Kathmandu Metropolitan City Office
Bagh Durbar, Kathmandu, Nepal

Kathmandu Metropolitan City e-Government Feasibility Study Final Report

August, 2009

Seoul Metropolitan Government

POSDATA Co., Ltd

Preface

The “Kathmandu Metropolitan City e-Government Feasibility Study (F/S)” has been produced by POSDATA under the supervision of Seoul Metropolitan Government (SMG). The SMG and POSDATA have the ownership on the modification and revision on this report.

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Kathmandu Metropolitan City
e-Government Feasibility Study
Final Report

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Part1. Project Overview

1.1 Project Background

As a Government-to-Government (G2G) international cooperation, Seoul Metropolitan Government (hereinafter referred to as “SMG”) provides a technical assistant, known as F/S (hereinafter referred to as “F/S”). Last two decades, SMG made tremendous efforts to establish e-Government infrastructure and systems. According to a number of research institutions, SMG reached the world’s highest level in developing and operating e-Government systems.

The F/S is an ICT strategy consulting program that enables partner countries to assess the current e-Government (national level and/or local government) status, and to draw realistic e-Government strategies and follow-up projects. With a number of program experiences in various partner countries last several years, the F/S program has been optimizing its assessment methodologies and guidelines.

To assist establishing a local e-Government strategy and plan for Kathmandu Metropolitan City (hereinafter referred to as “KMC”), SMG awarded the F/S project contract to POSDATA Co., Ltd, a leading ICT System Integration (SI) companies in Korea. POSDATA has various e-Government project experiences including “National Integrated Local e-Government Applications and Network” which is one of the flagship projects in Korean e-Government history. The project concept and its experiences can be shared with partner countries even if the political environment and the system of the law are different from Korea.

Since 2007, POSDATA and SMG have been jointly working with several partner countries to promote and to share e-Government project experiences and lessons learned. For this particular program, SMG and POSDATA signed a memorandum of understanding (MOU) in May 2009, and with this agreement, both parties will closely work together to assist e-Government development for KMC.

During the F/S project, POSDATA visited KMC two times: first visit for project initiation and information gathering and the second visit for the reviewing plans and prioritizing and finalizing the strategy and plans. Due to short duration of the program, assessment and strategy developing process schedule were extensive, but with the enthusiastic support from KMC, the consultants were able to complete the F/S project successfully

on-time. This is a final version of the e-Government F/S project for KMC, and was prepared based on ample exchange of opinions and information with the KMC.

1.2 Project Objectives

The main objective of a typical F/S project is to assess the ICT environment and e-Government development status of a partner country, and to deliver a recommended future development strategy and project plans to reduce digital divide, to create more efficient working environment for the government employees, and finally to provide the right services at the right time for the citizens. It is important to state that the know-how and recommendations are based on the SMG's previous experiences and its current ICT infrastructure and e-Government architecture along with ICT development trend and paradigm.

With such short project duration, it is virtually impossible to provide an in-depth analysis and Informatization plan, but F/S project will overview the current e-Government development in KMC as well as the national ICT plans and policies in order to determine the best possible conclusion.

From the initial desk research results, KMC has very limited resources and systems in terms of e-Government development. Thus, in this F/S project, the F/S project will focus on establishing ICT basic infrastructure, expanding communication channels among the government employees, change management for electronic document management, and finally system and data security management.

1.3 Project Scopes and Schedule

The project scope has two layers. One is geographical scope which defines the geographical and political boundary, and the contextual scope describes what needs to be done and what to deliver within the project duration. In this project, the geographical scope is KMC main office in Kathmandu, Nepal, and the 35 wards. Though 35 wards are remotely located in Kathmandu Metropolitan Area, their ICT environment and practical needs for ICT will be considered when to define future projects for KMC.
The contextual scope includes assessment of ICT infrastructure and to draws strategy and follow-up projects. At the end of consulting report, the consultants will introduce and guide the Overseas Development Assistant (ODA) program from the Korean government as one of funding methods.

- **Contextual Scope:**
  - To assess ICT strategy and annual plans, human resources, ICT budget
  - To assess ICT key infrastructure (PCs, Network, Application Systems, etc.)
  - To define ICT strategy, follow-up projects, and project funding method

The project duration for KMC is two months. The project starts on 15th of June and completes on 15th of August. Though it has a very extensive project schedule, the project consists of four major phases and seven work processes.
The overall F/S project schedule follows.

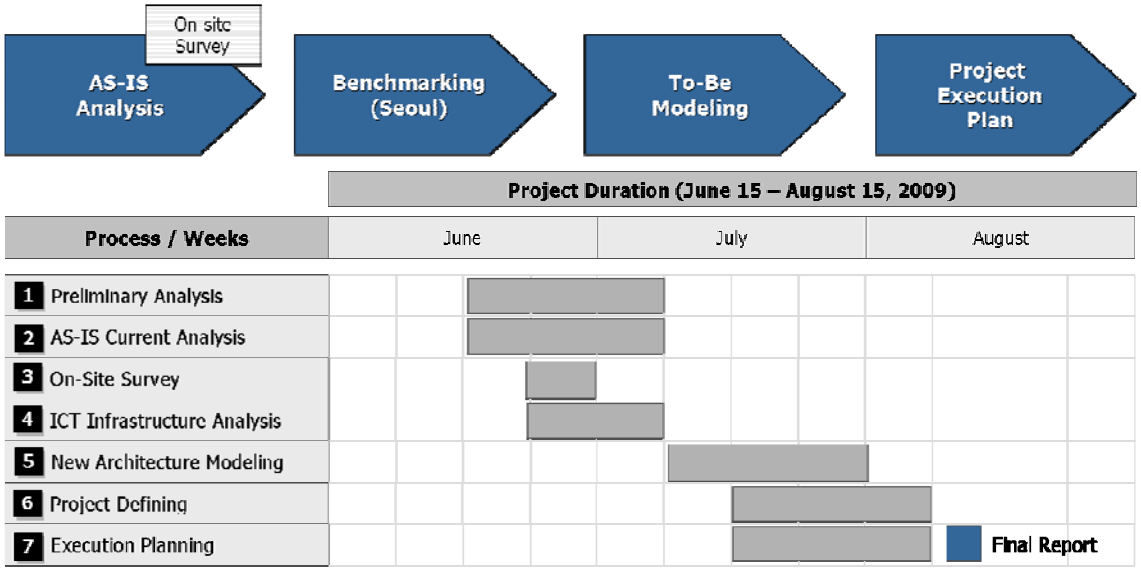


Figure 1: Project Schedule

Following describes detailed activities of each step

- **Step 1: Preliminary Analysis**

  It is the first step of the project. The project manager initiates desk research with project team members (consultants) searching for basic information in regard to country fact data, general ICT industry, capability index, and other important information and statistics including e-Government rankings and competitiveness index from the well-known international level organizations and research institutes such as United Nations and the World Bank.

- **Step 2 and 3: AS-IS Current Analysis and Site Survey**

  To identify e-Government infrastructure status and assess work processes, consultants will visit the partner country. The consultants use various methods to analyze the current ICT status. In most cases, a comprehensive site visit is initiated by the F/S consultants and scheduled in the early stage of F/S project. This visit is intended to gather detailed information from the partner country regarding the ICT infrastructure and resources and operation of Information Technology (IT) systems. The consultants will provide feedback or recommendations for the project during the site visit. It is important to be able to gather enough information for the further analysis, and the coordinators from the partner country arrange interviews and question and answer (Q&A) sessions with the department chiefs. The consultants will prepare questionnaires, templates. It is also important for the coordinators to deliver the requested information on-time.

- **Step 4: ICT infrastructure Analysis**

  The consultants and participating IT engineers start to analyze the partner countries' ICT infrastructure and e-Government applications. While strategy consultants review the ICT infrastructure in terms of ICT policy (national level, local government level), ICT strategy and on-going projects, ICT organization structure, ICT budget and human resources first, IT engineers to review and analyze applications, N/W configuration, customized e-Government software and IT architecture.

- **Step 5: New Architecture Modeling**

  Consultants determine the e-Government potential projects and future model or architecture for e-Government establishment. Usually the to-be image or a new architecture model contains communication channels with the citizen on the left, and core e-Government applications in the middle, and G2E back office infrastructure and applications on the right.

- **Step 6: Project Defining**

  With the sketched future e-Government model (to-be model), the project team members define several projects to be implemented for the next several years (mostly 1 to 3 years). It is important to state that the final to-do-projects will be defined with the partner country.

- **Step 7: Execution Planning**

  A brief estimate will be provided with the project list. In this step, financial resources is also considered so that introduction to Korean government's overseas development assistance

1.4 Project Organization

This project is initially organized by SMG, and plays the pivotal role in this project. SMG has the world-class e-Government project experiences, best practices in developing customized government back-office applications and system maintenances. So, SMG oversees and provides guidance in planning and developing strategy. KMC takes a role in providing the current status of e-Government development and ICT needs. In addition, it coordinates the assessment processes, prioritizing the follow-up projects. POSDATA as one of leading system integration companies in Korea provides technical expertise in assessing current e-Government development status, establishing ICT strategy, and phase-wise ICT plans.

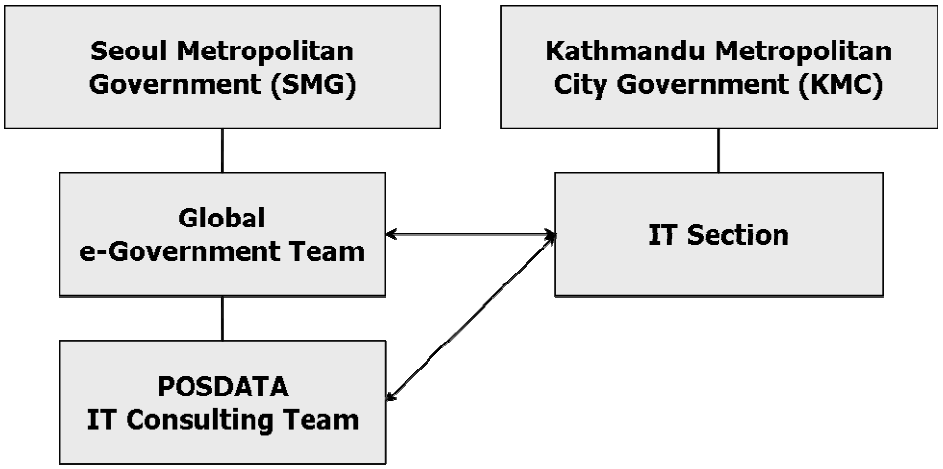


Figure 2: Project Team Organization

The detailed role and responsibilities (R&R) of each organization is as follows:

Category		Role & Responsibility
SMG	Program Management	- Overall management and supervision of the F/S - Provides best practices on its e-Government experiences and expertise

Category		Role & Responsibility
KMC	Project Coordination	- F/S project coordination . Providing ICT status information . Prioritizing follow-up projects & its scope
POSDATA	Project Management	- Overall management and supervision of the F/S - Project Management (Scope, Schedule, etc.) - Review and finalize the project deliverables
	Consulting	- Working-level staffs in charge of assessment and coordination

Table 1: Role and Responsibilities

Part 2. Environment Assessment

Part2. Environment Assessment

2.1 Country Profile

Figure 3: Nepal Map (source: CIA Factbook, 2009)

- **Location:** Southern Asia, between China and India (Landlocked)
- **Area:** Total: 147,181 sq km, land: 143,181 sq km, water: 4,000 sq km
- **Geographic Coordinates:** 28 00 N, 84 00 E
- **Climate:** varies from cool summers and severe winters in north to subtropical summers and mild winters in south. There is one rainy season between June and August
- **Land Use:** arable land: 16%, permanent crops: 0.85%, other: 83% (2005)
- **Life Expectancy at birth:** total population: 65.46 years, male: 64.3 years, female: 66.67 years (2009 est.)
- **Languages:** Nepali 47.8%, Maithali 12.1%, Bhojpuri 7.4%, Tharu (Dagaura/Rana) 5.8%, Tamang 5.1%, Newar 3.6%, Magar 3.3%, Awadhi 2.4%, other 10%, unspecified 2.5% (2001 census)
  note: many in government and business also speak English (2001 est.)
- **Religion:** Hindu 80.6%, Buddhist 10.7%, Muslim 4.2%, Kirant 3.6%, other 0.9% (2001 census) *note: only official Hindu state in the world*

2.1.1 Geographical disadvantage

Surrounded by China and India, Nepal is one of 44 landlocked countries in the world. World Development Report (World Bank, 2009) states "adverse physical geography generally increase economic distance, reducing trade of goods and services and the flow of labor, capital, and information, making delivery of public services harder."

Due to this geographical attribute, Nepal relies on India and China for trading goods and means of transportation. To overcome geographical disadvantage, NGOs and 32 countries participate building the trans-Asian highway, as known as "Asian Highway," a multi-billion dollars mega project.1 Though it is a long-term project with tremendous efforts and resources required, once completed, Nepal will be benefitted in terms of inter-country transportation, trading goods and services.

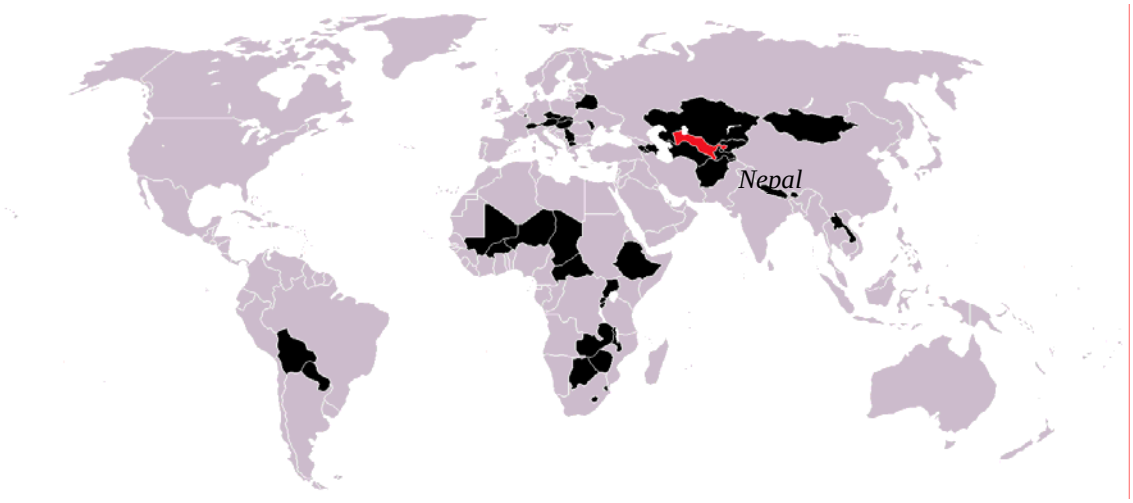


Figure 4: Landlocked countries (source: Wikipedia, 2009)

2.1.2 International Organization Participation

As of 2009, Nepal actively participates in 53 international organizations including UN, UNDP, and UNESCO. Several major international organizations have its representation in Kathmandu area. Among those international organizations, ADB and UNDP are the two major contributors in Nepal in terms of ICT and its related development. However, it seems like priority and percentage of ICT projects is still behind from other areas.

For instance, a simple analysis of ADB's previous 185 projects recent 10 years in Nepal shows that only 2% was ICT projects compared to 15% projects for developing agriculture. Even though acknowledging the needs for raising basic life quality and

1 UN ESCAP, Asian Highway Briefing 2008. (total of 141,000Km long mega project.)

developing social infrastructure, it is necessary to raise priority of ICT projects in order to increase people's self-reliance, government transparency, economic growth, and so on. Participating international organizations follows: ADB, BIMSTEC, CP, FAO, G-77, IBRD, ICAO, ICC, ICRM, IDA, IFAD, IFC, IFRCS, ILO, IMF, IMO, Interpol, IOC, IOM, IPU, ISO (correspondent), ITSO, ITU, ITUC, MIGA, MINURCAT, MINUSTAH, MONUC, NAM, OPCW, SAARC, SACEP, UN, UNAMID, UNCTAD, UNESCO, UNIDO, UNIFIL, UNMIL, UNMIS, UNMIT, UNOCI, UNOMIG, UNTSO, UNWTO, UPU, WCL, WCO, WFTU, WHO, WIPO, WMO, WTO

2.1.3 Administrative Divisions & Population

There are 14 zones (anchal, singular and plural); Bagmati, Bheri, Dhawalagiri, Gandaki, Janakpur, Karnali, Kosi, Lumbini, Mahakali, Mechi, Narayani, Rapti, Sagarmatha, Seti.

- Population: 28,563,377 (2009 EST, CIA)

Because of geographical attributes, the population density is higher in the southern part of Nepal. The Great Himalaya Range lies in the north, so naturally population density is low in that region. The population in the mountain area is hard to be estimated due to the fact that these people live in such a wide area scattered in isolated villages. Thus, the population statistic differs from information sources.

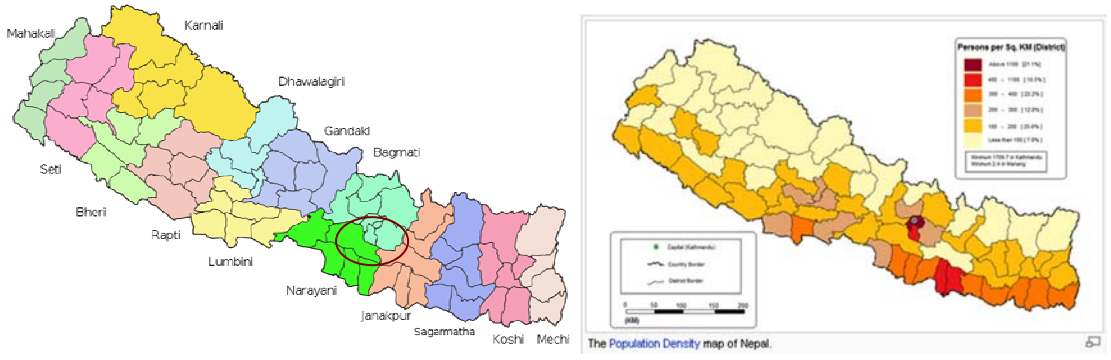


Figure 5: Nepal administrative divisions & Population distribution

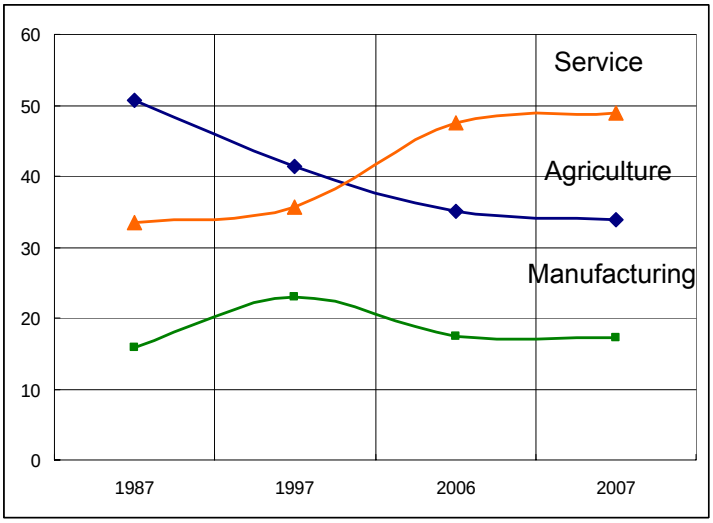
2.2 Economic and Political Environment Analysis

"In terms of per capita GDP, Nepal is now where Sri Lanka was in 1960, Pakistan was in 1970, and India and Bhutan were in 1980. (World Bank, 2009)"

According to World Bank (2009) and other international institutions, Nepal remains one of the poorest and lest developed countries in the world with a GDP per capita of 470 USD (estimated '09). It is unfortunate that nearly one-third of the population living below the poverty line.

In recent years, the percentage of the agriculture industry in the Nepal economy appears gradually decreasing, but agriculture is still the mainstay of the economy, providing a livelihood for three-fourths of the population and accounting for about one-third of GDP.

Industrial activity mainly involves the processing of agricultural products, including sugarcane, tobacco, and grain. In addition, at current state, the percentage of the service industry, mainly tourism, surpassed the agricultural industry in the late 90s, remains the top. Since 1997, Nepal the structure of economy illustrates that the percentage of service industry increases dramatically remains or getting lower while the percentage of the service industry is reaching 50%.



The deteriorating world economy in 2009 will challenge tourism and remittance growth, a key source of foreign exchange. Nepal has considerable scope for exploiting its potential in hydropower and tourism, areas of recent foreign investment interest.

Figure 6: Structure of the economy

2.2.1 Government Expenditure and Infrastructure

According to the recent article released from ADB, DFID, and ILO "civil war and/or conflict and deterioration in governance delayed some key development projects or initiatives."

In consequence, government investment or its expenditure for agriculture, utilities (electricity, gas, and water), and transport and communications dropped significantly in a decade. The current percentage of the government expenditure in agriculture and utilities are far lower than that of its 90s. The Nepali government should allocate most of its budget to improve various social infrastructures to improve its economy.

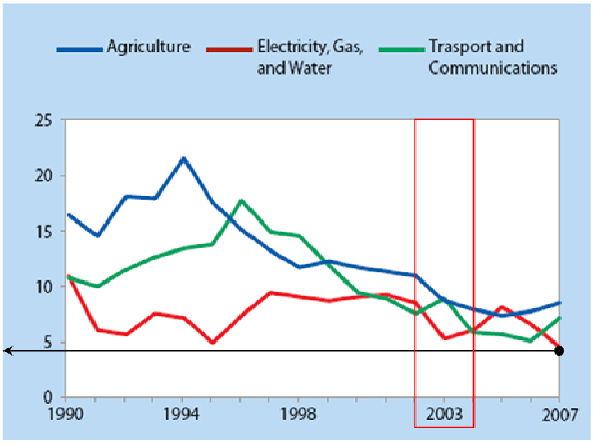


Figure 7: Government Expenditure in selected area[2]

The World Bank also addresses the importance of political stability to boost Nepal's economic situation. The economic growth in Fiscal Year 2009 is expected to be less than 4 percent which is lower than anticipated due to power outages, frequent strikes and highway blockades. To control and prevent strikes and highway blockades, the government will allocate more budgets into non-social infrastructure establishment, and the constraints will heavily affect to economy in many different ways.

The same study shows that the current social infrastructure level in Nepal is far lower than neighbor countries in the region. Especially electrification is in a serious situation. The consumers in Nepal were paying nearly 115% more than India and Bangladesh for electricity, and it is due to inefficiencies in the power sector. It also pointed out that the inefficiencies resulted from not only high transmission losses (technical), but also corruption in billing.

2 Country Diagnostic Studies. Nepal Critical Development Constraints, ADB, DFID, ILO (2009) pp. 6

Indicators	Bangladesh	India	Nepal	Pakistan	Sri Lanka
Electricity Consumption Per Capita (kWh)	136 (2005)	480 (2007)	70 (2007)	456 (2007)	378 (2007)
Road Density (km/km² of land)	1,838 (2003)	1,138 (2002)	121 (2004)	335 (2004)	1,505 (2003)
Paved Roads, Percent of Total	9.5 (2003)	47.4 (2002)	56.9 (2004)	64.7 (2004)	81.0 (2003)
Telephone Lines – Fixed and Mobile (per 1,000 people)	224 (2007)	243 (2007)	64 (2007)	516 (2007)	538 (2007)
Internet Users (per 1,000 people)	3.6 (2007)	71.4 (2007)	15.0 (2007)	109.7 (2007)	38.6 (2007)
Irrigated land as Percent of Total Arable Land	56 (2002)	35 (2002)	36 (2002)	83 (2002)	68 (2002)
GDP Per Unit of Energy Use (in constant 2005 PPP dollars)	6.8 (2005)	4.5 (2005)	2.8 (2005)	4.5 (2005)	7.2 (2005)

Figure 8: Government Expenditure in selected area[3]

2.2.2 Governance Indicators

The Governance Indicators also show political turmoil in early 2000s drastically pulled down government effectiveness, political stability, and other governance indicators. All governance indicators reached the lowest level in 2005, and then it appears to improve gradually since 2006 peace agreement. However, it is important to state that the indicators still remain under 30% which is lowest level in the South Asia region.

