

Construction of telecommunication network for rural development

Feasibility study of ICT application to the World Heritage Site of Luang Prabang

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Abstract. While tourism increased substantially since the inscription on the UNESCO World Heritage List, a town of Luang Prabang, Lao PDR, faces a need to promote specific policies and programs to ensure sustainable development. In close cooperation with UNESCO and the Government of Lao PDR, Tokyo Institute of Technology (Tokyo Tech) has been conducting field research since 2003. Field survey identified that Information and Communication Technologies (ICT) can be useful tools to promote sustainable management of natural and cultural resource for human development in Luang Prabang. This paper shall focus on the means by which ICT can contribute to the development of the World Heritage site of Luang Prabang. Namely, Luang Prabang has two types of ICT needs: Information management in La Maison du Patrimoine (MdP) and development of ICT center known as “Knowledge Kiosk”. In order to realize the sustainable ICT use in Luang Prabang, locally contextualized applications and human resource development are necessary.

1. Introduction

Sustainable management of World Heritage Sites has recently become one of the important issues in regional development. World Heritage Sites have positive and negative impacts on socio-economic development. While the regional economy would flourish due to increased tourism, there are cases that the lives of poor and marginalized people are threatened by unplanned rapid development of the site. Therefore, the comprehensive approaches such as environmental protection, social development, economic development and human development become a key for the sustainable development in world heritage sites.

Luang Prabang, Lao PDR, inscribed to the World Heritage List in 1995 has necessity to promote policies and programs for sustainable development in order to utilize the value of the heritage for the local community. Tourism in Luang Prabang has been developed after the inscription; however, it has also caused negative effects in the community. Farmers in mountainous area have migrated to Luang Prabang where an economic activity is increasing, and created slums since they do not have means to earn their livings.

The authors are convinced that ICT can serve as effective tools to promote the comprehensive approaches for sustainable development in Luang Prabang. The authors use “ICT” in this paper, as information technology using computer and telecommunication technologies focusing on interactive tools such as telephone and Internet. This particular paper does not refer to broadcasting technology such as TV and Radio. Recently, use of ICT has been exponentially increased all over the world. Especially in developed countries, people enjoy the benefit from ICT, such as economic growth and creation of new culture. In addition, ICT have been utilized for development projects in developing nations. However, ICT development might be considered as luxury and is given low

priority in developing countries. Then, ICT has been mentioned as the essential component since 80's. Referring to the Independent Commission for Worldwide Telecommunications Development (1984, p.8), ICT itself is not an element which makes people wealthy, but it could accelerate development for the local population by facilitating access to information and communication, thus complementing benefit of other fields.

This paper consists of five parts: 1) introduction 2) background, 3) research method & analysis, 4) insights on the survey result and 5) conclusion. The first and second parts focus on entire description and background information. The third part introduces out research method and Luang Prabang's current needs for information management are analyzed. Further, current issues about human resource and infrastructures are presented. The fourth part suggests that locally contextualized ICT application and its sustainability are the important elements for Luang Prabang. This paper concludes with our future prospects of ICT projects for sustainable development in Luang Prabang.

2. Background

2.1. REGIONAL BACKGROUND

Luang Prabang province, located at the north of Lao PDR, consists of 11 districts and 911 villages, and has a population of 365,000 people. The town of Luang Prabang is the provincial capital located at the south-east part of Luang Prabang province and approximately 230km north of Vientian, the capital city of Lao PDR. The town of Luang Prabang consists of 58 villages and 46,000 people. The town has a heritage conservation area, which consists of 33 villages and 30,000 people. After the town of Luang Prabang became a world heritage-listed area in 1995, tourism has been increasing; more than 60,000 tourists visit there every year. The town of Luang Prabang was inscribed on the world heritage from the following point:

“Luang Prabang represents, to an exceptional extent, the successful fusion of the traditional architectural and urban structures and those of the European colonial rulers of the 19th and 20th centuries. Its unique townscape including the biodiversity and traditional lives is remarkably well preserved, illustrating a key stage in the blending of two distinct cultural traditions.”
(UNESCO, 1996, s.VIII C.1)

Since the north of Lao PDR is mountainous area, it is difficult to implement road constructions. Although there are some national routes through some towns and villages such as the town of Luang Prabang, most of the villages in Luang Prabang province do not have roads. Therefore, the rivers are still the important means of transportation. Majority of the population lives in riverside and mountainous rural areas and earns the living by slash and burn farming. However, due to the recent aggravation of the natural environment caused by increase of population, the government of Lao PDR is introducing the policy to prohibit slash and burn farming. This is causing mass-migration into the town of Luang Prabang, because rural people can hardly live in the mountain. Unfortunately, they also have had hard time for living in the town because it is regulated to build a house there. Also they do not have enough skills to be employed. This is causing creation of slums in the town of Luang Prabang.

