how a socio-technical approach to e-commerce development might be undertaken so as to maximize sensitivity to local norms and simultaneously involve local participants. Conclusions on the viability of an eSilk Road are drawn.

## 2. Background

The Silk Road conjures up visions of strings of heavily laden camels trudging over endless stretches of barren terrain. This is not an entirely inaccurate vision, for some parts of the historical Silk Road would have looked much like this. However, there is much more to the Silk Road than camels and deserts. By some accounts, the Silk Road stretched from Hong Kong to Italy as illustrated in Figure 1.



*Figure 1*



*Figure 2*

However, the Silk Road was not simply a road. In actuality, it was a network as illustrated in Figure 2 with many links and branches into various parts of Central and Southern Asia and Eastern Europe. The Silk Road thus connected numerous countries and cultures with varied climates and ways of working.

Today, as in ancient times, the Silk Road is a study in contrasts. Demographics vary widely as illustrated in Table 1. The long strings of camels have largely gone, except for those giving tourists a ride out into the desert. Cities with 5-star hotels lie adjacent to valleys with nomads housed in yurts migrating from place to place as the seasons change. Traditional market places with locally produced products (e.g., hand-woven silk carpets) are augmented with Internet sites. Large agricultural cooperatives and oil and gas extraction industries have emerged. However, the rich multi-cultural heritage of the region and the spirit of the old Silk Road remains and is being increasingly re-discovered by visitors from around the world.

**Table 1**

Country	Pop (2002)	GDP	% of Internet access
China	1,294,377,000	866	3.58%
HK	7,047,000	23709	59.6%
Kazakhstan	16,026,000	1129	0.6%
Kyrgyzstan	6,047,000	265	3.0%
Mongolia	2,587,000	391	1.6%
Turkmenistan	4,930,000	934	0.17%

Source: [http://www.itu.int/ITU-D/ict/statistics/at\\_glance/Internet01.pdf](http://www.itu.int/ITU-D/ict/statistics/at_glance/Internet01.pdf);  
<http://www.nua.ie>; <http://unstats.un.org/unsd/demographic/social/inc-eco.htm>  
<http://unstats.un.org/unsd/demographic/social/population.htm>

The Xinjiang Uygur Autonomous Region in Western China lies at the heart of the old Silk Road. Xinjiang has established economic and trade relations with more than 70 countries and regions in the world. Outside investment is increasingly prominent. For example, over 100 firms from Hong Kong have invested over €160M and Xinjiang has reportedly attracted over €250M in foreign funds. Oil exploitation, petrochemicals, textiles, grain production, chemicals, machinery, electricity, and forest products are key industries. Tourism is growing rapidly as increased attention is given to preservation and display of historical and cultural artifacts and sites. Old ways of doing things, such as using long tunnels to bring water from the mountains to the city, are used in new ways, for example, to nourish vineyards for wineries oriented around western tastes. These are surrounded by archaeological sites, for example where massive caves are carved into rock richly decorated with religious inscriptions and murals.

### 3. Research Approach

This research emulates a socio-technological spirit in an action research context (e.g., Trist and Murray 1993; Mumford 1983; Bostrom and Heinen 1977; Qureshi and Vogel 2000; Davison and Vogel 2000). A socio-technological approach seeks to jointly optimize human and technical processes. It recognizes the importance of *structural*

*factors* (like government regulations and local business practices) in addition to human and technical factors. Because there are social, technical, and structural barriers to effective e-commerce adoption, overcoming these barriers requires *integrated* social, technical, and structural solutions. **Socio-technical systems theory** holds that joint optimization yields effective innovation adoption, use, and impact.