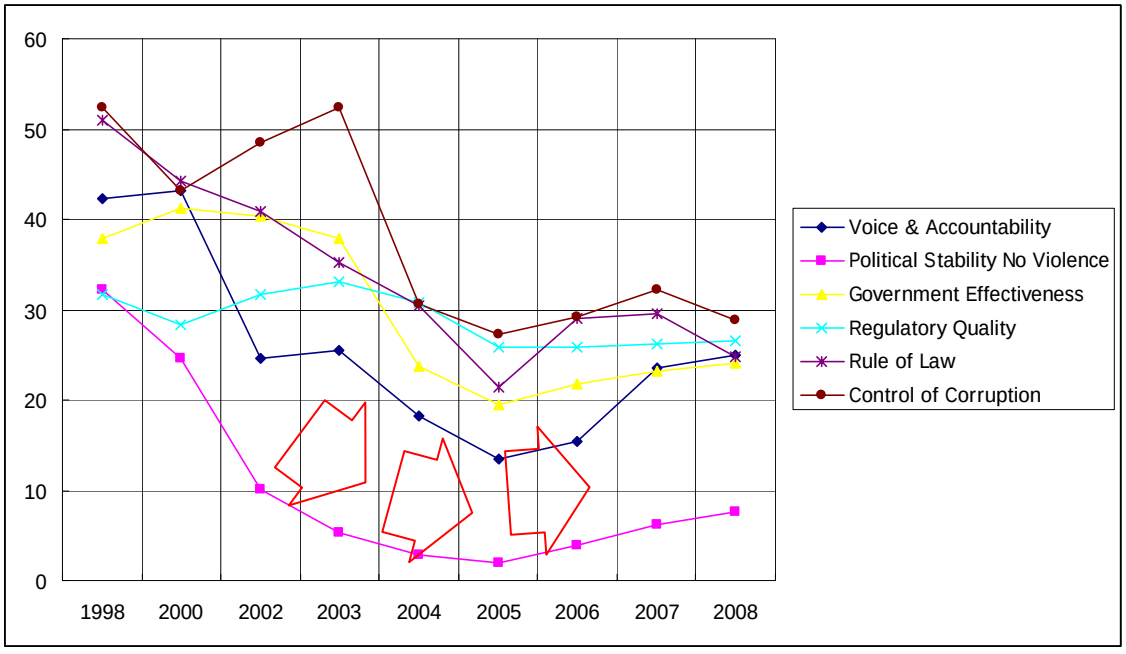


Figure 9: Governance Indicators (Data source: World Bank, 2008)

3 Country Diagnostic Studies. Nepal Critical Development Constraints, ADB, DFID, ILO (2009) pp. 7

2.2.3 Financial Indicators

Some of financial indicators show that even if growth rate of GDP (%) is going down, the level of import and exports is going up gradually since 2003. As long as the inflation rate and the currency exchange rate remain stable, the economy should find a way of improving its efficiency and scale along with the government political stability.

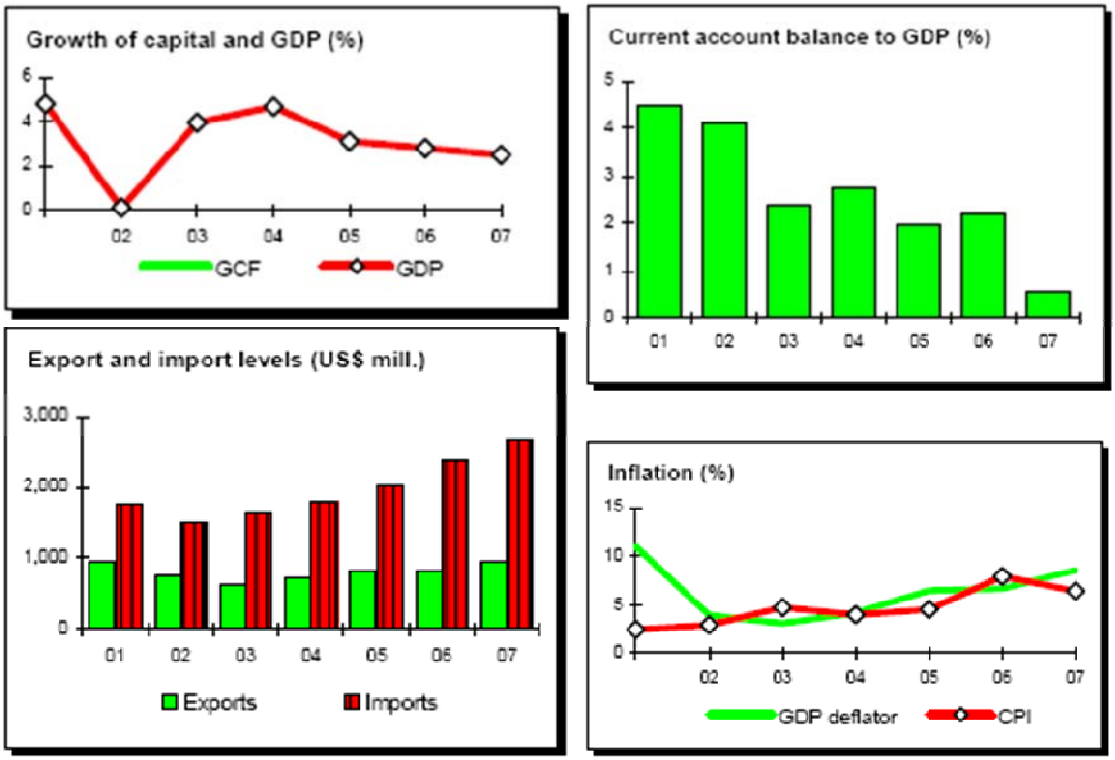


Figure 10: Selected Financial Indicators (World Bank: Nepal at a glance 2008)

In 2008, the Nepali government announced that the inflation rate might reach at 14.5% annually due to price increase in the service industry and agricultural products.
During the government fiscal year of 2008/2009 (Data source from KOICA 2009)

- Made surplus budget of 16.75 million USD due to increase in foreign cash grant.
- Nepal received 43.81 million USD in overseas cash grant and 15.46 million USD credits.
- Export increased in 39.9% (Export to India increased in 25.5%)
- Import increased in 38.9% (Import from India increased in 22.1%)

2.3. Technological Environment Analysis

2.3.1 Major ICT governance organizations

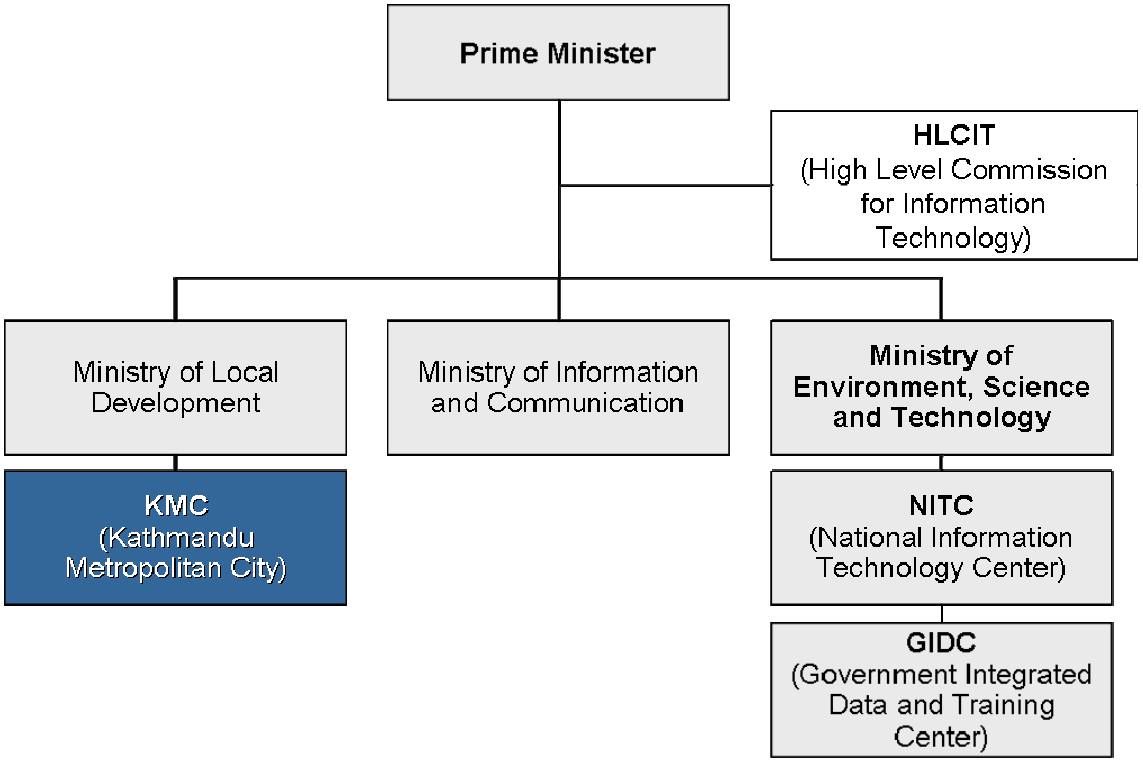


Figure 11: Major ICT governance organization

General ICT policy making and executing mechanism in Nepal is somewhat similar to its of Korean government. HLCIT is a top level policy-making authority overseeing the implementation of national IT policy and strategy under the prime minister.
Highlights of recent projects and activities include establishing Nepali Language in Information Technology (NLIT) to develop Nepali language system and government wide Enterprise Architecture (EA) funded by Asia Development Bank (ADB).
According to the vice chairman of HLCIT, the national level IT master plan does not include IT policy, strategy, and implementation plans for the local government. From Korea's e-Government development history, it is important for KMC to work with HLCIT and other national level ICT policy making organizations in order to conform to national standard and ICT development policy direction.
The top level ICT executive branches are Ministry of Information and Communication (MoIC) and Ministry of Environment, Science and Technology (MoEST). While MoIC manages postal services, telecommunications, broadcasting, press & information, and

film development, MoEST covers IT including e-Government services. National Information Technology Center (NITC) is an umbrella agency of MoEST, and it operates the Government Integrated Data and Training Center (GIDC) which serves as a national data center hosting internet home pages of most ministries in Nepal. MoEST was instituted in 1996 for IT and science development, but in 2006 it merged with Environment Department due to the dissolution of the Ministry of Population and Environment.

2.3.2 ICT indicators and rankings

"As a proportion of monthly income, Internet access in the United States is 250 times cheaper than in Nepal and 50 times cheaper than in Sri Lanka." (World Bank, 2008)

According to UN e-Government Survey 2008, Nepal ranked #150 among surveyed 182 countries. In 2005 survey Nepal ranked #126. In similar studies and surveys, including Brookings Institutes latest study in e-Governance, Nepal e-Government remains one of the least developed countries.

Contents		Nepal	Korea
UNDP HDI (2007-2008)		0.534 (142 Low)	0.921 (26th High)
UN e-Government Readiness (2008, MEAN=0.4558 91th)		**0.2725 (150th)**	0.8317 (6th)
e-Government Service Level [Appendix]	Level I (Emerging)	8	8
	Level II (Enhanced)	37	86
	Level III (Interactive)	41	94
	Level IV (Transactional)	0	42
	Level V (Networked)	0	16
Governance Studies at Brookings (2008)		**30.6 (96th)**	**64.7 (1st)**
Korean EXIM Bank Credit Rating & Priority		E, I Group	N/A

Table 2: e-Government Rankings

UN's e-Government service level has 5 stages – emerging, enhanced, interactive, transactional, and networked. Each stage has description and requirements. For instance, at level I, no particular online services, yet the accessible web page needs to be established. The enhanced stage should have some features to browse or to download documents as such. If reached at interactive stage, there should be a searchable database associated with the pages. The major distinction between the level 3 and 4 is that whether or not the citizens can receive a transactional service. For instance, perhaps a citizen should be able to pay tax online, and so on. The fifth level networked presence can be explained with citizens' direct participation such as on-line

polling, discussion forums, and so on. Based on this maturity model, Nepal is in stage III interactive presence. This is only for the central government's departments.

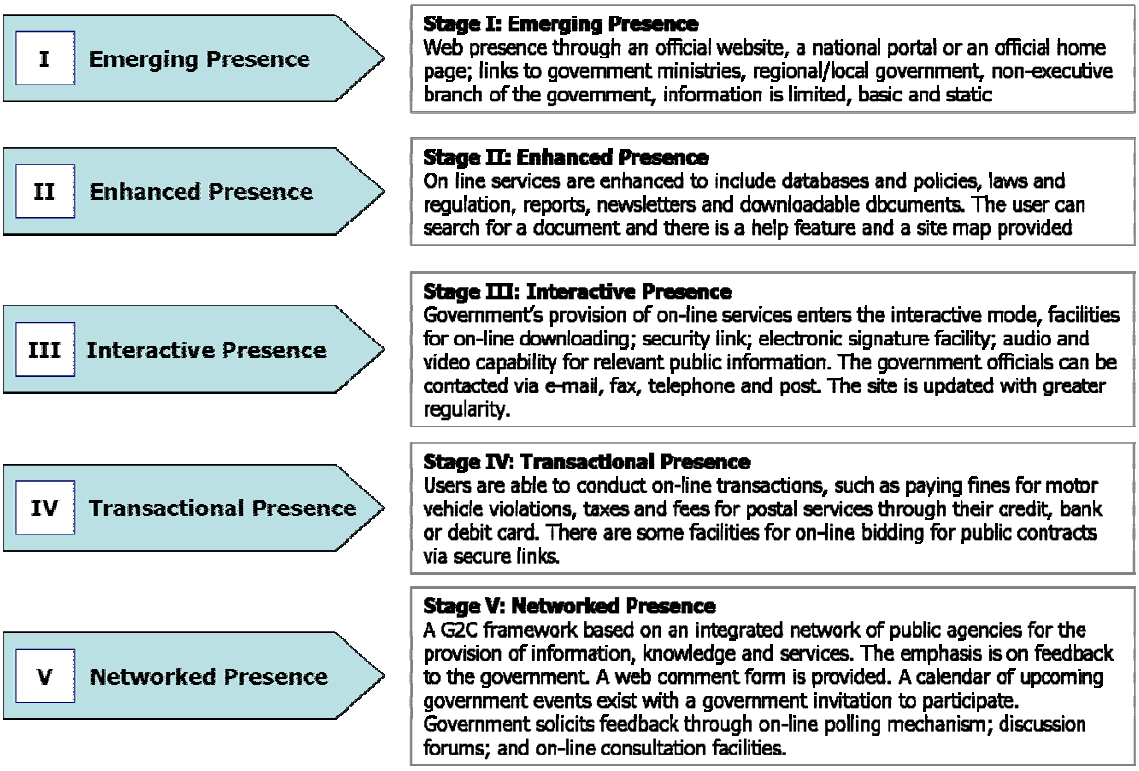


Figure 12: e-Government Phases (UN 2003)

Statistics show among 100 people less than one person owns a PC in Nepal. There are only 16 countries with lower than 0.49 PC per 100 user index statistic according to the UN Global e-Government ranking.

Index	Korea	Nepal
Internet per 100 Users	71.11	**0.90**
PC per 100 users	53.18	**0.49**
Cellular subscribers per 100 users	83.77	3.76
Main telephone line per 100 users	55.99	2.15
Broadband per 100 users	29.27	0.00

Table 3: Selected ICT Index (UN 2008)

Following table shows the changes in index and ranking in 2005 and 2008. In South Asia region, Nepal ranked 4th in 2005 with the index number close to the regional average. However, in 2008 ranking it dropped 24, and positioned 2nd from the bottom.

Country	2008 Index	2005 Index	2008 Ranking	2005 Ranking
Maldives	0.4491	0.4321	95	77
Sri Lanka	0.4244	0.3959	101	94
Iran (Islamic Rep. of)	0.4067	0.3813	108	98
Pakistan	0.3160	0.2836	133	136
Bhutan	0.3074	0.2941	137	130
Bangladesh	0.2936	0.1762	143	162
Nepal	**0.2725**	**0.3021**	**150**	**126**
Afghanistan	0.2048	0.1490	166	168
Region	0.3395	0.3126		
World	0.4514	0.4267		

Table 4: e-Government ranking changes in 2005 and 2008 in South Asia region

2.3.3 Government Integrated Data Center (GIDC)

In 2006, HLCIT signed a MOU with Korea S/W promotion Agency (KIPA), and jointly conducted to establish “e-Government Master Plan Consulting Report.” Soon after that Korea International Cooperation Agency (KOICA) started to determine the feasibility of establishing Government Integrated Data Center (GIDC) in Nepal.

Figure 13: Nepal GIDC

Located in Singha Durbar, GIDC officially started its operation in July, 2009. It is located in a two-story building with total site area of 2,034 square meters. The building was designed and constructed to resist a quake of magnitude 7, equipped with emergency generator and UPS, monitoring and controlling equipments, and others important features to ensure the 24/7 operations.

Nepal GIDC is the first of kind Government Internet Data Center (IDC). Unfortunately

currently it only hosts central governments' internet home pages – has no plan to host home pages and or other web-based applications for local governments including KMC. URLs for the ministry follow:

Ministry	URL
Ministry of Home Affairs	www.moha.gov.np
Ministry of Tourism and Civil Aviation	www.tourism.gov.np
Ministry of Defense	www.mod.gov.np
Ministry of Education	www.moe.gov.np
Ministry of Finance	www.mof.gov.np
Ministry of Foreign Affairs	www.mofa.gov.np
Ministry of Forests and Soil Conservation	www.moF/Sc.gov.np
Ministry of General Administration	www.moga.gov.np
Ministry of Health and Population	www.moh.gov.np
Ministry of Agriculture and Cooperatives	www.moac.gov.np
Ministry of Industry	www.moi.gov.np
Ministry of Commerce and Supplies	N/A
Ministry of Information & Communication	www.moic.gov.np
Ministry of Labor & Transport Management	www.moltm.gov.np
Ministry of Land, Reform and Management	www.molrm.gov.np
Ministry of Law and Justice	www.moljpa.gov.np
Ministry of Physical Planning and Works	www.moppw.gov.np
Ministry of Local Development	www.mld.gov.np
Ministry of Environment, Science and Technology	www.moest.gov.np
Ministry of Energy	www.mowr.gov.np
Ministry of Irrigation	www.mowr.gov.np
Ministry of Women, Children and Social Welfare	www.mowcsw.gov.np
Ministry of Peace and Reconstruction	www.peace.gov.np
Ministry of Youth and Sports	N/A
Ministry of Federal Affairs, Constituent Assembly, Parliament Affairs and Culture	N/A

Table 5: Nepal GIDC

2.3.4 Brief History of ICT policy in Nepal

"Since the introduction of computer for census in 1972, the country made an early start compared to the other countries, including the establishment of organizations for computerization. However, in the 1980s and 1990s, Nepal slowed down its momentum to push forward the advancement of ICT industry."
(Nepal e-Government Master Plan, 2006)

Following table illustrates the brief ICT history in Nepal:

ICT History and Policy	Year	Remarks
Computer used for the first time in history for national census	1971	IBM1401
Electronic Data Processing Centre established	1974	It is now merged with the National Computer Centre for promoting computer usage and computer literacy
First private overseas investment in software development	1982	Data Systems International, LTD
Distribution of Personal Computers	1985	
Liberalization on imports of equipment	1990	
Establishment of Computer Association of Nepal	1992	
Establishment of the Ministry of Science & Technology	1996	
Telecommunications Act	1997	
Nepal Telecom Authority (NTA) established	1998	
IT Policy 2000 (first IT policy)	2000	Vision: "To place Nepal on the global map of ICT within the next 5 years." - 15 general strategies - 17 ICT projects
Establishment of the National Information Technology Center	2001	
Establishment of the High Level Commission for Information Technology	2003	HLCIT is the highest policy-making organization in Nepal
Telecommunication Policy	2004	

Electronic Transaction ordinance	2004	
Electronic Transaction Act	2006	
e-Government Master Plan	2006	KIPA funded Master Plan
GIDC established	2007	Completed in 2008, KOICA funded
Kathmandu-Khasa Optical Fiber Cable Laying Project	2007	Completed in 2008, China funded 115Km Fiber-optic laid along the Arniko Highway
Enterprise Architecture	2009	ADB funded (tender released 09.6)

Table 6: Brief ICT history in Nepal (source data: Nepal eGMP master plan)

In 2000, the Nepali government released its first national-level ICT strategy called "IT Policy 2000." It consists with 15 general strategy and 17 major ICT projects aiming *"To place Nepal on the global map of ICT within the next 5 years."* It had three main objectives including making the IT accessible to general public and increasing employment through this means, building a knowledge-based society, and establishing knowledge-based industries. A typical national-level ICT policy consists of IT fund, organization, and the laws. IT Policy 2000 generally guides and draws specific goals for each criterion, and to realize its goals the government establishes the High Level Commission for Information Technology in 2003 under the prime minister. This was an important movement for developing ICT in Nepal.

During this F/S, unfortunately the consultants could not verify whether or not the government completed all the proposed detailed tasks. However, Nepal continuously maintaining and updating the national-level ICT plans in 2004 (draft) and in 2006. The latest and current ICT mater plan was establish by HLCIT and KIPA. In 2004, the government established Telecommunication Policy 2004, which aims to create a favorable environment for the telecommunication industry. This enabled for the Nepali people to use reliable telecommunication services at the reasonable price.

According to the e-Government master plan (eGMP) established in 2006, 20 major projects were proposed. The project sector was defined as Government to Citizen (G2C), Government to Business (G2B), Government to Government (G2G) – the proposed projects are government back office systems to provide services to citizen so that this should have been categorized as G2C- and finally ICT infrastructure. It is important to state that the core e-Government systems are designed to mostly for providing services to citizens and to businesses. In order to establish nation-wide

customized e-Government systems, NID and Business registration ID is the key to linking all the processes and services. Thus, in the eGMP, within the phase 1, NID project is included. In addition, to increase government employees work performance and efficiency, Government Portal, Group ware, e-Education projects were proposed. Finally to maintain standard e-Government system architecture, Enterprise Architecture[4] was proposed, and for the safety, PKI was also included. As stated in previous paragraphs, in July, 2009 the GIDC started its operation. Thus, there are one project completed (GIDC), and one (EA) is on-going in the first phase of eGMP.