2.2. MANAGEMENT OF HERITAGE

In Luang Prabang, an Inter-Institutional Committee is organized, specifically in charge of the protection and rehabilitation of the heritage site. The Committee consists of the Ministry of Culture and Information, the Ministry of Communication Transportation Post and Construction (MCTPC),

the Provincial Government and La Maison du Patrimoine (MdP). While the Ministry of Culture takes a leading role at the national level by proposing the issues for developing the adequate strategy, MdP serves as the focal institution for managing the Luang Prabang heritage site. MdP is a national Lao authority, directly reporting to the Ministry of Information and Culture. It was created in 1996 according to the UNESCO recommendations following the inscription of Luang Prabang site to the UNESCO World Heritage List. MdP is the local representation working closely with the international organizations and relevant local governmental offices. It provides advice to the national institutions in the way of conservation and rehabilitation of the heritage site of Luang Prabang. Professionals at the MdP have been conducting studies of new construction projects in protected heritage site. This is to assist DCTPC in case of issuing the construction permit in the protected area. Further, MdP has four important roles in 1) controlling, protecting, restoring and embellishing the listed heritage, 2) managing natural conservation, 3) developing the marketplace for local people, and 4) coordinating the relationship with international organizations and relevant donors. MdP consists of three sections, Architecture and Urban Development section, Secretariat and Communication section, and Water and Environment section. The staff members are Lao architects and engineers, administrative officers and international professionals.

2.3. THE MAB (MAN AND BIOSPHERE) PROGRAMME

UNESCO encourages the adoption of MAB programme as one of the effective strategies of the regional development as follows:

UNESCO's Programme on Man and the Biosphere (MAB) develops the basis, within the natural and the social sciences, for the sustainable use and conservation of biological diversity, and for the improvement of the relationship between people and their environment globally. (UNESCO web site, 2004)

UNESCO has been proposing that Luang Prabang shall adopt the MAB, because the concept of the MAB programme is matched with the needs of Luang Prabang. Sustainable development covering the peripheral area is necessary for Luang Prabang. Improving the quality of life of the poor inhabitants in both the town and neighbor village are essential for Luang Prabang sustainable development. Therefore, comprehensive development with environmental protection and heritage preservation is necessary for entire Luang Prabang community including the peripheral area. The area of 7,000km² covering the town of Luang Prabang and peripheral areas along the Nam Khan River is proposed as the MAB site. To promote the adoption of MAB programme, it is essential to connect the town of Luang Prabang and scattered villages around the town by ICT because the lack of public transportation causes the difficulties in exchanges between the proposed MAB site and the town of Luang Prabang.



Figure 1: Map of the Proposed MAB site (Anne, 2004)

3. Research Method & Analysis

3.1. FIELD RESEARCH

The team of Tokyo Institute of Technology has been involved in the field research in Luang Prabang province since 2003 with partnership with UNESCO and MdP. In early 2004, the team participated in the workshop, “Fighting Poverty through Heritage” organized by UNESCO. The team continued to conduct a field research to determine how ICT could utilize for sustainable development in Luang Prabang world heritage site. The team used the following data collection methods: 1) relevant document analysis at central and local government agencies, 2) interviews at local sites, 3) written questioners at local sites, 4) discussion and brainstorming, and 5) site observation along proposed MAB site.

3.2. CURRENT SITUATION & NEEDS

The preliminary analysis of the field research identified two current needs in Luang Prabang site: 1) information management by using ICT such as Database Management System (DBMS) and creation of web site and 2) establishment and sustainable development of “Knowledge Kiosks” which provide access to the useful information for the locals and visitors.

3.2.1. Information management of MdP

Well-organized and shared information contributes to high productivity of organizations. Information management should be strategic in order to utilize useful information for organizations' benefits. In the past years, MdP accumulated abundant information in the following categories: 1) heritage architecture and urban planning in a world heritage site, 2) environmental protection, especially, wetland protection, 3) socio-economic activities, 4) artifacts found in the Luang Prabang, 5) legislation and authorization, 6) workplace material. Such information not only has the cultural value as the information of the world heritage site but also is useful for the development and conservation activities in the other heritage sites. It is obvious that much more valuable information will be further accumulated while the MAB site will be making progression. In spite of the fact that MdP can be significant source of information, there are the problems, 1) Information is not effectively managed, 2) Abundant information is underutilized and 3) There is no information access to Luang Prabang via official website.