This research in progress began with a concept discussion followed by a panel at a major conference with additional data gathered through the web (Vogel et al., 2002). To capture the richness inherent in our socio-technological perspective, we then set off on a continuing series of exploratory site visits to establish action research projects engaging participants are various Silk Road sites. As such, we have begun to create a richer picture of the region through interviews followed up with extended site visits and more interviews, particularly at key Silk Road sites in Western China e.g., Xian, Dunhuang, Turpan, Urumqi and Kashgar. Xian is in Shaanxi Province and Dunhuang is in Gansu Province. Turpan, Urumqi and Kashgar are in the Xinjiang Uygur Autonomous Region. The focus has been to explore the emergence and impact of e-commerce along these regions of the old Silk Road that were central to its historical significance but which, also, are representative of currently least empowered regions.

## **4. Results**

In this section we report on findings in areas especially relevant to using technology and e-commerce to rejuvenate portions of the historical Silk Road in Western China.

### **4.1 Infrastructure**

Significant improvements have occurred over the past several years in the physical infrastructure of these regions. Multi-lane highways, extension of the train service to Kashgar and modern airports in Urumqi and Dunhuang are but a few examples. Telecommunication services have improved markedly as fibre optic cable and wireless access has proliferated. High speed Internet access and rural connectivity have emerged to enable a strong platform upon which e-commerce can be enabled. There is a strong presence of mobile phones and personal computers. Telecom costs, however, remain an impediment to the development of e-commerce. Without the freedom to cost-effectively surf the web and explore opportunities, diffusion of use is hindered. Lack of security, lack of a system to monitor and guarantee buyer and seller credibility, and an inefficient delivery system further complicate e-commerce adoption. China's postal delivery system is mostly dominated by the de facto monopoly, China Posts, which provides a complete national coverage. Compared with counterparts in advanced nations, China Posts' delivery time is long and its service quality is poor, especially in remote and rural areas.

Express delivery services by China Posts are often available in big cities and economically developed provinces, but rarely extend to remote and rural areas. International services are often jointly offered by China Posts and foreign carriers such as UPS. There are cargo services offered by airlines, railway systems, trucking carriers, and boat transportation companies in big cities. However, these services are very different from UPS in many ways. For example, goods are often not delivered to customers' offices or homes. They have to be picked up at service providers' central warehouses. This must improve in order to facilitate e-commerce activities. In many cases, especially within a metropolitan area, e-commerce service providers are hiring, or even establishing their own, private delivery networks. There is no sophisticated national private courier

company as yet. Although e-commerce diffusion could create opportunities for various delivery firms to be reorganized and to grow, currently, vendors or e-commerce service providers, rather than special delivery firms, deliver most of the purchased goods (Deng 2001).

A serious infrastructure gap exists in the nature of payment systems and banking. There is no history of local credit card use in Western China where cash has always been king. In fact, the credit card is a relatively new transaction method in China, with the first card issued in Guangdong province in 1985. The number of credit cards and debit cards has grown rapidly with 330 million new cards issued in 2000 (Tan and Ouyang, 2002). However, the usage rate is surprisingly low. Based on a year-2000 survey in 12 large cities, including Beijing and Shanghai, 20% of residents had a credit or debit card, but only 9% of them used their card at least once a week. Twenty-four percent of them used the card 2-3 times a month. The remaining cardholders used their cards only a few times a year. In general, credit and debit cards are used only in high-end department stores, luxury hotels and restaurants and, for the most part, by international visitors. As a result, online consumers in China often browse through a sales website only to find they must pay by mail or walk down the block to provide payment in person. Deng (2001) notes that 90% of B2C transactions use COD (Cash On Delivery; pay upon receiving the goods) to settle the payment. This makes e-commerce more time-consuming, more costly, and less predictable than a traditional form of purchase.