Phase	Priority	Project	Sector	No
1	1	Government Portal	G2C	1
	2	Groupware	G2G	17
	3	EA	Infra	20
	4	GIDC	Infra	19
	5	NID	G2C	4
	6	e-Education	G2G	14
	7	PKI	Infra	18
2	8	e-Authentication	G2G	16
	9	e-Tax	G2G	12
	10	e-Customs	G2B	9
	11	e-Vehicle	G2C	6
	12	e-Drivers License	G2C	7
	13	e-Land	G2G	13
3	14	e-Procurement	G2B	10
	15	Passport Management	G2C	5
	16	Immigration	G2G	15
	17	BRAMS	G2B	8
	18	e-Health	G2C	3
	19	e-Commerce	G2B	11
	20	e-Agriculture	G2C	2

Table 7: Nepal e-Government Master Plan projects

4 In June, 2009 HLCIT initiated an EA project funded by ADB (interview with HLCIT)

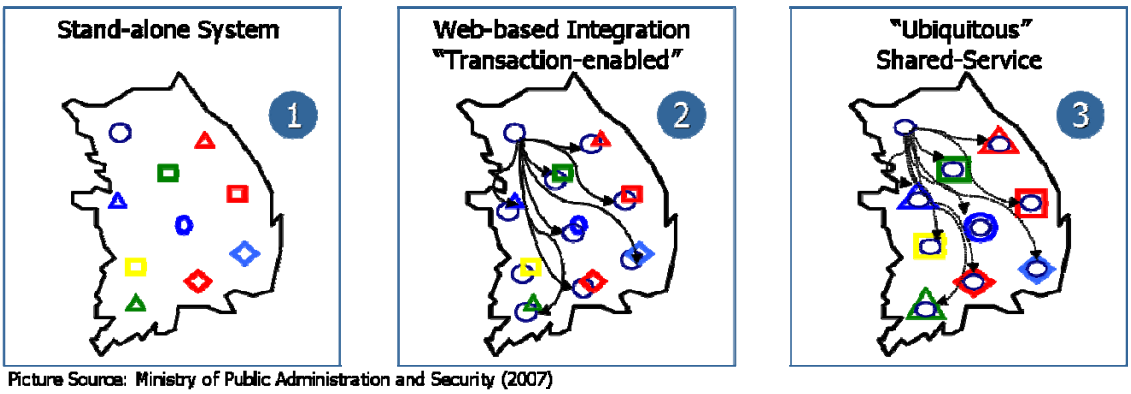
2.3.5 Vertical Integration: needs for collaboration

It is very important to state that NID, e-TAX (local tax), e-Vehicle, e-Drivers License, e-Land, e-Procurement, e-Health, e-Commerce – all these systems will be linked and need collaboration with local government, especially with KMC in the future.

According to interviews with KMC government officers and information from a desk research, currently some government services are provided by KMC, yet the authority and the function are at a ministry. For example, a citizen can register and receive a birth certificate from KMC, but the national-level management authority is at the Ministry of Local Development (MLD). So, there is one officer residing and handling birth certificate at the KMC.

Interestingly, in many countries and cases, when the central government decentralizes its power to local government, it only keeps policy-making functions. Often the central government transfers its functions such as managing and handling a civil service like vital registration. If so, the central government will be needing statistics from all the local governments rather than handling all the citizen-service level. Considering this circumstances, in order to establish a nation-wide e-Government systems, collaboration between the central and the local government is a critical success factor.

From an experience from Korea, the ministry of public administration and security (MoPAS), had a similar experience establishing a nation-wide core e-Government system. Back in 90s, each local government established its own computer systems for its own needs. As a result, each local government had its own architecture, standards, and functions of the systems.①



Picture Source: Ministry of Public Administration and Security (2007)

Figure 14: Integrated Local Government System(the case of Korea)

In the beginning of 2000, the government proposed a standard e-Government system that enables citizens to receive the same service anywhere in Korea. In order to achieve the goal, the government, MoPAS tried to like all the currently available systems in the local government. However, it was virtually impossible to integrate all the systems due to the different system architecture and standard. Thus, MoPAS re-establish a standard system to its 256 local governments.②

Some problem occurred after implementing the standard system. In local governments, the government employees had to work on two different systems for the same work: one for the existing system, the other for the newly implemented nation-wide system. It took sometime to migrate all the data from the existing systems, but some problems still remained due to the fact the nation-wide standard system does not have certain functions that a particular local government's employees need to use.
To resolve the problem, MoPAS is proposing a standard core system with allowing extension for the system use for each regional government. ③ This became possible after the establishment of nation-wide Enterprise Architecture (EA).

From this experience, it is clear that the central government need nation-wide IT standards and collaboration with local governments. It is also important for local governments not only to comply with the standard, but also actively participating ICT policy making with the central government.

Part 3. Current Status Analysis

Part3. Current Status Analysis

3.1 Overview of Kathmandu Metropolitan City (KMC)

3.1.1 Geographical Environment[5]

- KMC is located in the northwestern part of Kathmandu Valley which is consists of KMC, Lalipur and Bhaktapur. KMC lies at an altitude of 1,336 meters above sea level. The Bagmati, Bishnumati, Dhobikhola, and Tukucha rivers flow through the city.
- It has a warm climate between 1 and 35 degree Celsius. The annual rainfall is approximately 1,407 millimeters, mostly from June to August.
- KMC covers an area of 50.67 km² and it can be divided into five sectors - Central Sector, East Sector, North Sector, City Core and the West Sector.

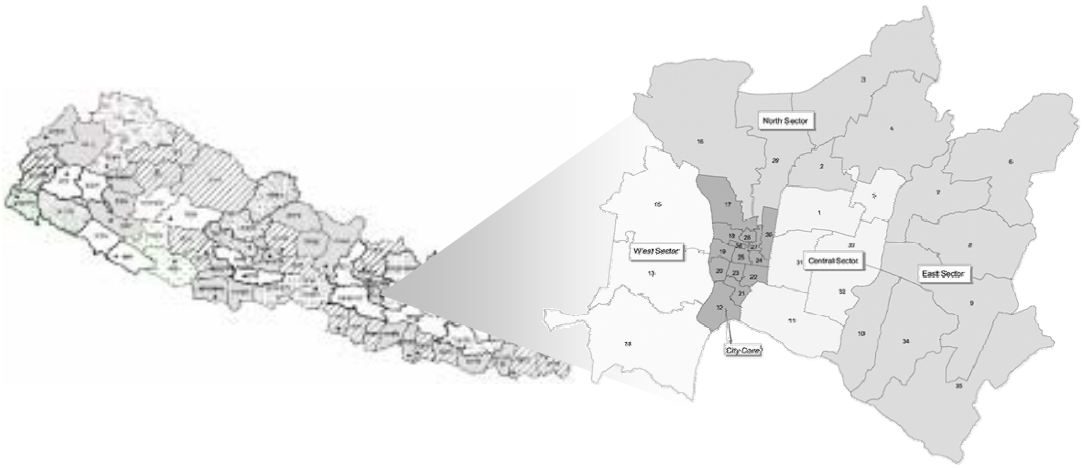


Figure 15: Kathmandu geography

3.1.2 Economic Environment

- Kathmandu is the largest economy in Nepal. The city's economic output is worth more than 170 billion NRs per year. (per capita income 360 USD)[6]
- Tourism is the country's most important industry. Nepal has a plenty of tourist attractions. In addition, Kathmandu is Nepal's tourist gateway with almost 90 percent of the foreign visitors arriving by air at the Tribhuvan International Airport. The city is always swarming through the streets with tourists.

5 Kathmandu homepage, www.kathmandu.gov.np

6 HLCICT Focal Officer Presentation's document, 2008, KMC

- The trading is the one of oldest business in KMC. Because it is located between India and China, Kathmandu could make the profit from inter- intermediate trade. Commerce has always been important in the lives of the inhabitants. Still now it is a major business. Beside trading, farming, metal casting, woodcarving, painting, waving and pottery are other popular traditional businesses.

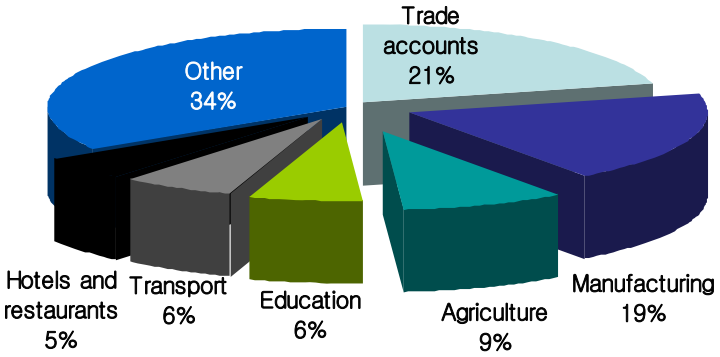


Figure 16: Sharing of industries in Kathmandu (%)[7]

3.1.3 Social Environment

- According to 2001 census, there are 671,846 residents in KMC. The number of population is estimated to be 777,795 in late 2006. Nowadays, its population is growing by swelling rapidly from the rural district and other countries.[8]
- The largest ethnic groups are Newars, Brahmins and Kshetris. Over the centuries various peoples have come to settle KMC.

3.1.4 Technical Environment

- As the result of survey from the central bureau of statistics, 15 ~ 20% of Kathmandu citizens have an experience of accessing the KMC Homepage. Nevertheless, the most of Katmandu's citizen are still difficult to access to the internet.

Figure 17: Sankhu telecenter

7 Kathmandu homepage, www.kathmandu.gov.np

8 "National report", 2001, Central Bureau of statistics

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- There are currently 39 licensed ISPs, of which 32 are operating in Kathmandu Valley.[9]
- Cyber café is most popular for browsing Internet. There are more than 500 Cyber café in the city. Recently, the young people and the foreign tourist use the cyber café very lively.[10]
- Only few people can use the internet by their own computers. In Kathmandu, also, it is expensive to access internet. (8 USD per month, It is like 1/4 of the average personal income a month)[11]
- In the outside of KMC where is difficult to access to the internet, NITC and ITU (International Telecommunication Union) have built the public telecenters (internet access center) in Narayan Jan secondary school Sankhu and Bugamati. Some telecenters have the program of training computer for youth.[12]
- It would be need more telecenters for covering all around KMC. Generally, it is still difficult for citizen outside of KMC to access the internet.

- Key findings -

- Nepal has a plenty of tourist attractions. Through the Tribhuvan International Airport in Kathmandu, 90% of the foreign visitors have been arriving in Kathmandu. So, tourism and trading are well developed.
- But still Nepal is belonging to the LDCs (Least Developed Country), and Kathmandu citizen's per capita income is only 360 USD a year.
- Due to urbanization of Kathmandu, the population has been swelling rapidly. But though the urbanization, it takes a more time to overcome the shortage of infrastructure.
- It is hard to access the internet because of few places to access of outside and high cost of central city.

9 "Digital Review of Asia Pacific 2007 - 2008", 2008, IRDC

10 "Internet in Nepal", 2007, Kathmandu Engineering College

11 "ICT at a glance", 2009, World Bank

12 NICT home page, www.nitc.gov.np

3.2 The analysis of the strategic system for the e-Government

3.2.1 The analysis of the e-Government strategy

A. Overview

- Even some IT plans from abroad country and international organizations have been donated as the technical assistance, still now KMC can not have a long-term IT plan officially. Because the plan was hard to conduct by KMC, for shortage of proper resource and technology.
- KMC could make the annual expenditure plan of maintenance for IT. Though it has not been completed, there were many attempts to make their own plan that customized to KMC.
- It is possible to figure the conceptual plan, through the mentioned stuff in the conference and internal reports.

B. Internal reports and related documents

1) Metropolitan Reform Program of KMC, 2008

- The Metropolitan Reform Program of KMC announced in 2008, contained the plan to innovate in entire part of KMC. There is the plan concerning IT and e-Government.
- Objective of IT and e-Governance
  - To utilize the IT in development and construction works
  - To provide necessary services and information to the citizen of KMC
- Contents of the plan
  - The computerized system shall be initiated strongly and effectively in the planning process, resources mobilization and financial management of the metropolis.
  - The policy wise decisions and public concerned matters shall be made available to the general regularly through the website of the metropolis.
  - The necessary steps shall be taken towards the implementation of e-Governance.
  - To make all the information about the metropolis easily accessible to general public by strengthening IT and broadening Computer Network, a Metropolis Information Center shall be established.
- It mentioned about needs of innovation through IT and e-Government. It doesn't have a delicate implement plan of e-Government.

2) HLCIT focal officer presentation (Dec. 2008)

- It is possible to figure the rough direction of future ICT image of KMC.
  - First, The ICT policy should be an integrated approach of e-Governance system for urban development process in the field of digital based service delivery, Revenue generation and Ward to ward networking for local level services delivery system, etc..
  - Second, it will leverage ICT and Geo-ICT for better e-Governance and strengthening of urban planning, some fields are Business, House and land tax collection system, Building permit and management of metric address system, etc..
- The future image was focused on the service delivery system and KMC business supporting system based on Geo-ICT system infrastructure.

3) The proposal on digital based service delivery to city people in KMC

- KMC had tried to establish of long term ICT plan and the accompanied system's rough specification. So KMC had a plan to make a project of ICT plan from last year, the proposal is waiting the approval of CEO.
  - The objective of project plan defined by proposal. (from the proposal)
  - Identify the short term and long term joint program in Geo-based be-Grid sectoral plan and develop the five year plan and its implementation, etc..
  - It contains the implement plan to develop the application of service delivery base on information system, ICT infrastructure, to manage IT resources, etc..
- The application also includes the system of tax collection and waste management and building permit based on Geo-ICT system infrastructure.

- Key findings -

- There is no official long term ICT plan. KMC tried to make own plan to build the e-Government. It is possible to figure the concept through the priority documents.
- It is mentioned in several times that it would consider the system based on the Geo-ICT infrastructure.

3.2.2 The analysis of IT organization and IT budget

A. The analysis of IT organization

1) The analysis of KMC organization

- **Overview**
  - The governance structure of the Kathmandu Metropolitan City (KMC) can be explained as follow: Under the Kathmandu Metropolis Council, there is metropolis board and mayor. Internally there are 13 departments and 35 wards as subsidiary.
  - KMC is operated by 69 public officials and 2,500 employed staff members.
- **KMC Headquarter organization**[13]
  - Metropolis Council
    - The current political scenario, In the Metropolis council of the KMC consists of 25 parties members will be representatives from the different political parties as according to current government form.
    - The council meets once a year (but depend on electoral body) to review the process of KMC's businesses, to approve the annual budget and to make major policy decisions.
  - Metropolis Board
    - The metropolis Board consists of the Mayor, Deputy Mayor, 35 ward Chairpersons and two nominated members.
    - The Board meets frequently at least twice a month.
    - Ministry of Local Development deputes a joint secretary in the KMC as a Secretary of the Metropolis Board and Chief Executive officer of the KMC.
  - Mayor
    - Mayor is the head of the Kathmandu Metropolitan City (KMC) and elected by the people.
    - The Deputy Mayor elected by the people and assists to Mayor.
  - Mayor's Secretariat
    - The Mayor's Secretariat handles public relations.
    - It helps to make the Mayor's necessary files and supplementary documents and manage the schedule.
  - Duty Mayor's Secretariat
    - The Deputy Mayor's Secretariat also handles public relations.

13 Kathmandu homepage, www.kathmandu.gov.np

- Executive Officer's Secretariat
  - The Secretariat is responsible for supplying necessary files and supplementary documents to the Mayor and the board.
- Executive organization
  - KMC has 6 major departments under the executive officer and 13 supportive divisions.
  - The description of executive organization is as below:

N.	Department	Division	Description
1	Administration and Organizational Development Department	Administration Division	▪ Human resource management: Staff hiring, training and development discipline appraisal dispute handling, compensation ▪ Procurement: Conducting the procurement matters; Interpretation and implementation of procurement policies; maintenance of KMC asset inventory ▪ Vital registration data management: vital registration management and reporting weekly and monthly registration data to MLD(Ministry of Local Development) ▪ Internal affair administration
2		Law Division	▪ Provision of legal services; prosecution of by-law cases; recording of council proceedings; legal education to all departments, division and ward office
3		Enforcement Division	▪ Standing and supporting to KMC to direct, implement, control, corrupt prevention and opposition on KMC
4	Economic Management Department	Information and Documentation Division	▪ Managing, planning, training and employing personnel specializing on information system ▪ Organizing to implement plans, policies, regulations for information system
5	Economic Management Department	Revenue Division	▪ Building the long, medium and annual plan on overall revenue of KMC ▪ Monitoring and managing of KMC`s revenue collected by Ward

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6		Accounting and Budget Division	▪ Instructing departments under Ward budget to make estimate cost , KMC to make annual estimate cost, making estimate budget under MOF ▪ Making estimate revenue for state tax collection; estimate revenue adjustment and organizing approved the expenditure
7	Public Health and Social Development Department	Public Health Division	▪ Provision of preventive, primitive, curative and rehabilitative health services. Promote health care in schools
8		Social Welfare and Cultural Division	▪ Management of rental houses, markets, libraries, stadium. Provide vocational training, welfare and recreation, youth and adult programs ▪ Community development services ▪ Management of nursery primary, and special schools, implementation of government education policies
9	Physical Development and Construction Department	Public Infra. Development Division	▪ Provision and development of public infrastructure such as road, schools, electricity utility, sewerage utility and bridge etc. ▪ Public works, roads traffic signals, building works, maintenance fire department, electrical, transport
10	Physical Development and Construction Department	Building and Heritage Division	▪ Monitoring and maintenance the safety status of building from fire hazard ▪ Heritage management
11	Urban Development Department	Building Permit and Land Use Division	▪ Instructing organizations, individuals to perform the regulation of project, architecture, city construction, constructing technology ▪ Inspection and permission the proposal of construction

12		Policy Planning and Monitoring Division	▪ The development and management of architecture policy on district area, of public infrastructure development policy
13	Environment Management Department	Environment Division	▪ Cleansing Services, Environmental planning management, parks management

Table 8: Description of executive organization

- The organization chart is as below:

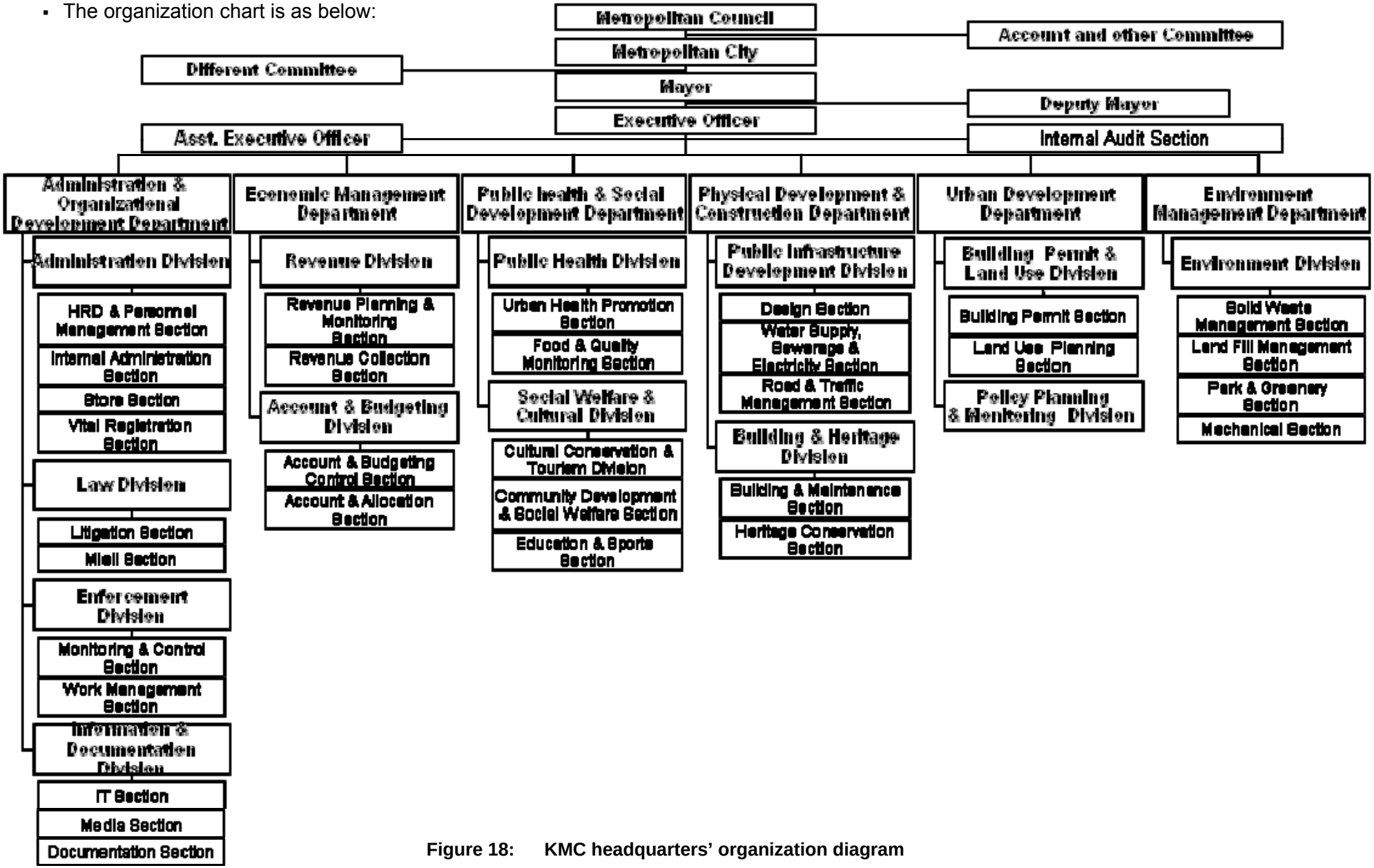

Figure 18: KMC headquarters' organization diagram

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- **Ward organization**

▪ Fuction

· In case of lifecycle event registration (birth, death, marriage, divorce, migration), the ward could receive the application of registration and examine the fact on the application document.

· Then the ward would fill out the confirm note and lead the citizen to KMC headquarter. (But it can not issue the registration.)

· Registration of new enterprise in ward and they could collect and manage all the tax. (Land Tax, Property Tax, Business Tax etc.)

· And it would report the revenue list from tax collection to the Revenue division of KMC by periods.