1) Information is not effectively managed

Most information in MdP is paper-based and is not in good condition so that some of them have

been damaged. Recently, the MdP staff members have made an effort to enhance the information management situation by using DBMS. Their effort is gradually showing the positive impact on their information management style; but they still have problems. Since there is no LAN (Local Area Network) in MdP, their DBMS system is working on each personal computer. Therefore, they have to share and update the information of the database by sharing CD-ROMs. Such DBMS tends to cause corruption of data uniqueness and it doesn't have system extensibility.

2) Abundant information is underutilized

Due to the above mentioned condition regarding information management situation, information cannot be shared effectively in MdP. The appropriate information management such as server-based DBMS can be proposed in order to efficiently utilize valuable information in MdP. Furthermore, the information sharing among related government institutions is a key to promote coordinated actions for heritage management and regional development. Currently, not only sectionalism among ministries makes it difficult to share information among the institutions but also appropriate and easy access to relevant information is technically not possible. Therefore, information sharing among the government agencies such as E-government will be necessary. The necessity of E-government is also proposed in E-readiness Assessment in Lao PDR (UNDP, 2002) and the interviews with the several related government institutions.

3) There is no information access to Luang Prabang via official website

There is no official Luang Prabang Town web site. Interested visitors can acquire better information, if there is easy access to the site information via website. Building the web site of MdP is strongly desired to provide information to public. Further, once effective MdP database is organized, developing the web contents linking the part of MdP database can realize the further external use of valuable information of the world heritage site.

MdP needs strategic information management for the internal and external purposes. Though MdP has accumulated lots of valuable information related to the Luang Prabang world heritage site for nine years, the information has not been well utilized for the MdP staff members and the local people in Luang Prabang.

3.2.2. Establishment and development of "Knowledge Kiosks"

"Knowledge Kiosk" is a type of multipurpose community telecenter (MCT). It provides communication and information facilities (phone, fax, computer, the Internet, photocopier, audio-visual equipment, etc.) for a wide range of community uses. Establishment of Knowledge Kiosks in Luang Prabang offers useful information access to the people in both the town and the peripheral areas. The following are the reasons why Knowledge Kiosk can be useful tools for public in Luang Prabang.

1) Need for the local people to have access to information

People in the town and peripheral rural areas have difficulties in obtaining necessary information for their lives. Though Internet cafes are rapidly increasing in the town of Luang Prabang, it is difficult to say that the locals receive benefits from them. Current main users of the Internet café are tourists from abroad. If local people can exchange useful information for their business and recreation, their social and economic activities would be flourished. In addition, locals do not have easy access to obtain the necessary legal information related to the construction of the houses in the town of Luang Prabang.

2) Need to develop active reuse of restored architectures.

There are a number of restored heritage architectures in Luang Prabang, but some of these architectures are underutilized. The restored architecture should be open to public for its cultural value and the tourism business opportunity for the local community. Mdp staff members stated that not only the conservation of the architectures but also its innovated reuse are vital to create benefits for the community and people. Two heritage sites in the town of Luang Prabang were restored by the project coordinated by Mdp. Although, the facilities are sometimes used for the event and ceremony; there is no regular activity.

The restored architectures could be actively reused as educational museums, community centers, and heritage repair skill training centers with the function of Knowledge Kiosk. If the remodeled heritage architectures can be equipped with necessary facilities Knowledge Kiosk, the sites can play a role as a tourist information center. There is no official tourist information center in Luang Prabang. Luang Prabang might have not been able to introduce important visiting sites in rural areas to tourists. In addition, people in such rural areas can expect to have a communication tools through Knowledge Kiosk

3) Need to ensure the security in the MAB site

The areas in proposed MAB site have well-preserved natural biodiversity and the traditional local culture. Visiting there would be attractive as eco-tourism for tourists. Furthermore, such visit could promote the tourism and local benefits in the MAB site. But tourists are scarce because of the distance from the town and lack of the security ensuring and information about there. Eco-tourism could be promoted by security ensuring and information providing via Knowledge Kiosk in the MAB site. Connection with the town via ICT providing specific information about the MAB site in the Knowledge Kiosk could alleviate tourist's concern.

3.3. IDENTIFIED PROBLEMS

Field research identified two fundamental issues in application of ICT in Luang Prabang. It is important to consider the following problems when ICT project is planned and designed.