#### **4.2 Interest in eCommerce**

Interest in e-commerce is growing albeit with little sense of urgency that is not surprising, given the generally slow pace of life. It is not uncommon for hotels to have websites that enable online reservations with deep discounts to encourage use. Internet cafes with affordable web access are widely available as are business centers in hotels. Locally made products (e.g., Uygur musical instruments from Kashgar at <http://www.trademile.com/tmnet/>) are available for purchase over the web. Historically, however, Chinese customers tend to shop by looking at, touching, listening to and tasting products before purchasing them; thus, they could feel less safe shopping on-line. Customers from some other countries (notably the developed countries of Europe, North America and Australasia), may be more willing to shop online. Recognition that customers can be both local and international may help local businesses to design their websites for various audiences and ensure that different customers are served appropriately. However Deng (2001) notes that many e-stores are not a 24-hour/7-day operation. Rather, they are open for certain days and certain time periods similar to traditional stores, and pricing through e-commerce is the same as through traditional commerce. This lack of distinction and imposition of restrictions seriously inhibits opportunities for e-commerce impact.

On a broader scale, ChinaTradeWorld.com is a joint venture between Infoshare Technology Co., Ltd. of the China International Electronic Commerce Centre (CIECC) -- the Internet/IT arm of the Chinese Ministry of Foreign Trade and Economic Co-operation (MOFTEC) -- and New ePOCH Information Co. Ltd., a private company based in Hong Kong. The site provides access to MOFTEC's database of 180,000 factories, farms and production centers, all quality-approved and licensed to export their goods to the rest of the world. ChinaTradeWorld.com is backed by CIECC's 600 staff in 74 cities in China and by the new port city of Nansha on the Pearl River in Southern China. This state-of-the-art port, just a one-hour flight from Hong Kong, will become ChinaTradeWorld.com's recommended business center for transactions.

### **4.3 Government Initiatives**

A number of on-going government initiatives are encouraging e-commerce along the Silk Road. For example, Sparkice.com, a China e-commerce pilot enterprise, has launched a special website to leverage conduct of on-line business and information traffic. The Internet site, [www.21cwn.com](http://www.21cwn.com), has been built as a virtual platform for the international co-operation alliance for development of China's western regions. The platform reciprocally allows China-based suppliers to sell their products on the Internet. On the way towards becoming an interactive marketplace for global e-commerce, Sparkice has forged a strategic partnership with Metro, one of the largest retailers in Europe, which will place procurement orders via Sparkice's One Source business-to-business (B2B) platform.

However, physical movement of products across borders is currently (January 2003) hampered by traditional problems. For example, at the Western border of China in Kazakhstan, truck traffic now requires everything to be unloaded from European trucks and reloaded on to Chinese trucks, often with a substantial delay. There is also a railway through to Almaty in Kazakhstan but the gauge is different, which also involves product transfer and delay. Attention to logistics and custom issues similar to those which have occurred in Western Europe where traffic now proceeds swiftly across multiple countries has not yet occurred along the Silk Road. However, there is a major logistics and distribution center in Urumqi for business to and from Kazakhstan and the Russian Federation which portends well for the future.

Numerous local, regional and national political issues also need to be addressed and resolved. The objectives of multiple stakeholders are difficult to reconcile, whether in Western China or Slovenia (Verbole, 2000). There are major developments in European road and rail corridors. Examples are Corridor 10, running from Lisbon via Trieste, Ljubljana and Kiev to Moscow; and Corridor 5, running from Hamburg via Ljubljana, Belgrade and Istanbul to the Middle East. Logistics flows today are developed on the corridors of the Silk Road but important questions remain. How and when can they be supported by eCommerce? How much can respective research accelerate the process by creating awareness, creating a need, opening up ideas, forgetting existing borders, or removing obstacles? A more comprehensive vision will have to be developed to connect these corridors. There is growing interest on the European side. For example, the European Commission has programs including China in research projects. Additional details can be found at [http://europa.eu.int/comm/dgs/information\\_society/directory/index\\_en.htm](http://europa.eu.int/comm/dgs/information_society/directory/index_en.htm). With ten countries entering the European Union in 2004, Europe will be closer to Asia in general and China in particular.