▪ The description of Ward organization is as below:

N.	Unit	Function
1	Financial Management Unit	·Reception of individual tax information application ·Collecting the revenue from tax of individual property ·Reporting the revenue collection status to KMC headquarter
2	Technical Unit	·Punching all revenue data ·Mailing the collected data to KMC ·Managing the computer utilities and documentation
3	Public Health and Environment Unit	·Prevention against pandemic and food product safety and hygiene in local area under Ward ·Cleansing Services and Solid waste management

Table 9: Description of Ward organization

▪ The organization chart of the Ward is as below:

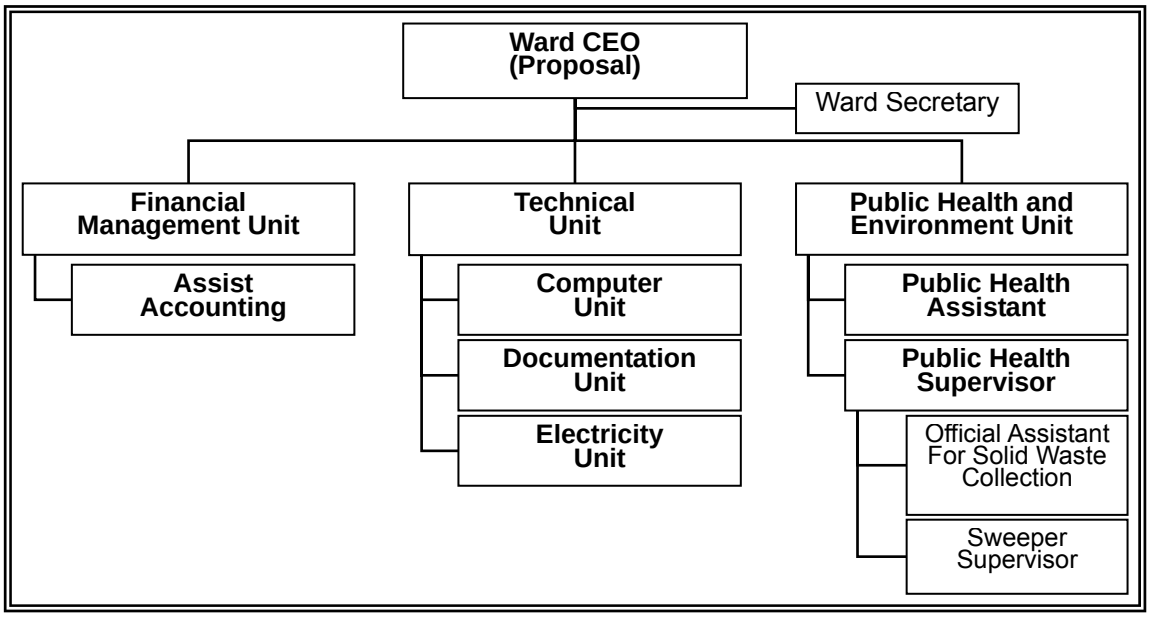


Figure 19: Ward's organization diagram

2) The analysis of KMC IT organization

- **IT management organization function**

  - Generally, all the authority of IT policy development and IT hardware management is on IT section.
  - 2 officials of KMC manage and administer the IT system.
  - Sometimes, in case of simple problem, the divisions who had used the system have solved, managed and administrated by itself.
  - Almost all system has been developing through outsourcing because IT section of KMC has not a programmer.
    - The entire Nepalese local venders don't deliver the document of the system architectural diagram and even manual.
    - Thus, it has been impossible to maintain the system and expand through the in-house development as user needs.

Figure 20: IT section

- **IT management organization's manpower status**

No.	Manpower composition	Number of persons
1	Computer officer	None
2	Computer Programmer	None (outsourcing only)
3	System administrator	None
4	GIS Officer	1 person (Mr. Pradhan)
5	Computer engineer	none
6	Computer Technician	1 person
7	Computer Operator	40 persons (30 of employees are temporary employees)
4	IT consultant	None

Table 10: IT management organization's manpower status

- It is necessary to recruit the specialist who will be charged with IT planning and IT plan monitoring and the specialist of programmer on system development and maintenance.

B. The analysis of IT budget

1) The analysis of KMC budget

- **Overview**

- In fiscal 07/08 year, KMC purposed a total budge of 1,879,391,000 NRs. (the planning of this fiscal year budget is postponed for new mayor's inauguration)

- **The income as budget category of KMC**

- KMC budget is allocated from various sources, not only from Nepal Central Government, but also citizen donation. Among the sources, the tax income is the largest portion. It is possible to consider tax collection and management as one of the most important work in KMC.
- The rest of income is allocated from government income, debt and donation.
  - the income list of 07/08 fiscal year is as below:

- **The process to allocate the budget**

- There is the Budget Committee to negotiate the amount and priority of the proposal of next fiscal year budget from all the department and division in every June/July.

No.	Income list (2008)		%
1	Tax Income (Land, House, business etc.)		42 %
2	Government Income		32 %
	2.1	Border Custom (from MLD)	15%
	2.2	Donation Fee (from MOH)(public infra. maintenance)	14%
	2.3	Fund from Government	1%
	2.4	Others	2%
3	Debt Budget		13 %
4	Citizen Donation(Local Contribution)		13 %

Table 11: Income list in 2008 fiscal year

  - The Budget Committee consists of the mayor, vice-mayor and 6 department's chiefs.
  - Before the Budget Committee is held, there is pre-discussion within each department in 2 month earlier.
- Every department and division could directly present their proposal to the Budget Committee and the Budget Committee could decide and fix their proposal.

2) The analysis of KMC IT budget

- **Overview**

▪ There is no IT budget of KMC from the Nepal Central Government. KMC allocated IT budget by itself. The amount is 4,300,000 NRs (about 5,500 USD) and it is about 0.2% of the entire budget of KMC.

· As compared with SMG, it is similar point to 1997 of SMG case when e-Government project was started.
(In 1997, 0.25% of whole SMG budget, about 200 million USD).

· When the project was started, SMG started to increase the entire amount budget and invest the new systems and infrastructures.

· Using basic systems and infrastructures, SMG escalate the e-Government. And then, in a period of the exchange of H/W and appearance of new technology, IT budget amount of SMG has been as much again.

· And now days, the percentage of IT budget is growing to almost 1.2% (about 1,100 million USD, 2008).

▪ Considering of the case of SMG on the initiative period, to escalate the KMC's e-Government, it is necessary to invest a proper resources to develop basic systems and to establish basic infrastructures, gradually.

- **IT Budget**

▪ 2007~2008 IT Budget plan is as below:

No.	List	Cost (Nepalese Rupees, NRs)
1	Procurement of server & hardware(2EA)	1,500,000 NRs
2	Network connect to all KMC dept. level	1,000,000 NRs
3	International relation cost (SMG, Incheon, Gwang-ju)	600,000 NRs
4	ISP(Internet Service Provider) fee	500,000 NRs
5	KMC homepage update & maintenance	50,000 NRs
6	PIS & local software development	250,000 NRs
7	GIS system update & data collection	200,000 NRs
8	H/W maintenance & back-up	200,000 NRs
	Total	4,300,000 NRs

Table 12: IT budget plan (2007 ~ 2008)

- As a small IT budget, it is difficult to invest a massive project just like Public N/W construction in KMC. As above table, it almost consists of the maintenance of H/W and S/W. It is difficult to invest new systems and infrastructures.

- In case of IT budget allocation, the chief of IT division make the IT budget proposal through whole KMC and confirm the proposal.
- A few years ago, IT department downgraded to IT division. After downgrade, Negotiation of IT budget is more difficult than before.

- Key findings -

- IT organization:
  - The shortage of programmer to develop and maintain the information system.
- IT budget:
  - The IT organization's situation is difficult to allocate the appropriate budget in KMC's e-Government.
  - It is hard to invest new system and infrastructure for the shortage of IT budget. And it fully covered the expenditure to maintain the existing systems and infrastructures.

3.3 The analysis of KMC e-Government status

3.3.1 The analysis of the business application

A. Business Function Classification

- As “LOCAL SELF-GOVERNANCE ACT, 2055 (1999)” and the result of site survey, it is possible to classify the KMC’s business function as below.
  - KMC’s business function can be mainly divided into civil service, urban infrastructure, and internal affair.

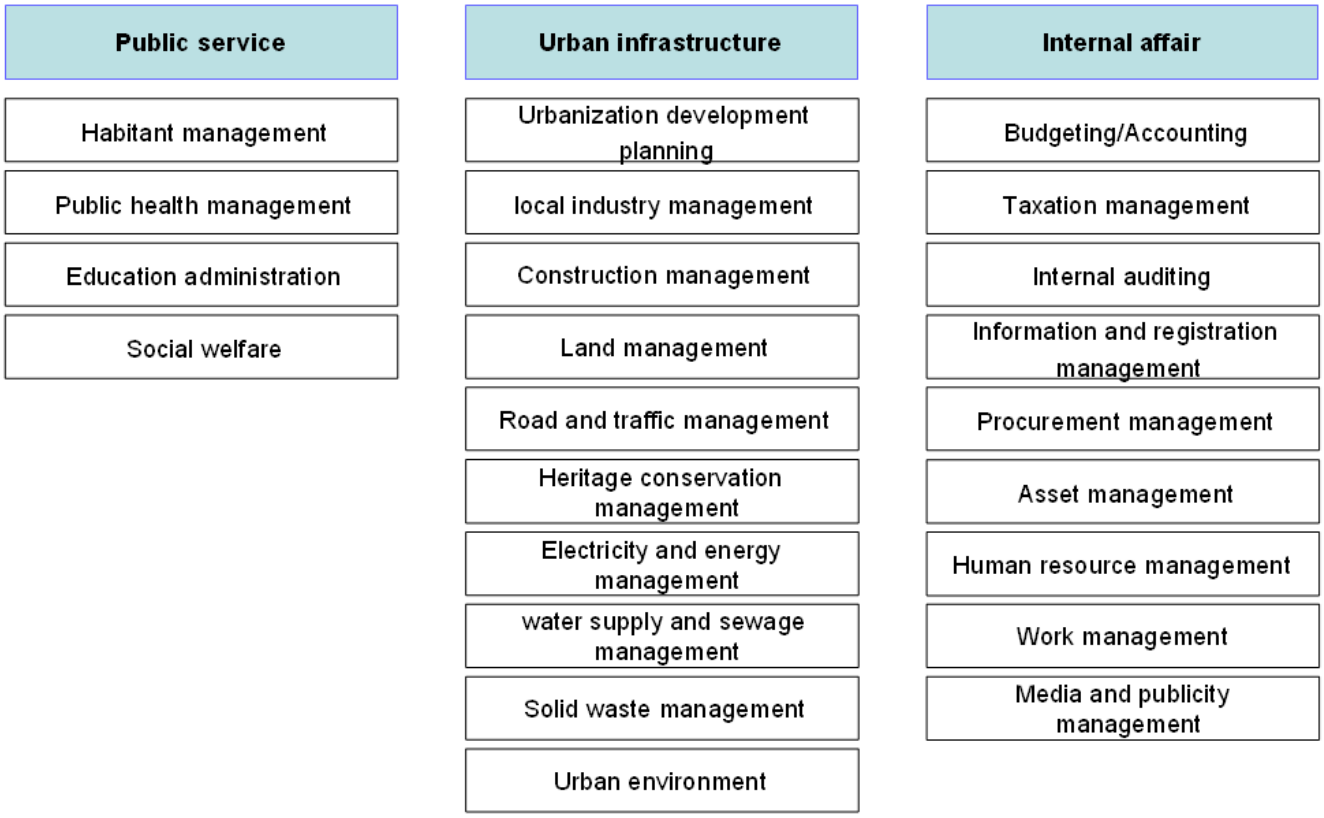


Figure 21: Function classification

B. Informatization request analysis

- Through the site survey and interview, the informatization request is found as below:
  - Needs for Information is high in supportive functions (internal affair).
  - Among primary functions, “Habitant management,” “Heritage conservation management,” and “Solid waste management” require datafication & informatization more than others.
  - Most departments need e-Document system to share and to store information properly.

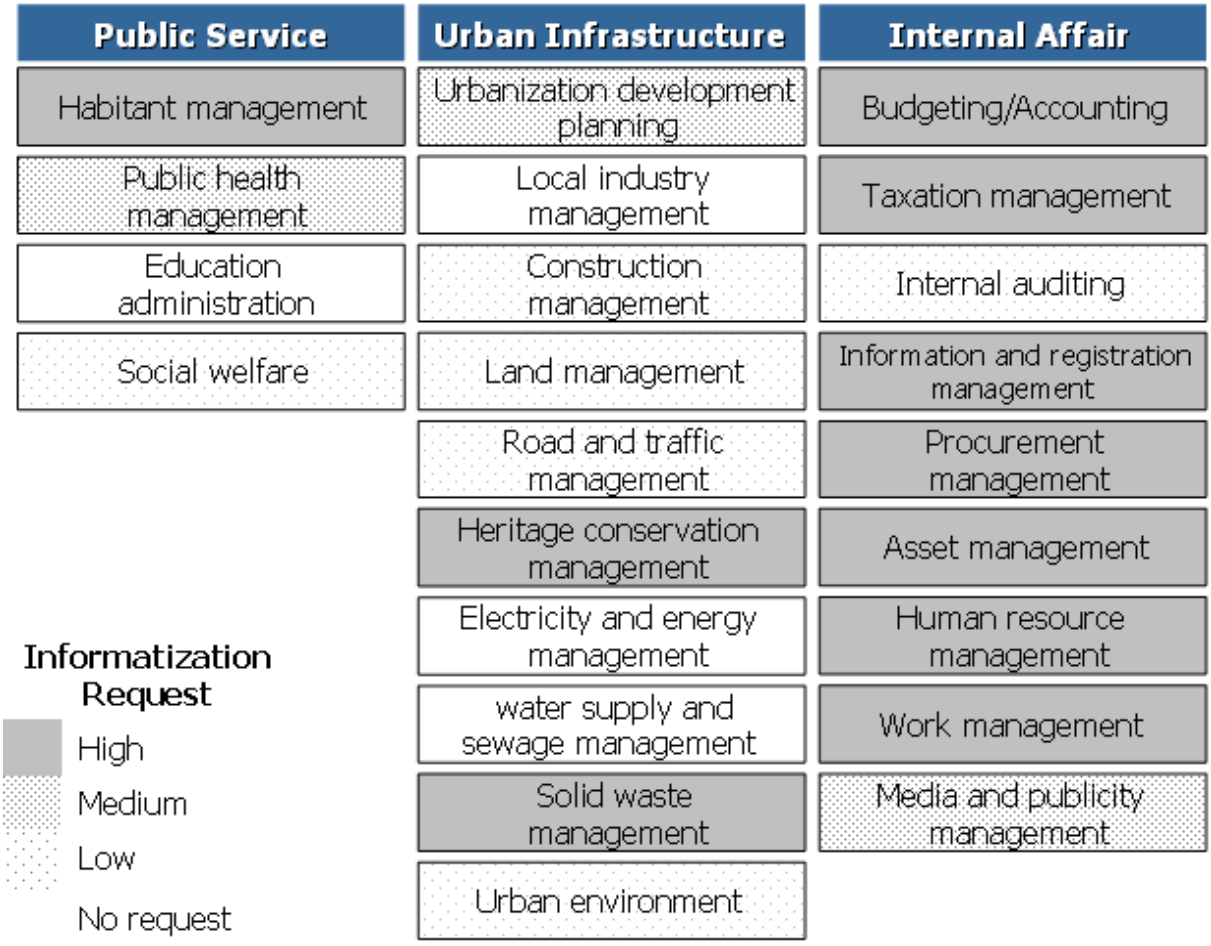


Figure 22: Informatization request by business functions

C. Informatization Status

1) Public service

- **Overview**
  - In the business function of KMC, the business for the citizen are “Habitant management”, “Public health management”, “Education administration”, “Social welfare”.
  - For the citizen to check a their vital record, KMC delivers the service to check self-identification through the information system named “Check Record System” through the homepage and more, it delivers six registration forms(birth, death, marriage, divorce, migration and taxation registration).
  - The public services for citizen have been happened 70 ~80 cases in a month and 1500 ~ 2000 cases in a year.
- **Informatization Status & Requests Analysis(public service area)**

Business function	Business application	Informatization Requests
Habitant management	▪ Vital Registration System(VRS) ▪ Check Record System (CRS)	High
Public health management	▪ No operating information system currently	Medium
Education administration	▪ No operating information system currently	Not available
Social welfare	▪ No operating information system currently	Low

Table 13: Informatization Status & requests analysis (public service area)

- **Vital Registration System (VRS)**
  - Usage section: Vital Registration Section
  - Fuction: recording the vital registration data (birth, death, marriage, divorce, migration)
  - Process:
    - Conducting by 5 persons of KMC and one person from MLD. 5 persons of KMC are 3 persons for receiving the application and 2 persons for punching the data in the computer. One from MLD is evaluating and issuing the registrations.
    - The one from MLD evaluate their suitability of application’s information and issue the registrations. Then he reports the statistical data (like total number of birth registration case in a week or a month)to the MLD.

- The statistical data get through using the MS Excel program. The report to MLD is conducted physically or sent by e-mail. (not whole data, but statistical data)

Figure 23: Vital record registration

- System:
  - The data is stored in 2 computers (1 host and 1 client) and the system is an isolated system. So, there is no interfaced data from other information system.
  - All these vital registration is trying to keep online and integrated database system to develop by MLD.
  - Back-up: there is no proper back-up policy. But through duplicate, the data is managed within the host computer. If it is necessary, it will be backed up by CD disk and it will be stored in the administration section's cabinet.
- Remarks
  - In case of original hard copy (the application), it is stored for 5years, if it necessary, it would be stored for 10 years. But it is stored from place to place. It is hard to think that it has been managed properly.

Figure 24: Storing the original paper of the vital registration application

- **Check Record System(CRS)**
  - Usage Section: IT Section
  - Function: to refer to the abroad embassy for the citizen's identity, through the homepage,CRS provides the citizens' data of "relationship registration", "income certification" and "total property" by request.

Figure 25: Reception of relationship registration

  - Process:
    - First, the applicants who want to provide their reference through the KMC's website fill in the application (Relationship detail form and Tax detail form) and send in a written application with the recommendation from the Ward to the place for application.
    - In case of "relationship certification," received applications are sent to the Administration Department. And In case of "income certification" and "total property," applications would be sent to the Revenue Section to certificate. The Revenue section could evaluate the application's data from tax evidences.
    - All confirmed data would be sent to IT section to notice and IT section input the data on the website.
    - And then Homepage could notice the result with reference number to the applicant.
  - System:
    - It is possible to input the data on the website by typewriting.
    - All data are stored in KMC's home page server in ISP (Internet Service Provider, Private Corporation). So the recorded data is provided in the KMC's homepage through "check record" service as the reference number.
    - In the near future, KMC hopes that the system could be develop in house.

- Remarks:
  - This system is mostly used to refer to the abroad embassy for the KMC citizen's identity.
  - Ward recommendation is managed by individual, it is easy to make a forgery and lose the original. So the embassy has asked to certificate the citizen information from KMC.

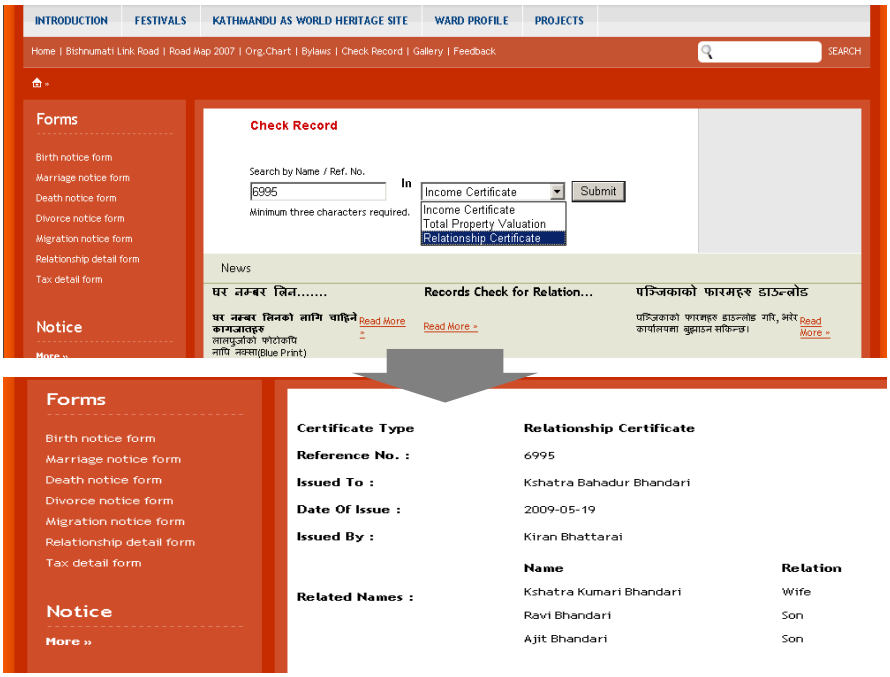


Figure 26: "Check records service" screen in homepage

- **Homepage**
  - As "Enhanced Presence" of UN e-Government Service level, it is possble to download the application forms and publications of public information.
  - Through the homme page, various information is being provided.
  - Due to shortage of DB establishing, it cannot provide the information search service.

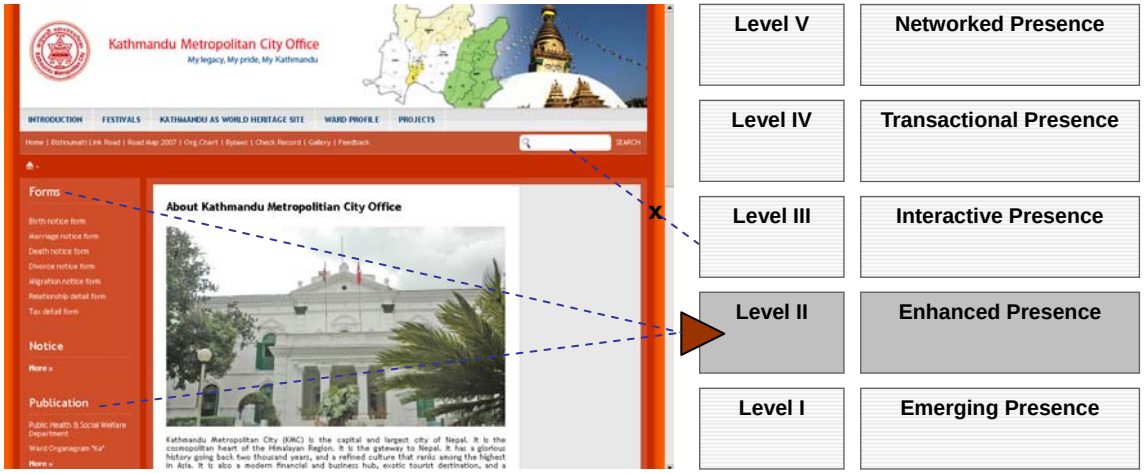


Figure 27: Homepage's service level

2) Urban infrastructure

- **Overview**
  - The business of “Urban infrastructure” means all businnesses related to the planning, development and management of KMC’s infrastructures.
  - It includes 10 businesses : “Urbanization development planning”, “Construction management”, “Land management”, “Road and traffic management”, “Local industry management”, “Heritage conservation management”, “Electricity and energy management”, “Water supply and sewage management”, “Solid waste management” and “Urban environment management”.

- **Informatization Status & Requests Analysis(urban infrastructure area)**

Business function	Business application	Informatization Requests
Urbanization development planning	▪ Geographic Information System (GIS)	Medium
Construction management	▪ Geographic Information System (GIS)	Low
Land management	▪ Geographic Information System (GIS)	Low
Road and traffic management	▪ Geographic Information System (GIS)	Low
Local industry management	▪ No operating information system currently	Not available
Heritage conservation management	▪ No operating information system currently	High
Electricity and energy management	▪ No operating information system currently	Not available
Water supply and sewage management	▪ No operating information system currently	Not available

Solid waste management	▪ No operating information system currently	High
Urban environment management	▪ No operating information system currently	Low

Table 14: Informatization status & requests analysis (urban infrastructure area)

- **Geographic Information System (GIS)**
  - ▪ Usage Section: IT Section
  - ▪ System:
    - · The global product of ESPI has been customized to the GIS, donated by EU (European Union). But now it is not working due to technical problem. (manpower shortage to develop and collect the geo-data)
    - · The data of geographic information is purchased from Ministry of Land, Reform and Management and the metadata is provided from urban Development Department and House Numbering Unit.
    - · GIS which ArcIMS(ETRI product) is customized has been crashed and it could not recover.
    - · Online service delivery system has not been developed yet. KMC has a plan for the forward level in future. It seems that it takes more time to define the plan of using the GIS clearly.
    - · Back-up: The important information would be back-up by CD in a week.