3.3.1. *Lack of human resources*

Human resource is one of the essential factors to realize sustainable development. In Luang Prabang, human resources for sustainable ICT projects are limited. Currently, private technicians and the computer shops provide the services in maintaining computer hardware. Internet Service Providers (ISPs) also provide the customer services against problems in using Internet connection. However, there are not enough technicians with skills of establishing, managing and maintaining DBMS, websites, and servers.

Though there are a new computer-training center and a university, they are not equipped to producing human resources with advanced computer skills. E-way Center in the town of Luang Prabang was established in line with the strategy¹ of Science, Technology and environment Agency (STEA). The center is currently providing ICT training for government staff and the local people and business support service for local companies. But the trainings contain only basic use of computers such as Internet browsing and word-processing. At this stage, the center does not train system engineers. Souphanouvong University established in 2003 as the first university in the north of Lao PDR does not have sufficient facilities or faculties for providing advanced information technology education.

3.3.2. *Insufficient ICT Infrastructure*

1) Electricity

Electric power grid is available only in the town of Luang Prabang and villages along the roads. According to the local people from the upstream of Nam Khan River, electricity is available in some villages in upstream of Nam Khan River by hydroelectric power. Laos PDR has many waterfalls because of its mountainous landscape so that there would be a possibility to produce hydroelectric power. Further data collection is necessary to analyze the status of electric power supply.

2) Internet Connectivity

In the process of installing necessary facilities including the servers and Knowledge Kiosks, insufficient Internet connection in Luang Prabang shall be a problem. Internet access is available in Luang Prabang but it is not enough stable and capable for sufficient services which people can have in developed countries. Besides, due to the lack of Internet Exchange between domestic ISPs (Internet Service Provider), interconnection with different ISP in Lao PDR has difficulty. This situation is insufficient to establish servers in MdP to provide the web service. Since the price of Internet connection is still too expensive for local people, especially in the peripheral areas, it shall be a problem.

4. Findings from the field research

4.1. REMARKABLE GROWTH OF ACCESSIBILITY TO ICT

Although Luang Prabang currently faces insufficient ICT infrastructure, the current situation of ICT accessibility is remarkably changing from the previous situation which described by Boualoykhong Chansavat and Phet Sayo (2002). According to the interview with the DCTPC, communication backbone network in Luang Prabang has established along the national routes via microwave or optical fiber. Due to this connection, telecommunication services such as fixed telephone, cellular phone and permanent Internet service in 64-128kbps are available in the town of Luang Prabang and other villages along the national routes. Furthermore, iPSTAR, a satellite providing data transmission in East Asia and Oceania, was launched by Shin Satellite Public Company Limited in 2004. Lao Telecom started to operate the permanent connection service by more than 512kbps. Internet-café's in Luang Prabang have already used this service. iPSTAR made it possible to provide Internet connection in the area where there is no connection via territorial communication backbone if electricity is regularly provided.

There are three permanent internet connection services provided by Lao Telecom, ETL (Enterprise of Telecommunications Lao) and Planet Online. Lao Telcom uses iPSTAR, and provides a connection service of which cheapest one is 512kbps connection by \$300US per month. Planet Online started the first permanent connection service and provide 64-96kbps DSL connection by \$400US. ETL started the 128kbps DSL connection service by \$300US per month. These services should still be extremely expensive for the local people, but most of Internet cafes use such services. Therefore, possibility of permanent connection seems to be increasing for institutional use such as Knowledge Kiosks due to the enhancement of the telecommunication infrastructure and the costs degradation. Moreover, further enhancement of telecommunication accessibility will be expected.

4.2.RECOGNITION OF IMPORTANCE OF INFORMATION MANAGEMENT

The brainstorming session with MdP and UNESCO revealed that they believe that the web site of

MdP should be developed as a portalⁱⁱ web-site of Luang Prabang with developed DBMS in MdP. The portal website of Luang Prabang aims at providing specific information to different user groups. The portal website should be created as the central information resource for people who need any information about Luang Prabang. The portal website of Luang Prabang should include information resources of 1) tourism information, 2) local information including legislation, commerce, and entertainment to name a few, 3) world heritage, especially focusing on Luang Prabang's tradition. Creation of a portal website for Luang Prabang will become an effective information resource for the locals, tourists and people who are interested in world heritage all over the world. Types of information and expected benefit from the website are illustrated on Table 1. These benefits will finally result in the local development in Luang Prabang and the other places. Furthermore, the synergy of Knowledge Kiosk and the portal website will create efficiency of information management in Luang Prabang as well as high reputation of Luang Prabang. Knowledge Kiosk will be able to promote the portal site by showing the website on the computer displays at the kiosk. The portal website should be matched with the local contexts. Consequently, a constant and efficient use of Knowledge Kiosk enables local peoples to obtain valuable information comfortably.