### **4.4 Education and Training**

According to statistics, at the end of 1997 there were 18 colleges and universities in the Xinjiang Uygur Autonomous Region with an enrolment of 45,696 students and 7,837 teachers; 2,090 secondary schools with an enrolment of 1,049,800 students and 84,059 teachers; and 6,962 primary schools with 2,419,700 students and 119,184 teachers. Xinjiang's educational undertakings continue to develop and are broadly appreciated. Basic education is continuously strengthened and various adult education approaches are being further developed. University programs in the Xinjiang Uygur Autonomous Region are especially centered in Urumqi with MBA programs as well as a host of other undergraduate and graduate offerings. For example, the Information Science and Engineering College at Xinjiang University offers a range of courses and is seeking to introduce e-commerce concepts to the region. In addition, the College has particular research interests in the digital representation of the Arabic style Uygur script and in



wireless communications, both topics conducive to further local infusion of use of computers and the Internet.

Other universities in China are placing additional focus on e-commerce with special emphasis on regional interaction. For example, there is growing interest in eCommerce research and teaching involving several university departments (finance, logistics, computer science) at Xian Jiaotong University. There is interest in action research with business and government, e.g., related to procurement, distribution centers, and development of eCommerce standards. Educational programs at undergraduate as well as graduate levels are being developed. Interest in cooperation with other universities is especially salient. An example is at the City University of Hong Kong where a variety of research and teaching efforts in e-commerce are underway. A cooperative research program with Peking University exists to further regional interaction and understanding. The Master of Arts in Electronic Business (MAEB) program seeks to build strongly upon business perspectives while the Master of Science in Electronic Commerce (MScEC) program blends Computer Science and Information Systems perspectives.

## **5. Discussion**

It is reasonable to address the renaissance of the Silk Road from the perspective of what is technically feasible, commercially viable and culturally sensitive. Our research suggests that all three of these aspects can be addressed positively, if care is taken in the operationalisation. Opportunities certainly abound for regions and cities along the historical Silk Road to become vibrant e-Silk Road players. Businesses, large and small, can benefit from the global product exposure that e-commerce can bring as well as use of information technology to encourage trade and interaction. The marketplace spirit is currently in place given historical prominence and an incredibly varied mix of cultures that are present in the Xinjiang Uygur Autonomous Region. Indeed, the physical infrastructure to exploit such opportunities is largely extant, though as has been noted, there are still deficiencies in the financial infrastructure.

It is interesting to speculate how lessons from the old Silk Road might provide insight into a rejuvenated Silk Road based on e-commerce i.e., through e-transformation. The old Silk Road had the best technology of its time and processes that worked based on node-to-node expertise and trust. However, each node in the network (and the people associated with it) had technology, intelligence and trust that extended only to a few adjacent nodes. Overall, through, this provided sufficient overlap to assure total network success. The old Silk Road was driven into extinction by better technology (e.g., large-capacity reliable sailing ships) as piracy, corruption, militancy and cost increased accompanied by process decay and decreased trust. As such, the old Silk Road fell into disuse. It remains to be seen whether current technologies facilitate a shift back to the ways of old or, more likely, emergence of new combination of process and technology that, in combination, will facilitate renewed interest.

The entrepreneurial spirit is present and international investment is rising rapidly along the old Silk Road. High-value local products (e.g., silk carpets) are internationally recognized and prized. Telecommunications infrastructure is present to enable direct local contact using websites and e-commerce channels to bring supplier and producer together in a trust-worthy fashion. Custom-made products including carpets are available at the source for a fraction of the ultimate commercial price currently charged at destinations. A variety of transportation networks (road, rail and airfreight) now exist that compete with sea lanes and existing systems of warehousing for cost-effective delivery. Product specialization is being sustained and trans-border issues are being worked out to facilitate

more inter-region trade similar to the EU. A bright future can well be in store for the region as e-transformation takes hold.