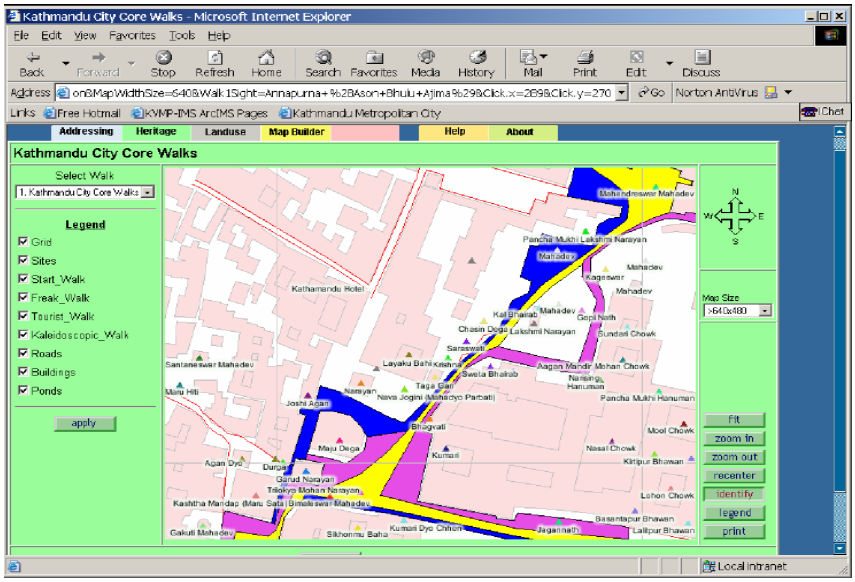


Figure 28: GIS system Screen

3) Internal affair

- **Overview**
  - Internal affair means the business related management, operating, monitoring of the KMC office and accounting etc.
  - It includes 9 businesses : “Budgeting/Accounting”, “Internal auditing”, “Taxation management”, “Procurement management”, “Asset management”, “Human resource management”, “Information and registration management”, “Work management” and “Media and publicity management”.

- **Informatization Status & Requests Analysis(internal affair area)**

Business function	Business application	Informatization Requests
Budgeting/ Accounting	▪ Corporate Accounting System(CAS)	High
Internal auditing	▪ Corporate Accounting System(CAS)	Low
Taxation management	▪ No operating information system currently	High
Procurement management	▪ Municipal Procurement System(MPS)	High
Asset management	▪ Municipal Procurement System(MPS)	High
Human resource management	▪ Personnel Information System(PIS)	High
Information and registration management	▪ No operating information system currently	High
Work management	▪ No operating information system currently	High
Media and publicity management	▪ No operating information system currently	Medium

Table 15: Informatization status & requests analysis (internal affair area)

- **Corporate Accounting System (CAS)**
  - Usage Section: Economic Management Department
  - Function: Managing the business of journal voucher, payroll, expenditure, bill and Audit etc.
    - Municipal accounting system (including account and revenue but budget)
  - Process:
    - Ward has sent the revenue, tax collecting and expenditure data by e-mail or hard copy to the Revenue division of KMC.
    - The Revenue division inputted the data into CAS. And using this system, KMC manage the municipal Accounting business.
  - System:
    - 5 years ago, the UDLE (Urban Development through Local Efforts, the cities alliance's project) donated to develop the Municipal Accounting System. It was based on Visual Dbase and developed by Germany Company named GT-Net.
    - 1 year ago, the technical assistance from ADB help to upgrade the system based on Oracle 8i to meet the global accounting standards.
    - The main server connects to 8 clients to share the data and distribute the internet line.
    - Back-up: there is no back-up policy. But through duplicate the partition, the data is managed within the host computer.

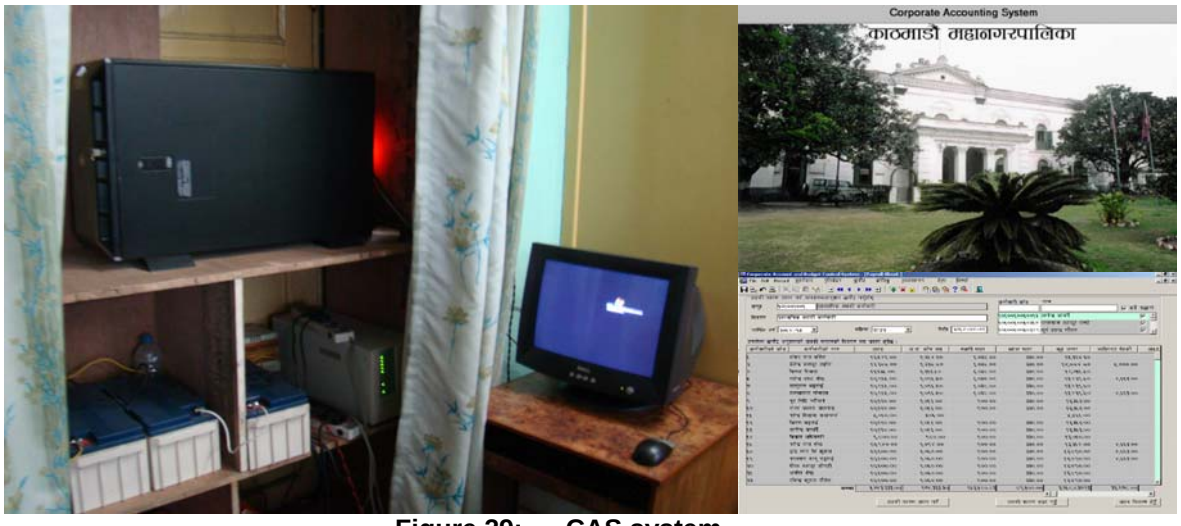


Figure 29: CAS system

  - Remarks:
    - Budget managing is conducting by the customized MS-Excel. (in-house development)

- **Municipal Procurement System(MPS)**
  - Usage section: Store Section
  - Function: managing the procurement and the asset of KMC
  - Process:
    - The entire related document (Tender & Asset Management List) is writing by hand. At the same time, they would input the same data in the computer. But the input work is not conducting due to manpower shortage recently.
  - System:
    - Based on the MS-SQL, it was developed by Nepalese company in last year.
    - There is no interfaced data from other information system. (isolated system,1Host 1Client)
    - These days, the system is used rarely, but making the statistics to report to MLD.
    - It is induced before one year. This year, there is a plan to input all asset and procurement tender data.

Figure 30: KMC asset management book

  - Remarks:
    - They intend to develop the homepage for tender notice which is published on Delhi newspaper.

Figure 31: Storing the Human resources management documents

- **Personnel Information System (PIS)**
  - Usage section: Administration Division
  - Function: managing the Human Resource information of 69 officials (including technicians) and about 2000 employees
  - Process:
    - The modification of KMC's human resource information due to hires, personnel changes, and retirements has been occurred, the administration section has sent the data to IT section.
    - And then IT section has inputted the modification data into the computer and managed the information. But the data punched into PCs is some major information, not all data.
    - And the original documents such as a certification have been put in the administration division's cabinet. But the administration division has not used or accessed the system.
  - System:
    - It is developed by MS-SQL. It could deliver the service of statistics information.
    - The data is stored in IT section's main server (1 host and 3 clients) and the system is isolated just like a punching program. So, there is no interfaced data from other information system.

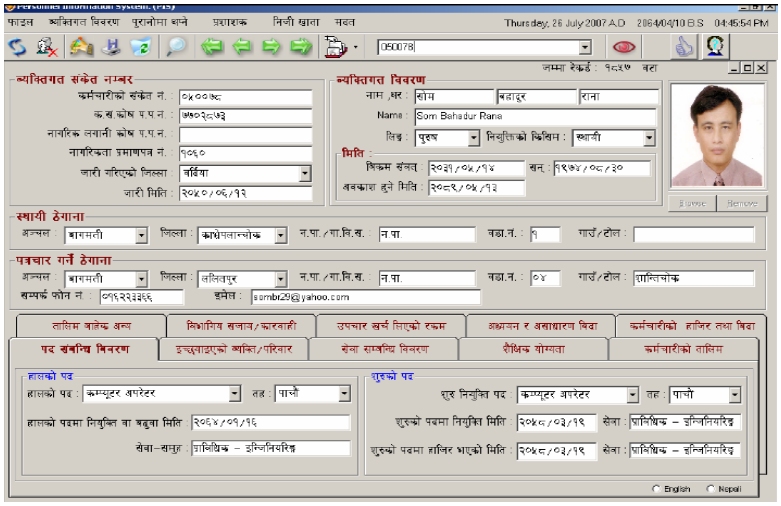


Figure 32: PIS system Screen

  - It would be upgraded the information including the individual fingerprint, picture and furthermore the whole documents by scanning. And it plans to advance into the service of citizen information management. PIS has been managed and maintained by IT section.

- Back-up: There is no back-up policy. But through duplicate the partition, the data is managed within the host computer. And special information is back-uped by CD.

▪ Remarks:

- In case of original hard copy, it will be stored for 5years. If it necessary, it would be stored for 10 years. But it is difficult to manage the document.

4) Developing information system development project

- **Land Tax Information system**

▪ The pilot project which is inducing the proto type of revenue system (named Land Tax information system) is on going in the 3 wards. If it will be successful, it will be distribute to all wards.

- The system is developed with Visual basic.
- There might be no interfaced information from other system.

- Key findings -

- Most business processes of KMC are operating by manual. There is little business processes by using the information system.
- The Information system has a function to store the data as a low level e-Government.
- Broadly, KMC has not the deep understanding of e-Government. Therefore the utilization of information system is not high in the business of KMC.
- The paper applications for registration are left in unsystematic.
- In the disaster, KMC has a high risk of losing all data for the limited back-up policy and utilities.

3.3.2 The analysis of KMC IT infrastructure status

A. Application Analysis

1) Overview

- KMC is managing and operating 6 kinds of application systems. And due to the poor environment of using computer. The information application status is poor to utilize properly. All of applications can not interface the data each other and from other organizations.

2) Application Inventory

System Name	Induced Year	Managing Department	Utilizing Department	System Function (related business)	Operating Method	Linked System	Linked Information	Utilizing Rates	Donation	OS	DBMS
PIS	2006	Admin. Department	IT div./ General admin. div.	KMC's staffs management	Client Based	-	-	Low	-	Win XP	MS-SQL
CAS	2008	Finance Department	Finance Department/ Ward	KMC's financial management	Client Based	-	-	Medium	UDLE(2003) ADB(2008)	Win 2000 server	Oracle 8i
VRS	2006	Admin. Department	Vital registration Section	Public service	Client Based	-	-	High	-	Win XP	-
GIS	1999	IT section	IT section/ Urban Department	GIS base info. service	Client Based and web based	-	-	Medium	EU	-	-
MPS	2007	Store section	Store section	Procurement and asset management	Client Based	-	-	Low		Win XP	MS-SQL
CRS	2009	IT section	IT section	Citizen identify service	Web based	-	-	High		-	-

Table 16: Application inventory

3) Utilization of the Business Applications

- There are 7 business systems, but actively using and operating 5 systems. And Systems have limited functions and are mostly stand-alone type.

Business Functions \ Business Applications		Vital Registration System	Check Record System	Geographic Information System	Corporate Accounting System	Personnel Information System	Municipal Procurement System	Land Tax Information system
Supporting Functions	Budgeting/Accounting				Medium			Developing
	Internal auditing				Medium			
	Taxation management							Developing
	Procurement management						Low	
	Asset management						Low	
	Human resource management					Low		
	Information & registration management							
	Work management							
	Media and publicity management							
Core Business Functions	Habitant management	High	High					
	Public health management							
	Education administration							
	Social welfare							
	Urbanization development planning			Medium				
	Construction management			Medium				
	Land management			Medium				
	Road and traffic management			Medium				
	Local industry management							
	Heritage conservation management							
	Electricity and energy management							
	Water supply and sewage management							
	Solid waste management							
	Urban environment management							

Table 17: Utilization of the Business Applications

B. Hardware Analysis

1) Overview

- The average PC/Employee rate is low. Especially in the ward office, there is only 1 compute and 1 operator. And the ICT resources are limited, and the basic infrastructure such as PC and application server should be expanded and acquired to support the departments' needs.
  And more servers should be acquired for supporting the application system.

2) Hardware Inventory

Managing Department	Model Name	Induced Year	Usage	System Information					Problems & Improved Matters while operating
				CPU	Memory	HDD	OS	DBMS	
IT Dept	Dell power edge 2400	2001	Internet host, PIS host, Thumb attendance program. mgt., Back up	Intel	256MB	16GB	Window XP	-	· Low capacity · Operated the window xp
Finance Department	Dell power edge 2900	2007	Internet host, CAS host	Intel Pentium 4	32GB	300GB	Window Server NT	Oracle 8i	· Need to improve Client capacity

Table 18: H/W inventory

3) Remarks

- In June 2009, SMG donated 100 computers to KMC, KMC has a plan to distribute to affiliated organizations by the specification of computers. 35 computers will be providing to the Ward for purpose of using in the revenue. Some will replace the outdated computers in the KMC's headquarter. And some will be used for the education.

C. N/W Analysis

1) N/W Diagram

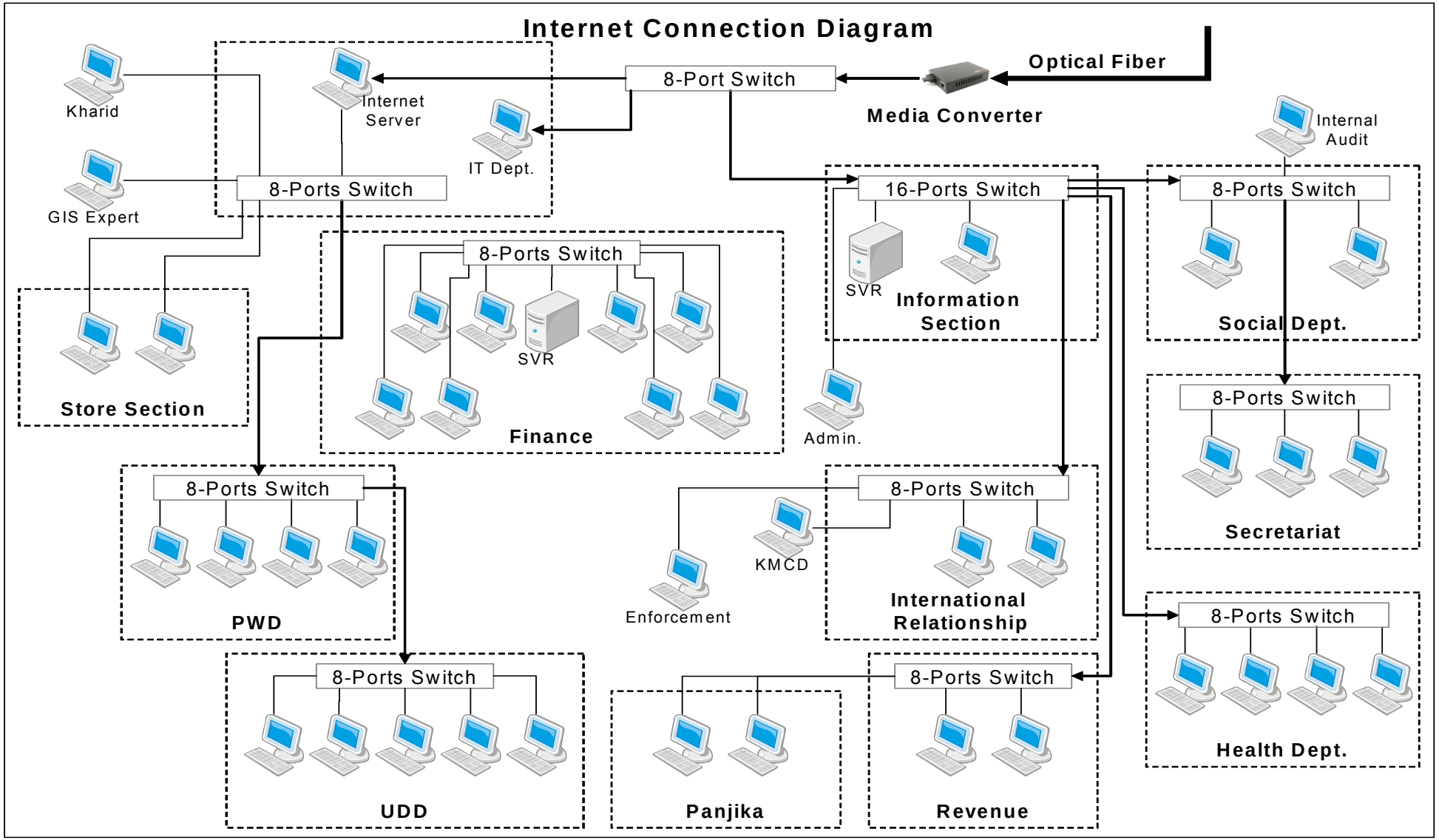


Figure 33: KMC LAN distribution

2) N/W Status

- Internet
  - 45 computers of 155 computers in KMC's headquarter connected to the internet. And there is no internal connection with wards. In headquarter, the internet line is Optical Fiber line (speed: 384 Kbps) provided by Websurfer Nepal.
  - The internet connection of the Ward level is the Dial-up line (speed: 56 Kbps) and 30 lines is provided by world link Technologies Private. Ltd..
- Security
  - There is no equipment for the network security (like Firewall, IPS etc.).

- Key findings -

- Application: The use of information system is not high, except some applications.
- H/W: Most of H/W in KMC are low available for oldness, malfunction and shortage of utilities.
- N/W: There is no equipment for the network security. Furthermore internal network connection of headquarter to ward level depended on private line.

3.4 Summary of key issues

- Based on the site survey, the consultants conclude on 8 aspects in regard to the e-Government at the KMC.

Aspects	Current Availability	Implications and Notes
Strategy	No MP or ISP	▪ Currently it is possible to understanding the KMC's conceptual future image of e-Government. There is no official e-Government strategy and plan. ▪ KMC should establish its short-term and long-term e-Government strategy.
Organization	Limited	▪ IT organization downgraded to division. ▪ KMC needs the programmer to increase the system capability and capacity to support the department and specialist to plan and monitoring the entire IT of KMC.
Budget	Limited	▪ For small amount of IT budget, most of budget is used in maintaining the existing systems. It is difficult to invest new system development. ▪ It needs to increase the budget gradually as a long term strategy.
Business Process	Limited	▪ Most business processes of KMC are operating by manual. ▪ Through inspiration and understanding of e-Government, It needs to advance the management of business process and system. ▪ Also the needs for the internal groupware and the file management system are very high.
Application	Limited	▪ Entire information system is isolated. There is no interfaced data. ▪ Considering the 15 departments, there should be more applications.
N/W	Limited	▪ Most of H/W in KMC are low available for oldness, malfunction and shortage of utilities.

H/W	Limited	▪ There is no equipment for the network security. ▪ Furthermore internal network connection of headquarter to ward level depended on private line.
Document management	Limited	▪ Some important data and document is left idle. These have a high risk to be damaged. ▪ The important data should be managed by systematic way and proper utilities.

Table 19: Key Issues

Part 4. Case Study: SMG e-Government

Part4. Case Study: SMG e-Government[14]

4.1 Vision

"Clean and Attractive Global City" is SMG's vision for 2010 aiming "Ubiquitous Seoul – The World's Best e-Government." SMG has been striving to enhance its brand value, improve the quality of citizens' lives through ICT and strengthen the ICT-driven governance system. There are five main policy goals: "City of Economy," "Cultural City," "Welfare City," "Green City," and "City of Citizens." In order to achieve these goals, SMG will encourage public use of e-Serves and enhance ICT governance structure while expanding and enhancing the currently operating e-Government systems continuously.

Figure 34: SMG e-Government vision

14 Unless otherwise specified, all subsequent references to this chapter refer to e-Seoul Master Plan, Seoul e-Government White Paper (2006), and the presentation material from SMG..

4.2 Development Phases

SMG embarked on building e-Seoul by establishing the “e-Seoul Master Plan” in 2003. The strategy aims to expand its ICT infrastructure, to enhance its customized applications, and to integrate systems to provide “collaborative interoperability” for government employees. This resulted in being able to provide comprehensive government services to citizens.

Figure 35: SMG e-Government Development Phases

In 2005, SMG expanded its online services dramatically. “One-Click Civil Petition Service” and the “e-Tax” system were launched so that the e-Government service level reached “transaction-enabled” phase. With new technological paradigm, SMG established “u-Seoul Master Plan.” in 2007.

The concept of Ubiquitous Computing – Ubiquitous refers to being everywhere as if the government services can be provided everywhere. As a pilot project SMG launched mobile technology and GIS-based services, in another word for location based services (LBS). For the future, SMG aims to become a world-recognized ubiquitous government by year 2010.

4.3 e-Seoul Portal

e-Seoul Portal is the single, trusted point-of-service for SMG, and it is one of the best e-Government portals in the world. The portal consists of 224 sites, providing several hundreds different types of information and services. Its annual visitors reached 6,715,531,[15] in 2008, and SMG is continuously making effort to update and expand its services and contents.

The portal has 7 major features. First of all, the portal provides the user gateway for "citizen," "business," and "tourist" ① so that visitors can browse information quickly and easily. This feature is based on the Content Management Systems (CMS) and Customer Relation Management (CRM) technology that allow "user-centric" information browsing.

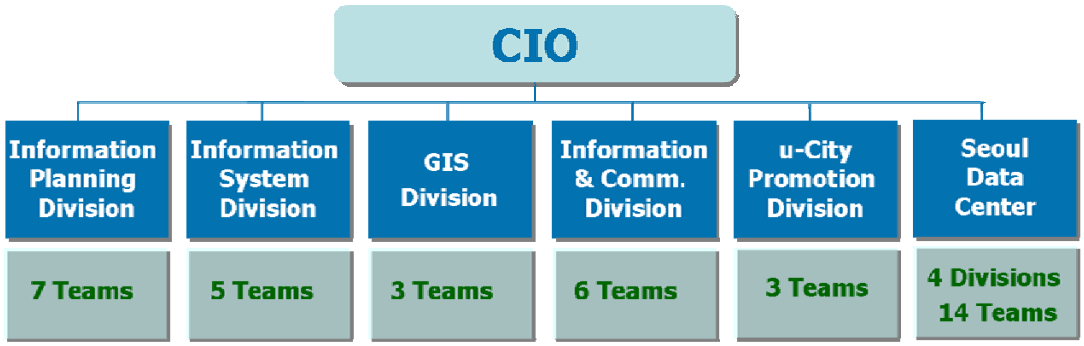
Figure 36: SMG e-Government homepage

Secondly, the portal provides service and information index ②⑥. Users can select categorized menu for quick information search and pre-defined customized information. In addition, providing frequently requested information makes easy for users.

15 2009 Seoul e-Government Plan (pp.14)

For instance, users can click on “Find hospitals near you” to search for hospitals or public health centers. The portal will show hospitals on a map using the registered user information. Third, users can search the integrated database for information and services. ③ Forth, the portal can be viewed in 7 different languages: Korean, English, Japanese, Chinese(2), French, and Spanish. ④. Fifth, latest news, information, announcement can be viewed in real-time ⑤. Finally, citizens can directly write a message or send an e-mail to the mayor. ⑦

4.4 IT organization



IT Human Resource (Incl. district offices)

Category	By Job			By Organization		
	Total	Computer/ Communication	Administration/ Others	Total	IT Bureau	Others
No. of Persons	603	335	263	603	225	378

Figure 37: SMG IT organization

Under the leadership of the CIO, the Information System Planning Bureau is divided into five divisions: Information Planning Division, Information System Division, GIS Division, Information & Communication Division, and u-City Promotion Division. The divisions are divided into 24 teams, and currently there are 603 employees. (Including employees in all 25 district offices – numbers are IT employees) It is important to state that the organization has planning, maintenance and operation units separately, and the percentage of technicians and administrative staffs should be somewhat balanced.