Table 1: Benefits from creating the web site

[Source: brainstorming and meeting in MdP, Luang Prabang, Lao PDR, Sep 2004]

Target groups	Types of information	Benefit
General public	Information on Luang Prabang Activities of MdP	LPG and MdP known to public
Tourists	Historic, cultural and tourist information	Tourist better equipped MdP officials save time
Researchers	Specific information e.g. architecture, environment	Academic knowledge Further research
Business people	Regulations Bidding information	Increased business opportunities No need to repeat information
International organization Aid agency	Management of world heritage conservation activities	Shared knowledge Increased opportunities of fund raising
Community people	Authorization process and regulations, good practice	Raised awareness

4.3. IMPORTANCE OF LOCALLY CONTEXTUALIZED ICT APPLICATION

Development of locally contextualized ICT application is the most important factor in the ICT project in Luang Prabang. In order to realize sustainable utilization of ICT within local context, it is necessary to adopt the system to the actual situation with constant compatibility. Therefore, flexibility and scalability also needs to be considered when systems are installed. It is important to consider Luang Prabang's technical, geological, and institutional requirements and constraints when creating of contextualized ICT applications. Considering only technical aspects is not enough for effective ICT applications. Furthermore, research on the style of traditional information sharing in each community should be essential for designing locally useful ICT applications. Sometimes, traditional information sharing sometimes might be more important than ICT-based information sharing and vice versa. Also the traditional information sharing style could provide useful ideas for efficient user interface design. In order to make the application sustainable by the locals, further discussion with

local team will be necessary.

4.4. CAPACITY BUILDING FOR SUSTAINABLE DEVELOPMENT

To create locally contextualized ICT application, capacity building for raising necessary human resources is important. As we stated earlier, the ICT project in Luang Prabang requires a group of people who are familiar with cultural, social and technological aspects in Luang Prabang and know how to manage and operate computer systems. People should be able to improve the system on the basis of current Luang Prabang's needs. Therefore, the local team that has technical knowledge and capacity to analyze the system with a comprehensive perspective are most appropriate for sustainable development in Luang Prabang by ICT.

Though the locals have difficulty in developing ICT skills in Luang Prabang at this stage, the town of Luang Prabang, the biggest town in the north of Lao PDR with the world heritage, have enough prospects to attract businesses and educations. Generally, there is a tendency that talented individuals in rural areas of developing countries tend to leave for the capital city or abroad. However, it seems that Luang Prabang have potential to retain educated local people, especially people with advanced ICT skills when the demand of ICT engineers for business is increasing.

5. Conclusion

In the town of Luang Prabang and its peripheral areas, there are two types of ICT needs for sustainable development: information management in MdP and development of Knowledge Kiosks. Establishment of server-based DBMS and creating the web-site of MdP are required for efficient information management in MdP. A portal web-site of Luang Prabang is hoped to served as the central online information resource on Luang Prabang. Furthermore, when knowledge kiosk is developed, the synergy of Knowledge Kiosk and the portal website will create benefits for managing information in Luang Prabang as well as promoting high reputation of Luang Prabang. In order to realize the sustainable ICT use, locally contextualized applications and human resource development are necessary. In the future research, it is hope to identify the specific requirements within the local context, prioritize the needs for DBMS, web-sites and Knowledge Kiosks, and concern the effective way for local capacity building.

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ⁱ STEA (Science, Technology and Environment Agency) has a strategy to provide the ICT training the local people to develop the human resources for ICT. There are ICT training center in each province and STEA has already trained more 1,500 people. Also in Luang Prabang, there is E-way center which is one of the ICT training centers of STEA.

ⁱⁱ According to the definition refer to WHATIS.COM (2004), *Portal* is a term, generally synonymous with *gateway*, for a World Wide Web site that is or proposes to be a major starting site for users when they get connected to the Web or that users tend to visit as an anchor site. There are general portals and specialized or niche portals. Some major general portals include Yahoo, Excite, Netscape, Lycos, CNET, Microsoft Network, and America Online's AOL.com. Examples of niche portals include Garden.com (for gardeners), Fool.com (for investors), and SearchNetworking.com (for network administrators).