The benefits extend as well to regions less central to the old Silk Road. For example, Hong Kong has long been an effective window to China. Indeed, the South and East Chinese ports, once 'discovered' and opened up to trade, rendered the original Silk Road somewhat obsolete. China has always enjoyed the benefits of this kind of window. Acting as a filter and choke point for trade, people, and ideas, the country can be closed and yet open. The opening up of a new window through the former Silk Road may fit well with this closed-open philosophy, and it may well act as a significant catalyst to the development of the Far West, as well as neighboring regions.

The societal implications of bringing e-commerce to the Silk Road seem dominantly positive, though we cannot exclude the possibility that some yet to emerge disruption will occur to traditional ways of working. What evolves in terms of governmental policy and local business application and action remains to be studied. It appears that the population at large is open to the use of technology and indeed has already begun rapid adoption. E-commerce can provide viable alternatives to rural disenfranchisement that has occurred in other developing regions of the world, but it clearly needs very sensitive management. Cultures can remain intact without the need for Chinese to migrate to cities or adopt urban ways at a time when tourism is developing and electronic outlets for local products are gaining global exposure.

## **6. Research Opportunities**

Issues to be addressed in future research are many and varied. We will use tourism to illustrate a research opportunity that we expect to engage in to illustrate our socio-technical action research approach. Tourism opportunities and options abound that increasingly move away from traditional forms to encompass creative alternatives, e.g., community-based tourism. Community-based tourism refers to tourism enterprises that are owned and managed by the community in which the tourism occurs. It is a form of community development that provides income through operating a tourism enterprise and using that income to better the lives of community members. Often, it also involves an approach to conservation, whereby the natural assets, such as wildlife or landscape that a community lives among, are conserved as sustainable tourist attractions. Clients of community-based tourism engage closely with host communities, usually living among them, encountering their cultures and life-styles at close quarters and even participating in local development activities. Community-based tourism lends itself especially to rural localities inhabited by ethnic or cultural minorities or to areas of unspoiled natural beauty. In Xinjiang, both of these conditions exist.

Whilst the overall contribution of community-based tourism to national or regional tourism income is usually low, it can be hugely significant to the community in which it occurs. Moreover, as the Internet is a natural partner for tourism, given that at the point of sale, tourism is entirely an information product, and as ICTs are beginning to find their way into rural areas, in support of rural development, it is now possible to link remote communities with global tourism markets in a way that disintermediates the string of commission agents from the tourism value chain and ensures that more of what tourists pay for their experience will actually reach the pockets of the communities that they visit.

Community-based tourism has already established a foothold in the regions. For example, a community based tourism operation in Kyrgyzstan (on the Silk Road west of the Xinjiang Uygur Autonomous Region) provides homestays with nomads, horseback treks,

etc. It is supported by Helvetas, the Swiss development agency. For details, see [http://www.helvetas.kg/pr\\_bpp\\_en.shtml](http://www.helvetas.kg/pr_bpp_en.shtml) and the web page on the concept at [http://www.helvetas.kg/cbt\\_main\\_en.shtml](http://www.helvetas.kg/cbt_main_en.shtml). Tours operate within a short summer season and are bookable off the Novinomad web site (<http://www.novinomad.com/>), a Kyrgyz-Swiss Joint Venture specializing in eco-tourism, trekking and horse-riding. E-commerce capabilities are currently at a relatively low level but give rise to opportunities for case studies of how they operate, engage communities, facilitate visitors' facilities, etc.

Mobile devices will likely play a large role in Silk Road rejuvenation. Creative combinations of phones and PDAs can fit well with a nomadic lifestyle, and at the same time provide independence with confidence to visitors. Yurt-based web services can be envisioned to advertise to the outside world and provide a window for local goods without disrupting culture and life-style, yet bringing in monies for community development. Technologically, the infrastructure is in place and custom mobile devices can easily be developed to deal with the characteristics of the environment and activities to be supported. Structural factors such as banking and payment clearance need to be addressed, as well as exploration of stable patterns of government agency involvement. Social factors in terms of consumer trust and acceptance/adoption dynamics deserve attention, as does preservation of cultural values.