4.5 e-Government Concept and Model

SMG's e-Government concept can be explained in four major areas: ① front office (Service Portal), ② back office(administrative information systems, administrative portal), ③ Data Center, ④ e-Seoul Net and integrated nation-wide e-Government network.

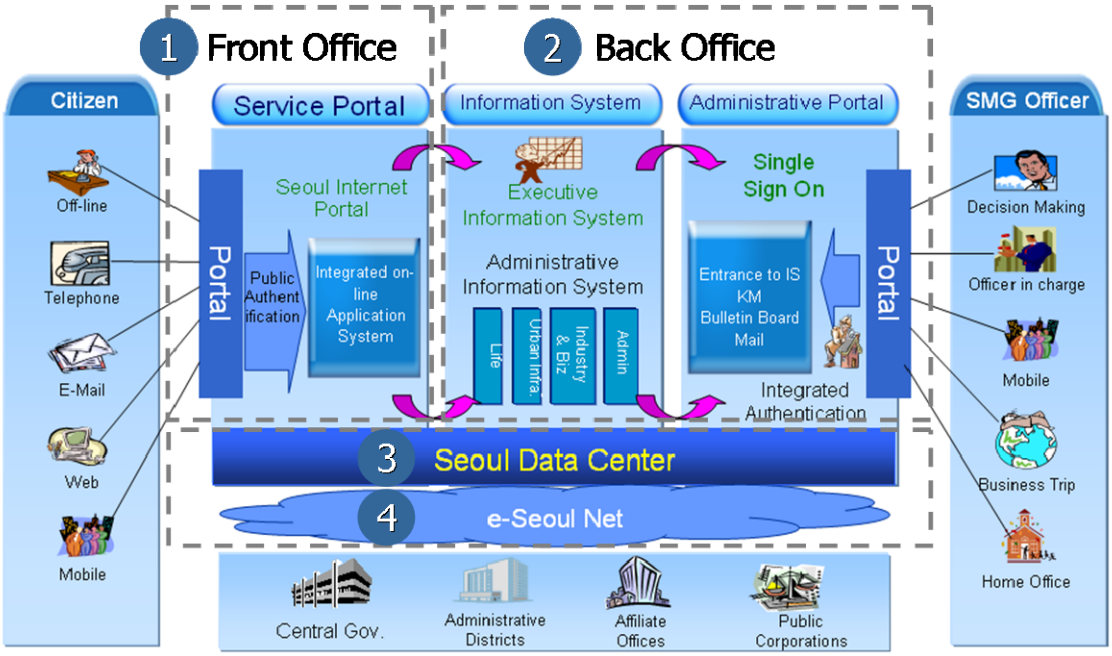


Figure 38: SMG e-Government model

Various channels and service homepage and gateways for e-Services these all explains the front office. Citizens are able to receive the same service via web, KIOSK, phone, FAX, and even with a cellular phone. In order to provide all the government services online and offline, developing and maintaining the customized systems for the government employees are necessary. These customized applications are the "back office systems," and it needs to be accessed through the internal portal.

Single-Sign-On (SSO) is an important component of the internal portal for user access control. With the internal portal, the government employees are able to exchange and to share various information using e-mail, bulletin board, instant messenger, and knowledge management functions. In addition, the portal should be integrated with Electronic Document Management System (EDMS) or e-Document management system.

Some of the detailed information regarding front and back office follows.

4.5.1 Front Office (Service for Citizen)

Front office enables citizens to use administrative information through the internet without visiting to public offices. Seoul provides citizens with services through 191 sites of 13 major areas such as Main menu, Culture and Tourism, Administration, Informatization, PR, Industry/Consumer, Woman/Youth, Health/Welfare, Environment, Construction/Urban planning, Housing, Transportation, Informatization.

Section	Main functions (Citizen Services)
Information provision through the internet	▪ News on municipal affairs – Hi Seoul news (Seoul city news & News release) – Notice – Monthly news ▪ Living information – Health – Housing information – Clean Seoul – Transportation – Women – Leisure ▪ Administrative information – Major projects – Open administrative information – Budget – Statistical Data – Administrative information archive ▪ Introduction to Seoul – Mayor's office – Seoul history museum – Image of Seoul – Seoul guide
Administrative service through the internet	▪ e-application – Guide and counsel, Civil application and confirmation – Tax query and payment, Query of report/audit – Public service reservation – Query of counsel/report history

Civil participation through the internet	– Idea suggestions – Discussion – Free board – Community

Table 20: Citizen Services

- SMG external portal has developed into the ones providing two-way interactive services and opening information at the request of citizens.
- Citizens can download a civil application form and pay taxes on homepages. Since May 2007, Seoul started to offer mobile services on its mobile portal (mSeoul702) by which citizens can suggest ideas, information regarding transportation, air quality, culture, municipalities are available, and even facility reservation can be made with a cell phone.
- Front office system should be a one-stop application in connection with back office. In addition, an area for public participation and a monitoring system should be also offered continuously.

4.5.2 Back Office (Groupware and Administrative System)

Back office system can be divided into five major categories: General Civil Affairs, Office Automation (Groupware), EDMS (Electronic Document Management System), KMS (Knowledge Management System), Public Administration Information, and finally City infra Information.

And the system were classified into 16 subordinate functions including municipal planning, IT, PR, audit, personnel, finance, administration, urban planning, housing, fire fighting, construction, transportation, culture, welfare/ women, environments, and industry.

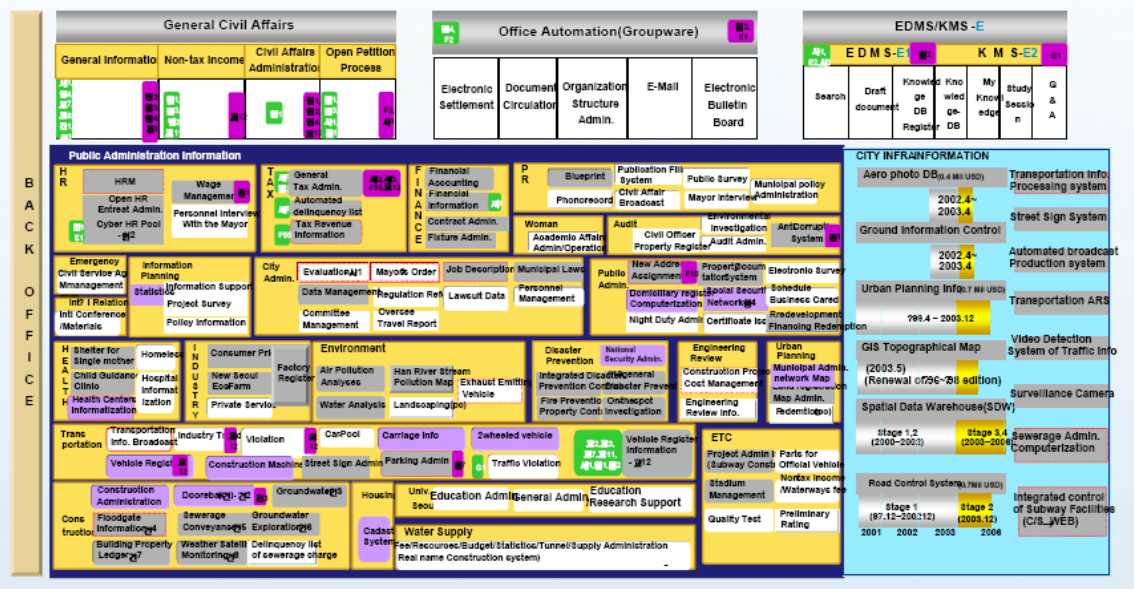


Figure 39: SMG Back Office Systems

Electronic approval system has been introduced since 1991. The SMG and 25 autonomous districts have started to utilize electronic document system or EDA regardless system types since 2002. Now, all works are connected to electronic approval system with hierarchical approval procedure. The rates of information sharing and work efficiency have greatly increased. (All approval process is electronically conducted)

In addition, electronic approval system is connected with administrative information system such as OPEN system (Online Procedures ENhancement for Civil Applications) e-personnel administration, and thereby simplifying the overall approval process.
In 2006, Seoul web portal was established for the efficient management of electronic approval, e-mail, messenger, community, bulletin board, and Blog.

Since 2007, Seoul has focused on the systematical analysis and systemization of work process through administrative systemization projects, not developing an individual system for each area.

4.5.3 Data Center

The Seoul Data Center is a major infrastructure where all kinds of information resources related to Seoul e-Government system are managed and processed. Since 2003, integration and networking of information resources has started while computer system room has expanded on February 2nd 2004 when information resources and systems, which used to be managed by each division, were moved into it, the Seoul Data Center has launched.

For the purpose of realizing competitive e-Government system, SMG has provided citizens with various services and developed information systems throughout the overall administration. However, it is about time that SMG sought the turning point quality-wise to accomplish its vision and role which is “World best intelligent city satisfying the citizens.”

The biggest problem was that it is difficult to run high-quality e-Government services stably 24/7 due to information resources scattered to each division.
As more information resources were gathered, the necessity for minimizing total cost of operation (TCO), which is on the increase, and accomplishing the greatest effects arose.

Therefore, Seoul has embarked on building a Data Center where separately-managed information resources could be integrated with large-capacity processors, advanced management systems. Indeed, Seoul Data Center has become a forum for professional management of resources through the integration of various information resources, automated management system, and a Standard Operating Procedure (SOP).

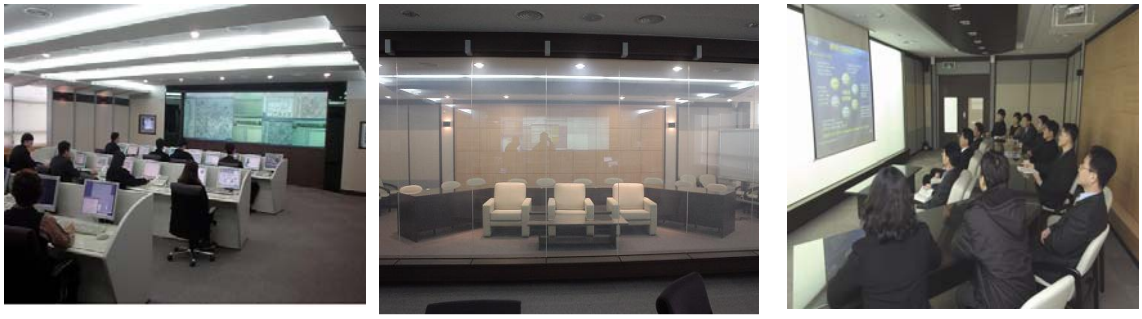
Meanwhile, Seoul needed to upgrade its way of providing services for citizens who are high internet users in order to attract more users and to increase citizens’ satisfaction. In an effort to meeting the needs of citizens, SMG has launched a call center in Data Center to upgrade the quality of e-Government system.

A. Data Center facility

SMG has expanded the existing system room to 893m² to stably run information systems. The expanded system room of which the floor and the ceiling are water-proof has high-tech devices such as monitoring cameras, finger print recognition system etc.

B. Control room

In control room, ten 50-inch DLPs are installed to show how the system runs so that all facilities and systems can be monitored around the clock. Auditorium is prepared to have a meeting in case of emergency.



[Control room] [Auditorium] [Meeting]

Figure 40: Control room and Auditorium

C. Integrated information management system

Integrated information management systems such as SMS (System Management System), APM (Application Performance Management),
and FMS (Facility Management System) run in the Seoul Data Center.
And each system mentioned above is interconnected to be comprehensively handled.

Figure 41: Data Center

D. Integration of information resources

132 servers were moved into the Data Center and interconnected with each other for the seamless system operation.

E. Help Desk

The help desk in the Data Center plays as a single window of counseling on problems related to services and system breakdowns. The SMG has witnessed the rapidly increasing satisfaction rates on the system fully armed with professionals.
An average of 75 counseling cases are recorded a day.

4.5.4 e-Seoul Net

Since 2003, Seoul has been operating e-Seoul net, which is an information highway connecting 36 major municipal agencies with optical fiber cables along the subway tunnels.

e-Seoul Net increases the convenience, cost-efficiency of the integrated network management and thereby contributing to boosting citizens' trust. Moreover, real-time information sharing and broadband information transfer is possible through e-Seoul Net. In addition, N/W Operation Center (e-SNOC) manages real-time operation of systems such as administrative information network, administrative telephone network, and office automation.

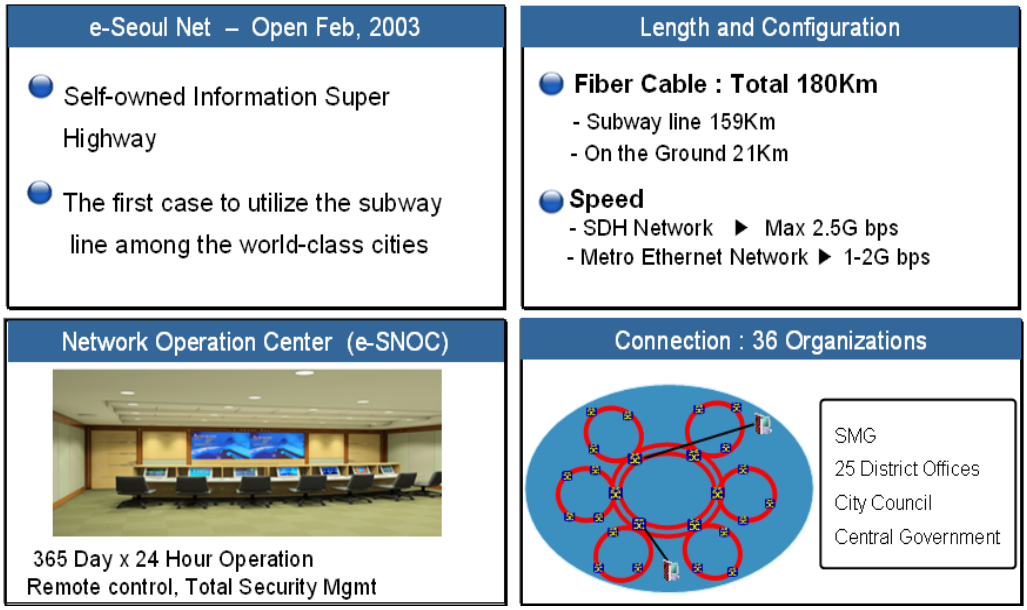


Figure 42: e-Seoul Net

- Transmit large-sized administrative contents and multimedia data
- Strengthen security against virus and hacking by unifying access points to the external Internet
- Enhance data backup function through Integrated Data Library and Disaster/Failure

Recovery System

- Reduce cost using the high-speed communication network

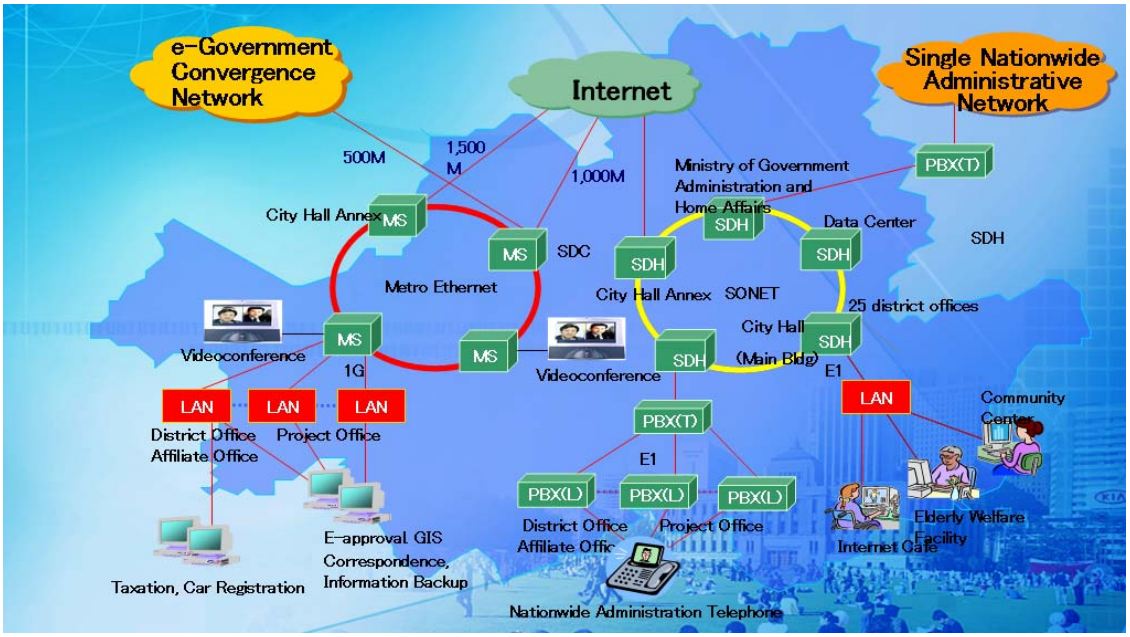


Figure 43: Diagram of e-Seoul Net

The foundation of the e-Government of Seoul, e-Seoul Net connects each and every government agency in the entire city. The e-Seoul net is an exclusive communication network laid along the city's subway tunnels for interconnecting all the umbrella agencies in the SMG.

SMG is operating credible network establishing e-Seoul Net – broadband ultrahigh speed information network to link major 36 administration organizations as fiber cable network utilizing subway lines in the year 2003.

Establishment directives of e-Seoul Net are easiness of network integration management, credibility, enlargement, using convenience and economical efficiency e-Seoul Net has enabled real-time data sharing as well broadband data transfer request's reacting because it has been changed as self-owned ultrahigh speed fiber communication network. Information management offices with computers are operating integrating internet, district administrative information network, administration telephone network and office automation to be operated by existent regions.

The results that were gained due to the launch of the Seoul Data Center are as follows.

- First, in terms of strategy, information infrastructure has been dramatically raised due to the systematic integration of information resources and improved computer systems. For the first time among public organizations, SMG has secured professional human talents who operate the system, opened the Data Center, automated the management system, allocated resources most properly, and therefore ensuring information security. Such efforts are now drawing the attention of many domestic and foreign people who want to benchmark the accomplishments.
- Second, in the service-wise, SMG has improved its service quality by operating systems around the clock, minimizing the rate of system error, and thereby providing citizens with stable services. After the establishment of the Data Center, the rate of system error has decreased by 76 percent. Also a more sound foundation has been prepared for upgraded e-Government system thanks to the help desk by which the satisfaction of citizens and SMG officials is improved.
- Third, in the economic aspect, economy of scale is realized due to basic infrastructure sharing and cost reduction. When building its Data Center, Seoul was able to save up about 2.1 billion won by remodeling the existing facilities. Furthermore, as the maintenance rate has decreased by 2 to 3 percent due to an integrated maintenance contract, the budget for system operation and maintenance has been reduced by 800 million won in 2004 and by 300 million won every year since 2005.
- Fourth, in the management aspect, systematic and technology-intensive operation framework has been prepared by adopting the latest know-how such as SMS, SOP, and SLA. In addition, information security has been tightened up while large-scale integrated back-up facilities enhanced the efficiency of information protection and resource management.

Part 5. To-Be Model and Strategy

Part5. To-Be model and Strategy

5.1 To-Be model

"Business transformation" often refers to within an organization, aligning people, process and technology to support business strategies and to realize its vision. Most importantly, IT serves as a catalyst for "transforming" traditional work handling methods, processes, and practices. Paper-based work processes must be transformed into the integrated IT-enabled high-performance working environment.

Considering previously stated environment assessment results and ICT status analysis, implementing basic IT infrastructure for employees such as building a Local Area Network (LAN) is a critical success factor for the e-government development at the KMC. The back office system development has the highest priority in order to increase work efficiency as well as transparency.

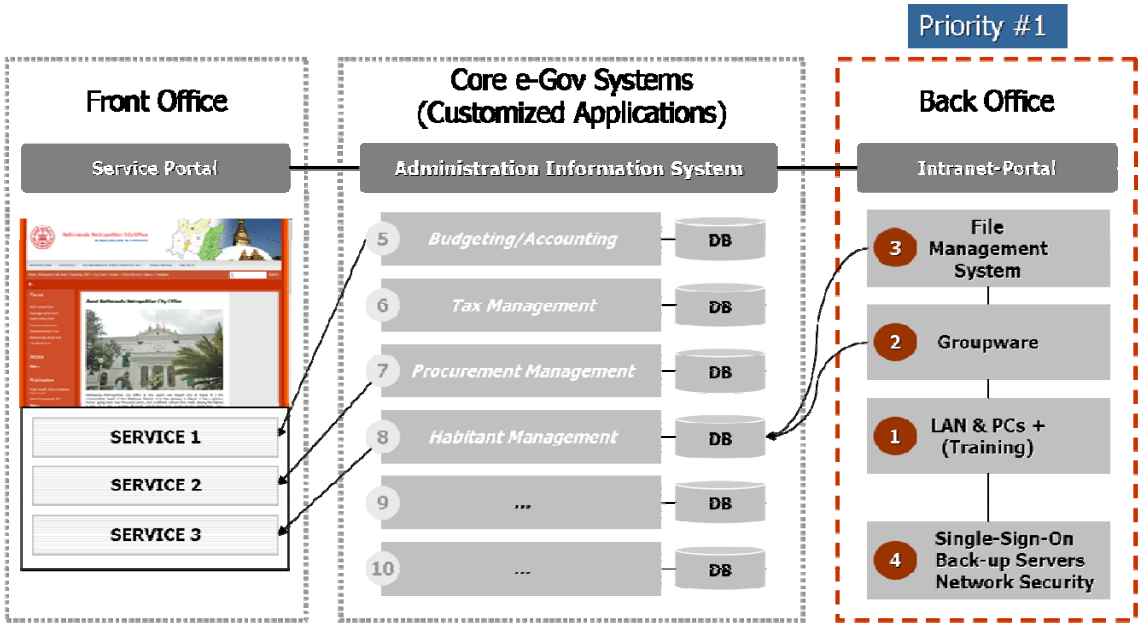


Figure 44: To-Be Model

Above To-Be model illustrates that the KMC should consider developing and aligning three major areas: front office, core-e-Government applications, and back office systems. Most importantly, it is recommended to focus on the back office systems and infrastructure.

First of all, building a LAN, distributing PCs, and providing IT training for employees should be considered a must have for establishing e-Government at the KMC.

Currently there are still a lot of government employees who have never experience working with computers and its equipment. For those employees, providing a PC cannot simply changes work habits or practices. Launching a long-term change management might help them to enjoy working with PCs in a smooth transition phases.

Second, a groupware will increase communication speed and change organizational culture. Though KMC has a web site with its own domain name, it appears that government employees use public e-mail services with various internet portal services such as Yahoo and MSN rather than having its own e-mail services.
According to a number of research institutions, the groupware technology reached it's very stable stage that there are various off-the-shelf products available at the market. To make easy for KMC employees, it is necessary to customize its functions.

Third, developing file management system for KMC is another important component. Years ago, creating a paper-less working environment was a number one issue in many municipalities around the world. In fact, developing the file management system does not the same as scanning all the paper-based documents. KMC must establish electronic document standard format and proper exchanging processes to maximize the basic functions of the system. e-Document achieves will be established, and this system will dramatically change the way of handling most documents within KMC.