An example of the proposed research is to pilot a rural telecentre in the Bai Yang Gou Valley Tourist Region, as follows:

- a case study of existing tourism in the Valley
- a study of the Kyrgyzstan CBT example
- implementation of the Infomobilisation<sup>1</sup> methodology with the community
- development of Internet enabled CBT as the initial application
- extrapolation of the implications for rural e-development on the Silk Road



Community based e-tourism on the Silk Road offers a microcosm of the salient factors that affect the development of the e-Silk Road that we envisage; namely:

- operating in an area of export-oriented income generation that lends itself to e-business
- addressing the cultural specificity of the region in a way that fosters its recognition and appreciation and offers opportunities for its preservation and enrichment
- focussing attention on travel and logistics, land and air, as well as payment systems and certification

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<sup>1</sup> *Infomobilisation*; a collection of participatory mechanisms for community engagement to ensure that ICTs have optimal impacts for development within rural communities.

- engaging directly with the region's remoteness from western markets, one of its defining characteristics.

Community based tourism is closely associated with ecotourism, and is regarded as a tool for natural and cultural resource conservation and community development. It is a community-based practice that provides contributions and incentives for natural and cultural conservation as well as providing opportunities for community livelihood. It has the potential to create jobs and generate entrepreneurial opportunities for people from a variety of backgrounds, skills and experiences, especially for women. Typically, individuals and small groups, often independent travellers, stay with local families and blend into the environment. Their impact is low, but their contribution can be high. Moreover, the promotion of CBT on the Internet (e-CBT) offers an immediate, tangible, purpose for a community to engage with ICTs. Typically this would be in the form of a development oriented community telecentre. A telecentre is a community centre equipped with one or more computers with Internet access and printers and possibly fax and television and radio as well. The staff of a telecentre promote its facilities for the purpose of community development in the areas of income generation, health, education, cultural enrichment and so on. As a shared resource, a telecentre can deliver the benefits of the information age to large numbers of poor people who would never be able to afford their own computer (Harris, 2001).

Although there is mounting enthusiasm among many developing country governments and all leading international aid agencies for the potential of this form of ICT to alleviate widespread poverty, there are many challenges to achieving sustainable development with ICTs. Among them, the identification of appropriate applications and suitable content that is relevant to local communities exists as a major factor influencing outcomes (Colle, 2000). Consequently, targeting e-CBT as a catalyst for development with ICTs represents a potentially effective introductory mechanism, and reason for installing ICTs, ensuring that decisions concerning technology are appropriately driven by strategic development objectives rather than by solely technological intentions. Moreover, in most developing countries, tourism is an important and growing sector in the economy, with China being the largest developing country tourism market in the world. Accordingly, the proposal for e-CBT in Xinjiang has important implications not only for China's growing use of ICTs but also for that in other all other developing countries. Tourism and e-commerce are natural partners.

## **7. Conclusions**

In conclusion we see an e-Silk Road as promising but challenging with numerous opportunities for research. The infrastructure is in place but lacking application. The region's rich heritage invokes opportunities but also makes salient an ongoing need for cultural preservation and special sensitivity that may be less necessary in other contexts. Many additional considerations lie in the nature of tradeoffs between land, sea and air options building on shared information and e-commerce flexibility. Overall we feel that the historical prominence of the Silk Road has renewed significance in global e-commerce. By nature, this is multi-year and multi-project research. Our efforts to date represent only the first steps down the e-Silk Road. Extended collaboration between universities, businesses, and governments is warranted. This would extend beyond joint panels and workshops toward development of prototypes (test beds) and action research to influence successful implementation and use of the e-Silk Road.

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