Finally, the Single-Sign-On (SSO) often comes with the groupware, and it is the key to access not only the groupware, but it also allow accessing most databases with its own access rules. By using SSO, government employees will be able to access and to share IT resources. However, one of the most important reasons implementing SSO is its security feature. This is an effective safety feature controlling access users.
In addition, KMC has very limited data and information back-up systems. To protect important data, it is necessary to have KMC-wide back-up and security policy.

Following describes in detail regarding the groupware and file management system

System functions and description		
Function level1	**Function level2**	**Description**
Infra Application		
File (Document) Management system (DMS)	Document registration	Provides to create new documents or open existing documents from the system
	Version management	Classifies document by the modification rates when the document is created, modified, or registered. It enables to attach the special version labels so that every history of the document is searchable.
	Check-In/Out	Provides a lock function while modifying so that an unauthorized personnel many not access contents to modify
	Security management	Enables to create access authorization on every area including registered contents, workflow, etc.
	Audit Trail	Manages all document access related system event, check-In/out, reading, deleting, workflow, etc., by log
	Workflow	Systemizes user-centric work process. Provides graphical workflow
	Renditions	Automatically creates and saves all types of content files (PDF, HTML, TIFF, DWF, etc.) Runs suitable views and tools according to user's circumstances
	Searching	Provides the extensive search functions: words, synonyms, system search, logic and arithmetic operation, and accurate search

System functions and description		
Function level1	**Function level2**	**Description**
Administration Portal		
Groupware Service	E-mail	▪ Receives and sends internal mail and web mail. Develops mail message, retrieve and search, external mail box, mail box management, etc.
	Electronic Approval	▪ Template registration, document development, document printing, approval processing, document receipt and sending, document storing and archiving, etc.
	Electronic Bulletin Board	▪ Develops message to post on the Bulletin Board, search, time-set posting, Bulletin Board management, etc.
	Resource Management	▪ Resource registration, retrieval & reservation, review, etc.
	Community Management	▪ Registers same-taste association, Bulletin Board, Data Room, search, membership management, etc.
	Personal Information Management Service (PIMS)	▪ Individual & group schedule management, address book management, etc.
	LDAP/ Organization Management	▪ Retrieve internal and external user information, manage organization chart, etc.
	System Management	▪ Rights assignment on all functions, etc.
	Survey	▪ Develops survey, view respondents, automated statistical processing, etc.
	Full Text Retrieval (FTR)	▪ Natural language/ subject word search, index, dictionary management, etc.

System functions and description		
Function level1	**Function level2**	**Description**
	Short Messaging Service (SMS)	▪ Recipient designation, message development and transmission, etc.
Enterprise Portal Service	Integration	▪ Develops universal UI(User Interface) when users access business information, Integrates all information, internal system of district (legacy), menu function in the united web through a unitary gateway
	Personalization	▪ Organizes characterized information for individuals/sections, organize personalized contents for individual's tasks and roles
	Administration Support	▪ Provides necessary internal contents for administrative tasks: direction, work instruction, regulations, etc.
SSO(Single-Sign On)	ID/PW based authentication	▪ Service request/redirection ▪ ID/PW submission ▪ ID/PW authentication request and verification ▪ Issues a certification token ▪ Sends the certification token to the system concerned. ▪ Requests and check the right information ▪ Connection

Table 21: To-Be model functional description

5.2 Approaching Strategies

5.2.1 Process-based work automation and change management

To achieve above To-Be image, F/S consultants recommends following four strategies.

First of all, the following illustration explains the fundamental concept of Public Administration Business Process Re-engineering (PABPR). There are four phases with this concept.

First of all, process optimization should be considered. Each department and division has its own work description and various work processes. To design an e-Government core application, each process has to be examined and analyzed for optimization. Processes with irrelevant, duplicated, looped work processes can be found, and with professional business consultants can guide the through with the current processes. Improving work processes usually resulted in organizational structural changes, new job assignment, eliminating functions. Most employees are reluctant to cooperate and accept the changes due to job security, possible new assignment, and many other reasons. Thus, in order for the organization not to face strong opposition, it is usually recommended to launch a change management program prior to initiating PABPR.

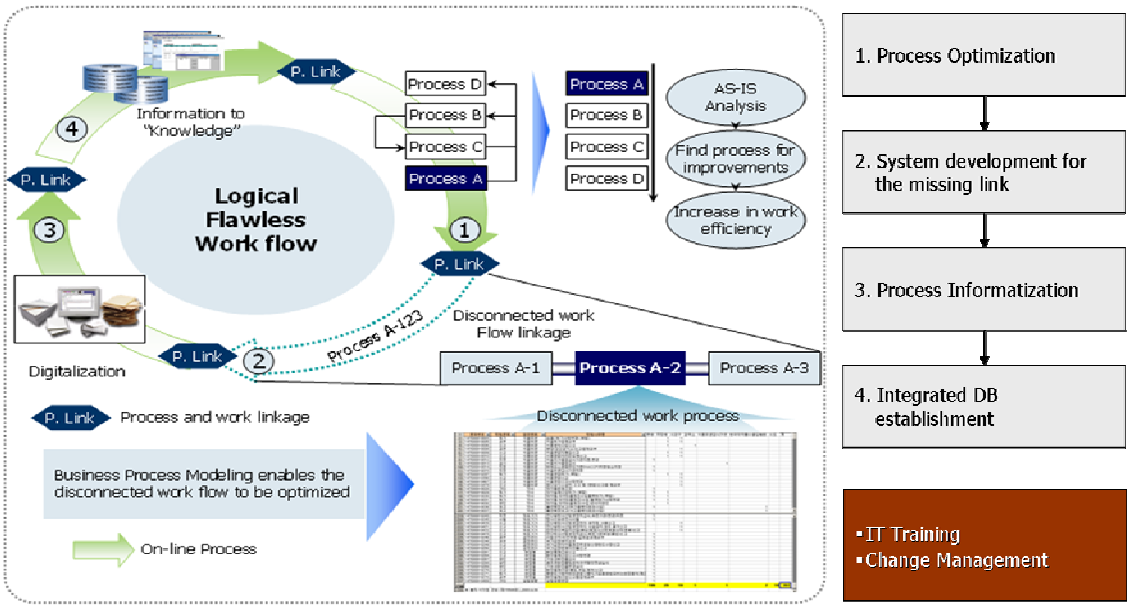


Figure 45: Strategy #1 Process-based work and Change Management

Most change management program, especially for establishment of e-Government, includes IT mind-up training program, seminars, bench marking, workshops, and so on.

Secondly, among the sequenced processes, it can be found that some processes are manually handled even though linked or connected processes are automated (handled with IT systems). Informatization priority should be given especially to these disconnected processes. In KMC, during the F/S project, processes were not specifically analyzed, but the consultants found that the existing IT systems and applications are stand-alone systems serving a particular department's specific-but-limited functions so that it is safe to assume that there is a number of disconnected processes.

Third, creating paper-less environment enables employees to search and to verify a lot of information at any time. To establish database, the standardization of document format and template is pre-requisite. It also takes long time, and costs a lot. However, once DBs are established, the use of information will lead KMC to the knowledge management which is the phase four. This is the last and could be considered as the first phase. If an organization completes the four phases, its IT capability will dramatically improve.

It is important to state that some companies and government take a "big-bang approach" with strong vision and objective, all the processes are innovated and develop various information. Sometimes, it is recommended to invest and to implement the system. However, previously mentioned, KMC has limited workforce and resources to take a Process Innovation with PABPR. The F/S consultants recommend taking a one step at a time to conduct PABPR. A few departments with high priority should take the opportunity optimizing its work processes as a pilot project. If successful, one at a time, departments should participate in process innovation to minimize project risks.

5.2.2 Improving Front Office by establishing "Back office infrastructure"

This particular strategy pictures similar concept to the previously stated in "To-Be image." However, one of the important concept is that implementing both groupware and file management system will create an environment to provide interactive services with the service portal. More information can be searched and similar to the SMG's OPEN system, some documents can be provided at the service portal. From the e-Government maturity model, in order to reach Level III searchable Database, multimedia capability, contact information, and other interactive services should be provided with regular update and maintenance including implementing groupware and file management system.

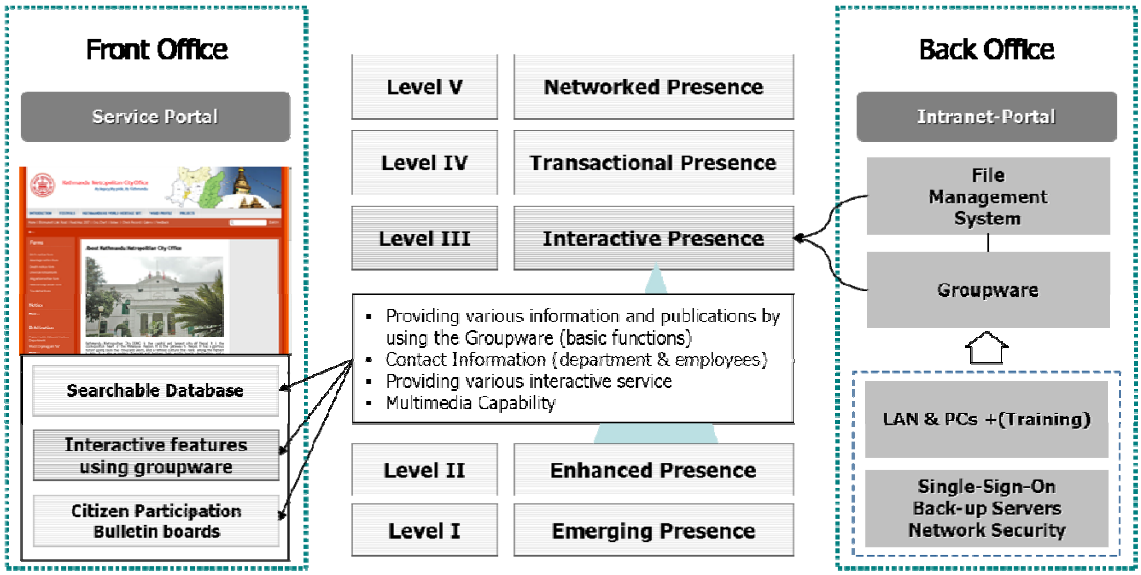


Figure 46: Strategy #2 Improving Service Portal

5.2.3 Collaboration with the central government and SMG

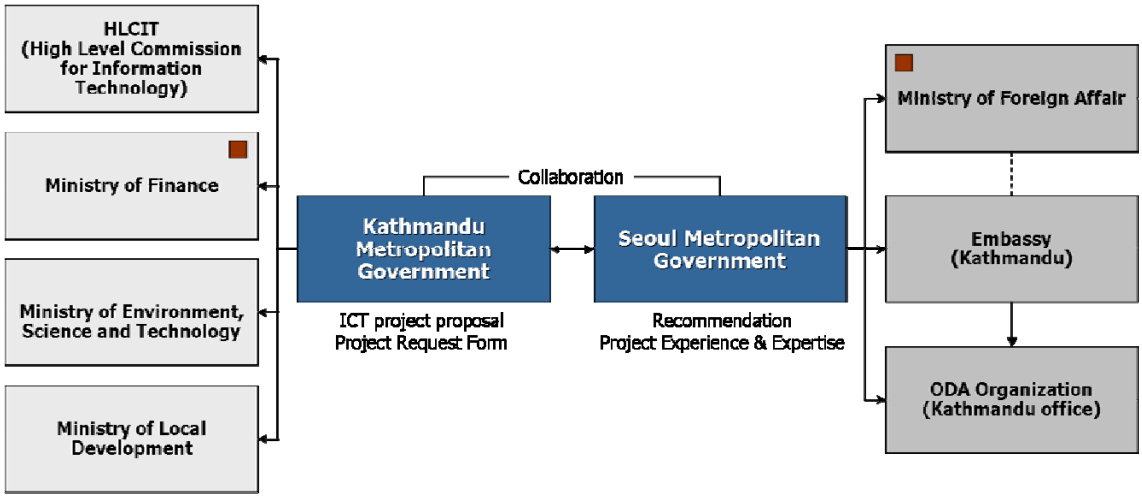


Figure 47: Strategy #3 Collaboration between KMC and SMG

Finding project fund is one of the critical success factors. To receive a foreign government's ODA grant or other type of project assistance, it is recommended to establish a good inter-organizational relationship with the central government of Nepal especially collaborating with HLCIT, Ministry of Local Development, Ministry of Environment, Science and Technology, and so on. At that same time, KMC should continuously collaborate with SMG for e-Government development.

5.2.4 Expanding IT organization and IT Budget

KMC should consider expanding IT section and allocating more IT budgets. Refers to the current ICT status assessment, there are only 2 IT professionals. To implement more e-Government systems, IT section should be expanded to a department and there should be two sections: IT planning section and System Management section.

To increase in its capability, within KMC nurturing IT experts could be important, but due to the time factor, often it is recommended hiring more IT professionals from external sources.

In addition, the F/S consultants strongly recommend that the ITC budget needs to be increased to approximately 1% of the entire KMC budget. With the current budget amount, IT section can only barely maintain existing equipment. It is recommended that the investment for new project should be 25% of the IT budget. (Currently it's only 6%)

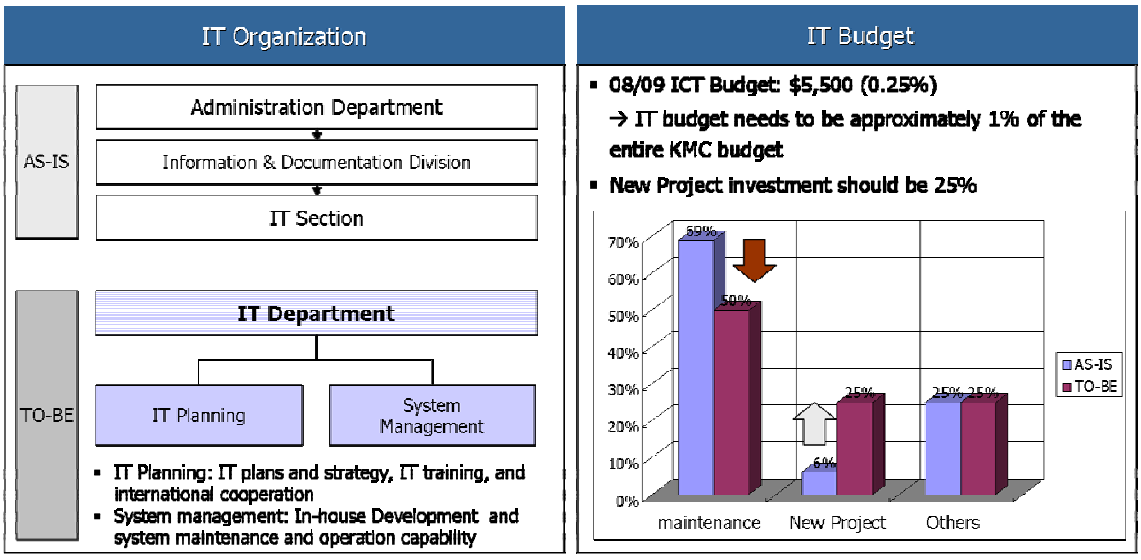


Figure 48: Strategy #4 IT organization and IT budget

Part 6. Schedule and Cost Estimation

Part6. Schedule and Cost Estimation

6.1 Schedule

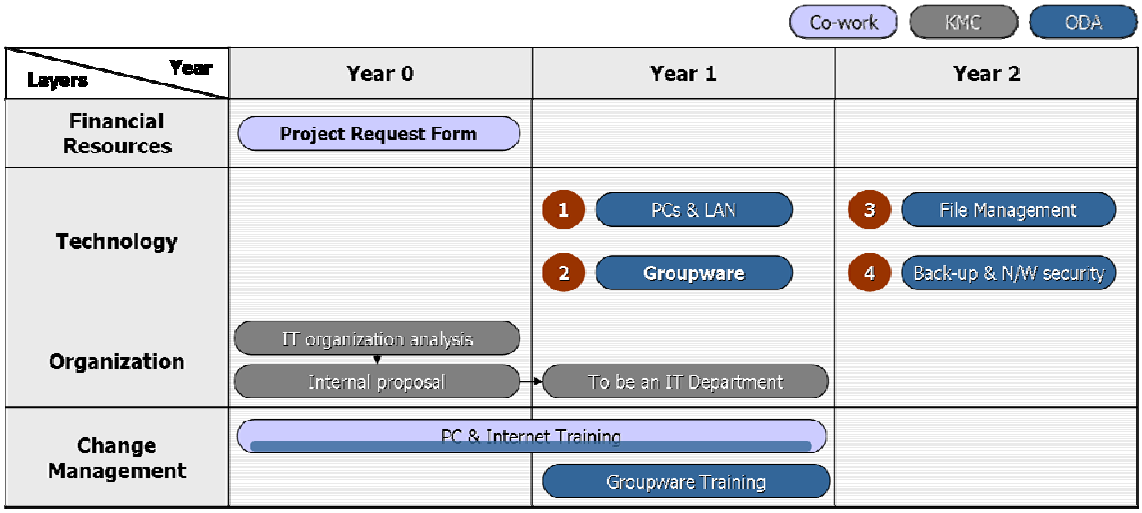


Figure 49: Strategy #4 IT organization and IT budget

There are four important areas: Financial Resources, Technology, Organization and Change Management. The first year is set to “Year 0,” due to the fact that it is hard to determine when the project fund becomes available. However, organizational reform and PC and Internet training program can be initiated even before the project fund is available by KMC. In general building Local Network Area can be completed within 6 months considering the structure of the city hall. Also, it can be expected to implement a groupware at the KMC within 10 months including customization and localization. Thus, both projects can be completed in one year.

The F/S consultants recommend implementing a file management system in the second year or “Year 2.” The file management system has to be integrated with the groupware, and it might take sometime for KMC to finalize e-Document standard format. In addition, if there are more than two to three small-scale but critical projects at the KMC, project can be delayed due to known and un-known risks. It is recommended to implement back-up systems and N/W security systems once the groupware and file management systems are operational.

6.2 Cost Estimation

The F/S consultant estimated the total project costs for the above four project components. To estimate project costs, consultants carefully monitored and examined the market prices. This is estimation. The detailed final project costs will be determined and calculated once again by KOICA or donor agency.

Unit EA, USD

Category	Estimated Costs	Scope
N/W LAN Construction	160,000	Router, Switch, Firewall, Network Management System (NMS), LAN Construction (KMC)
Hardware	360,000	PC, Server, Storage, Printer, Scanner
Solution	230,000	Groupware, File Management System
Other costs	50,000	UPS, Server Rack, and so on
Customization	700,000	System customization, maintenance, and so on
Total	1,500,000	

Table 22: Cost Estimation

The total estimated cost for the four project components is approximately $1.5 million USD. This includes groupware customization, maintenance, yet IT training costs. Currently KMC has 155 PCs and SMG recently donated 100 refurbished PCs so that there are 255 PCs available. Thus, for this estimation, it was considered to add up additional 100 PCs. It is also important to state that the LAN construction is for the KMC mail building only. The Inter-connecting 35 ward office might cost too much for a grant project.

In “Hardware” section, printers and scanners were included for the file management system. The cost was calculated with 50 printers and 20 high-speed scanners. The estimated cost for “Other costs” includes UPS system. In Nepal, the power shortage is a national concern. It might be a good idea to install a generator along with UPS system, yet the generator was not included for this project costs.

More detailed information will be provided to KMC, and POSDATA and KMC will continuously communicate to finalize the quantity and detailed specifications for the betterment for the project.

Part 7. Financial Plan

7.1 Funding Source

Part7. Financial Plan

7.1 Funding Sources

7.1.1 Domestic Efforts

Different from the central government, KMC is an autonomous local administration which heavily relies on its own revenues (including taxes) which accounts for 42%. Though KMC receives nearly 32% of its budget from the Ministry of Local Development, but IT budget is not specified. It implies that IT section must find its own ways of increasing IT budget within the organization persuading the major and major department leaders.

The consultants once believed that the ministry level or perhaps the HLCIT or other central government might provide or support the KMC in terms of financial resources for e-Government development. However, because the KMC is an autonomous local administration, the central government does not provide extra funds for establishing or implementing e-Government projects.

Similar to many municipalities in the world, in Korea, also, SMG had to find its own way of promoting e-government, and made tremendous effort to persuade decision makers to increase its own budget for new IT projects. The KMC, especially IT section, should make efforts to receive more budgets for e-Government projects. It is highly recommended that IT budget rate should be 1% of the KMC budget. Currently the IT budget is less than 0.25%.

7.1.2 Korea Trust Fund (KTF)

The government of Korea established Korea Trust Fund (KTF) in the major MDBs including World Bank and ADB. Especially with the World Bank, the Korean government established 15 million USD KTF on ICT4D awards which grants World Bank projects and activities. Unfortunately, it appears that only staff members of all World Bank Group (WBG) operational units are eligible to submit proposals, and these grants are “bank-executed activities.” However, if possible, collaboration with World Bank or ADB in Nepal might lead KMC to have an ICT project opportunity. Also, most developed donor countries provide similar opportunities so that KMC should look for more resources.

7.1.3 Korea ODA (Official Development Assistance) System

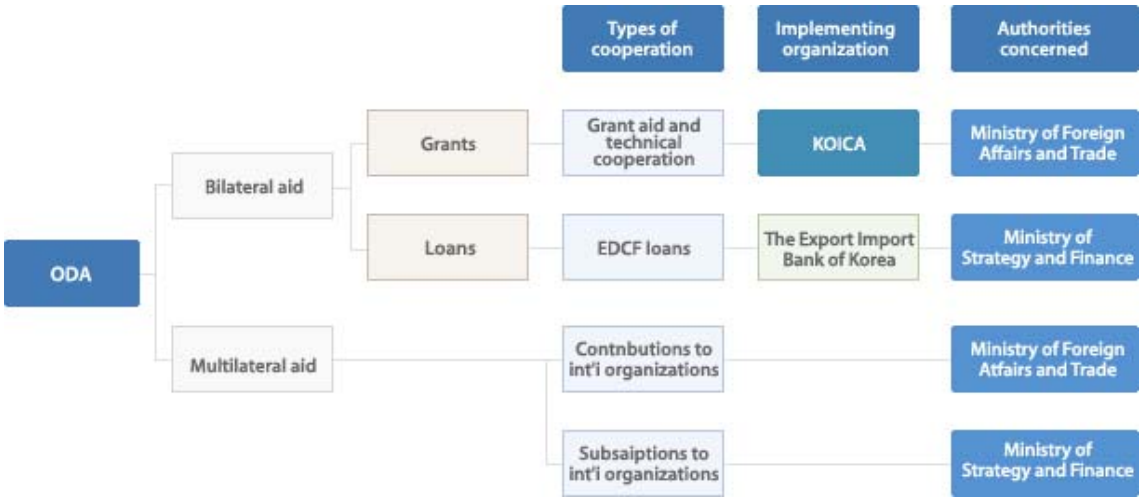


Figure 50: Korea's ODA System (picture source: KOICA)

A. Grant aid and Technical Cooperation from KOICA

The government of Korea provides bilateral and multilateral aid. Korea International Cooperation Agency (KOICA) is an umbrella agency of the ministry of foreign affairs and trade. It provides grant aid and technical cooperation. In Nepal past several years, KOICA provided several projects including establishment of GIDC. For KMC, KOICA's grant aid and technical cooperation is a good source for IT project funding. Perhaps, it might be difficult to persuade internal decision makers to receive the order of priority, and to receive an approval from the higher government body including the ministry of local development and ministry of finance. However, it is highly recommend making an effort to take this opportunity.

According to KOICA, the typical procedure for project aid (grant) follows: (direct quote)

1. Survey request and receipt of project proposal through the Korean embassy
2. Selection of candidates project for pre-feasibility study
3. Pre-feasibility study
4. Preliminary planning and confirmation
5. Notification to the recipient country
6. Establishment of a project master plan
7. Dispatch of an implementation survey team and sign a Record of Discussion (R/D)
8. Confirmation of R/D by both governments through an exchange of Note Verbal or the signing of an agreement
9. Project implementation
10. Evaluation and follow up

As stated, a survey request is required, and to initiate this process, it is necessary to fill out the KOICA's "project request form." It is recommended starting in September; KMC should start to make the request proposal. This F/S report contains most information that required from the request form. In addition, step-by-step guidance will be provided from the F/S consultants. Following is the suggested task schedule for the proposal.

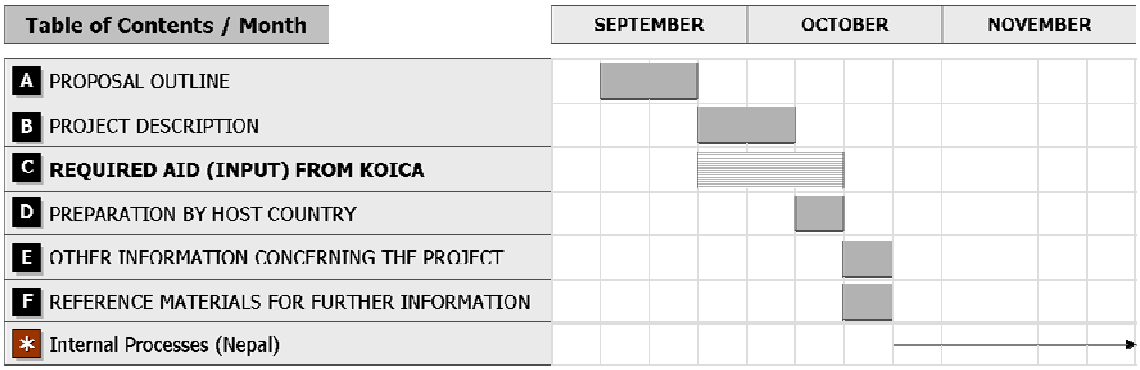


Figure 51: Suggested Schedule

B. EDCF (Economic Development Cooperation Fund) from KEXIM bank

Though based on the environment assessment in KMC, EDCF loan cannot be recommended due to various difficulties, the following introductory information may help understanding the Korea's ODA system.

EDCF is a bilateral ODA loan program to help developing countries spurt industrial growth and improve economic stability, as well as to encourage development of a sound economic relationship between Korea and other countries.
In terms of economic infrastructure assistance, among other fields, EDCF has emphasized the importance of reducing the "digital divide" by seeking ways to assist developing countries in their development of the information technology (IT) industry.

Loan Procedures

Loans to foreign governments are implemented in accordance with a standard procedure, which starts with project identification then proceeds to preparation, appraisal, loan negotiation, loan agreement, project implementation and supervision, and ends with the evaluation of completed projects.

Terms and Conditions for EDCF Loans

- Loan Amount : Up to 80% of the total project cost
- Interest Rate : 0.5% ~ 3.0%
- Repayment Period : Up to 30years, including a maximum 10 year grace period
- Denomination : Korean Won

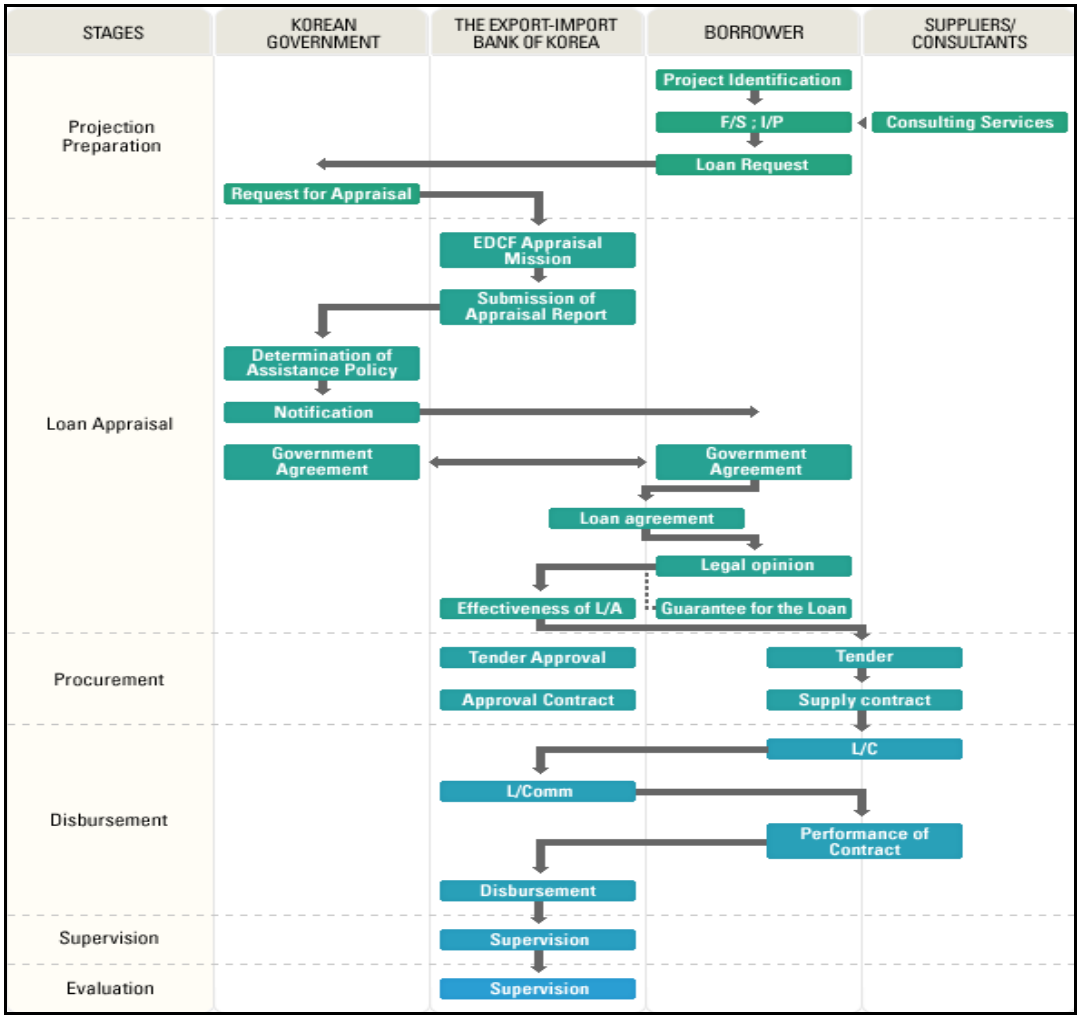


Figure 52: EDCF Loan Process (KEXIM, 2008)

Part 8. Consideration

Part8. Consideration

8.1 Training Plan: Training Subject and Content

The successful informatization of the KMC demands consensus on its necessity shared by not only IT section but also the KMC staff as a whole. KMC should nurture IT experts to contribute to the IT system development. The e-Government system users should be encouraged to learn basic IT skills and how to use a PC and the systems.

KMC should draw up a training policy, making efforts to develop training programs in a constant basis, and need to consider building an IT training center in a long-term.

- Training for Field Staff
  - Objectives: Learn the roles of field divisions during system implementation and how to use the e-Government systems.
  - Training Content
    - Basic computer and IT application skills
    - e-Government system processes and implementation direction
    - Roles of field staff and participation during system implementation
    - Components of the e-Government system and their usage
- Training for Administrators
  - Objectives: Manage the computerized system and set up rational policies
  - Training Content
    - Basic computer and IT application skills
    - IT project management plan
    - System components and operating plan
    - Latest IT trend and best practices of advanced countries
- Training for IT Professionals
  - Objectives:
    - Foster the capability to develop, operate and maintain the system
    - Nurture experts, who will lead IT in the KMC and can teach general KMC staff IT knowledge
  - Training Content
    - Application S/W Area
    - S/W engineering and System analysis and designing technique

- Programming language (development language)
- Server and Local Network Area (LAN)
- Fundamentals of System & Network
- System & Network Administration
- Troubleshooting & Performance Tuning
- System S/W Area
- Database Architecture & Administration
- Programming with DBMS
- Acquisition of Latest IT trend and technology
- Benchmark overseas best practices

8.2 Project Management

The Integrated Management Methodology which is applied to the Local e-Government Project is constructed to integrate and manage the development methodology and project management of each area. It provides a consistent process from system analysis design to the application test stage.

Figure 53: Project management area

Project Management must consist of a well-defined systematic process in order to plan, observe, monitor, and control inter-related tasks. The determined goal can be achieved with the provided budget, time, resources, and technical limitation through this process. This project consists of four stages: initiation, planning, execution & control, and completion.

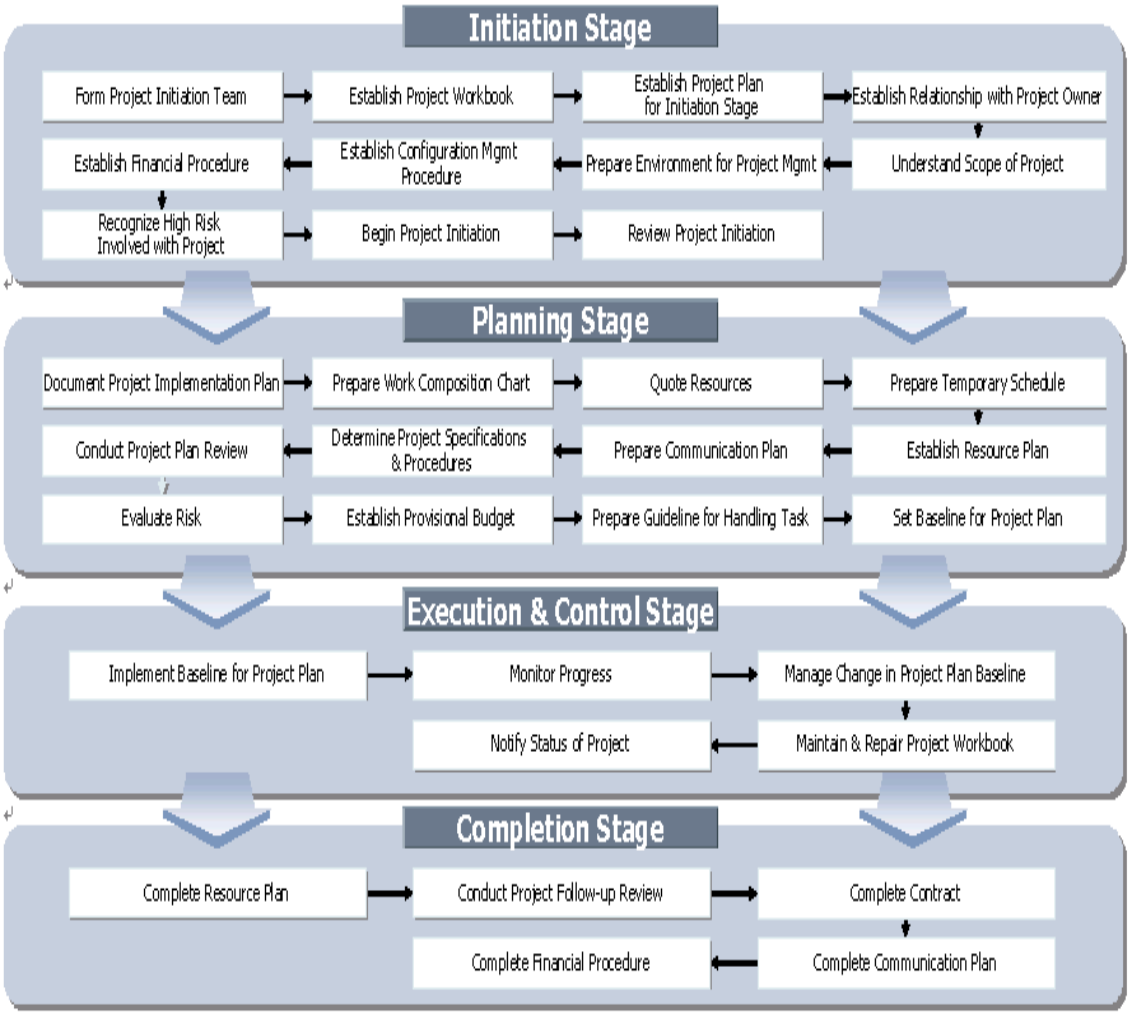


Figure 54: Project management methodology

8.3 Implementation Organization

Establishing a separate driving force and allotting a part to each organization shall be unconditionally required since the informatization is vast and long-term thereby resulting in changes on the current work processes. The outsourcing to the outside development professional is inevitable since the KMC itself cannot develop the whole system. The system integrator shall do its best in establishing an information system in line with the status of KMC based on the professional knowledge.

8.3.1 Role and Responsibility (R&R)

- **Project Steering Committee:** a standing investigation committee, that investigates disputes between departments and main issues and makes a decision over what to propel and where to head, and manages the system integrator.

- **Advisory Committee:** committed to counsel by to-be driven fields such as the improvement of law and regulations, establishment of information infrastructure, implementation of software and standardization, and strategies.
- **Law/System Revision:** composed of the personnel on grant/loan to each working department and committed to the practical affairs such as revising laws, improving systems and establishing a detailed plan for system improvement.
- **System Establishment and Operation:** assigned to the practical affairs related with system establishment such as operating the existing system, setting up the movement plan of a new system and future operation along with the system integrators
- **Field Work Coordinator:** composed of the coordinators from each department and committed to collecting needs from their department especially from the field officers.
- **Education and Publicity:** conduct educational training for both inside/outside users and outside user-oriented publicity activities, and collect opinions from the stakeholders.
- **Systems Integrator:** be wholly charged of the implementation of e-Government systems, responsible for completion of the project.

8.3.2 Internal Participation

- Select KMC officers from each department and have them work and participate in the Task Force Team (TFT)
  - Advise on the real work processes or systems and closely cooperate with the personnel of the TFT in order to achieve successful system development.
  - Take charge of being a liaison between the departments where they belong to and the TFT and strive for appreciation between organizations.
  - The substantial revising works for procedures or systems shall be conducted by the departments where they belong to.

8.3.3 Set-up a TFT for e-Government Project

- The TFT of the KMC shall consist of in combination of IT personnel and the personnel of the offices thereby preventing the generation of idle manpower due to one-sided increase in the computing personnel.
- The officers, once sent to and worked in the TFT can play a leading role in testing, simulating operation, and training for the new system.

8.3.4 Commitment of Employees

- KMC employees may take part in the whole development process, from system analysis to design and implementation.
- In addition, that positive participation will bring a good result in information sharing about informatization or IT projects in general, IT capacity-building and technology can be transferred toward the KMC.

8.4 Operation and Maintenance Plan

8.4.1 Operation Plan

- There required a method that enables efficient operation for the resources such as server, system software and network equipments consisting of the whole system in order to guarantee reliable and stable operation of the newly established computerized system.

A. Training Strategy

▪ Training of Operational Personnel

· At the level of system implementation, both the outsourcing developer and would-be operator should be encouraged to work together thereby enabling the operator to independently administer the system after the development is completely finished as well as contributing to cultivating the ability for stable and reliable system operation.

▪ Select trainee

· Select targets under full consideration of personal IT ability and role

▪ Participate in system development project

· Take part in the development of server and network infrastructure

· Take part in database design

▪ Instruct the personnel

· Instruct the operators by fields : Use the instruction facilities of the outsourcing developer and vendor

▪ Technology transfer

· Set up technology transfer plan by fields

· Improve operating ability via technology transfer

B. System Control and Management

- In order to assure that the new system is operating without a hitch, continuous control & management will be required thereby promptly coping with abrupt errors as well as preventing excessive network traffic.
  - Server Control & Management
    - Monitor the performance and error status of all servers by establishing management server at data center
    - Collect CPU performance, memory usage and various event messages
    - Detect an error on real-time basis and take measures against the error
  - Network Control & Management: NMS (Network Management System) system
    - Monitor the status of the line and equipment operation on a real-time basis
    - Detect an error on real-time basis and take measures against the error

8.4.2 Maintenance Plan

- The maintenance activity is for keeping the normal state of the whole system and accepting user's request arising from the changes on environment.
  - Maintenance activities
    - Set up maintenance system for efficiently managing a variety of application software, computing equipments, networks and system software.
    - At the initial operation level, the developer should support the operation and maintenance for a certain period of time thus elevating safety and system efficiency.
    - To secure prompt maintenance and repair system, an advanced foreign developer and IT Company shall be jointly committed to the project.
    - In order to ease the future maintenance activities, development standards should be established and the quality should be strictly managed during the application development.

8.4.3 Disaster Recovery Plan (DRP)

- In preparation for Act-of-God, a backup and recovery plan shall be set up and the pilot test shall be continuously conducted for verifying the appropriateness of the plan thus securing fast recovery.
  - Backup recovery plan
    - Prepare for the materials and computing resources required for backup and recovery
    - Appoint a master manger for backup and recovery and have him/her fully

equipped for the job

- Set up priorities and then effective backup & recovery procedure

▪ Pilot Test

- Prepare for the pilot test in preparation for possible disaster
- Verify the appropriateness of the plan and, if required, correct the plan

8.4.4 Risk Factors

- Resistance factors

▪ Resist against the Informatization

- The employees may take a stand against the automated work processing since they tend to stick to the old customs.
- No-paper work may result in maladjustment to the new system thus leading to confusion and degrading the system effectiveness.

▪ Resist against know-how open

- There is a concern that the know-how acquired with difficulties is easily disclosed to others.
- This resistance may be quite strong in case information exchange between entities is not active.

▪ Tangle with the assigned roles

- Organizational environment changes for efficient work processing.
- New works are being created in return for the decrease of the existing manual works.

- Undertakings

▪ Perform both existing and new work processes simultaneously for a certain period of time

- Encourage the users on condition that the user interface will be enhanced when the pre-training and system is completed thus minimizing inconvenience of the users.
- The system change including no-more document should be first applied to loyal entities in the way of no-attachment and gradually expand the applicable scope.
- A Manual Work Processing Directive, tentatively called, should be set up and always ready for possible system errors.

▪ Change over the recognition on Know-how open and award incentive

- Awaken people to a sense of cooperation: individual know-how makes an organizational know-how (information sharing benefits all)

- Consider the possibility that the statistics works are utilized for making a decision for works in field by giving an incentive to know-how provider.

▪ Coordinate concerns between departments via the Coordination Committee

- Assign roles according to the characteristics of the new system, but fairly and reasonably
- Set up a coordinating committee and commit it to discuss and decide main policies early in the computerization and have officers work in the informatization driving force thus scheming understanding between entities

Appendix1. Abbreviation

List of Abbreviation

ADB	Asian Development Bank
AfDB	African Development Bank
APM	Application Performance Management
BIMSTEC	Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation
CA	Certificate Authority
CAS	Corporate Accounting System
CD	Compact Disk
CEO	Chief Executive Officer
CIO	Chief Information Officer
CMS	Content Management Systems
CP	Colombo Plan
CRM	Customer Relation Management
CRS	Check Record System
DBMS	DataBase Management System
DLP	Display LCD Panel
DMS	Document Management System
DRP	Disaster Recovery Plan
EA	Enterprise Architecture
EDA	Enterprise Digital Assistant
EDCF	Economic Development Cooperation Fund
EDMS	Electronic Document Management System
EU	European Union
FAO	Food and Agriculture Organization
FMS	Facility Management System
F/S	Feasibility Study
FTR	Full Text Retrieval
FTTH	Fiber to the Home
G2B	Government to Business
G2C	Government to Customer
G2G	Government to Government
G4C	Government for Customer
G-77	Group of 77
GDP	Gross Domestic Product
GIDC	Government Integrated Data Center
GIS	Geographic Information System
HLCIT	High Level Committee for Information Technology

HR	Human Resources
IBRD	International Bank for Reconstruction and Development
ICAO	International Civil Aviation Organization
ICC	I International Chamber of Commerce
ICRM	International Red Cross and Red Crescent Movement
ICT	Information Communication and Technology
IDA	International Development Association
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFRCS	International Federation of Red Cross and Red Crescent Societies
ILO	International Labor Organization
IMF	International Monetary Fund
IMO	International Maritime Organization
IOC	International Olympic Committee
IOM	International Organization for Migration
IPS	Intrusion Prevention System
IPU	Inter-Parliamentary Union
ISO	International Organization for Standardization
ISP	Information Strategy Planning
ISP	Internet Service Provider
IT	Information Technology
ITA	Information Technology Architecture
ITSO	International Telecommunications Satellites Organization
ITU	International Telecommunication Union
ITUC	International Trade Union Confederation
KEXIM	The Export-Import Bank of Korea
KMC	Kathmandu Metropolitan City
KMS	Knowledge Management System
KOICA	KOrea International Cooperation Agency
KTF	Korea Trust Fund
LAN	Local Area Network
LBS	Location Based Service
LDAP	Lightweight Directory Access Protocol
LDC	Low Developed Country
MDB	Multilateral Development Bank
MIC	Ministry of Information and Communication
MIGA	Multilateral Investment Guarantee Agency
MINURCAT	United Nations Mission in the Central African Republic and Chad
MINUSTAH	United Nations Stabilization Mission in Haiti
MONUC	United Nations Organization Mission in the Democratic Republic of the Congo

MLD	Ministry of Local Development
MoEST	Ministry of Environment, Science and Technology
MOH	Ministry of Home
MoF	Ministry of Finance
MOGAHA	Ministry of Government Administration and Home Affairs
MoLG	Ministry of Local Government
MoIC	Ministry of Information and Communication
MOU	Memorandum Of Understanding
MP	Master Plan
MPS	Municipal Procurement System
NAM	Nonaligned Movement
NITC	National Information Technology Center
NMS	Network Management System
NRs	Nepalese Rupees
ODA	Official Development Assistance
OECD	Organization for Economic Cooperation and Development
OPCW	Organization for the Prohibition of Chemical Weapons
OPEN	Online Procedures ENhancement for Civil Applications
PABPR	Public Administration Business Process Re-engineering
PAPR	Public Administration Process Re-engineering
PC	Personal Computer
PIMS	Personal Information Management Service
PIS	Personnel Information System
PKI	Public Key Infrastructure
PR	public relations
R&R	Roles and Responsibilities
SAARC	South Asian Association for Regional Cooperation
SACEP	South Asia Co-operative Environment Program
SLA	Service Level Agreement
SMG	Seoul Metropolitan Government
SMS	System Management System
SMS	Short Message Service Text
SOP	Standard Operating Procedure
SQL	Structured Query Language
SSO	Single Sign On
TCO	Total Cost of Operation
TFT	Task Force Team
UDLE	Urban Development through Local Efforts
UI	User Interface
UN	United Nations

UNAMID	African Union/United Nations Hybrid Operation in Darfur
UN-ASPA	UN & the American Society of Public Administration
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Scientific, and Cultural Organization
UNIDO	United Nations Industrial Development Organization
UNIFIL	United Nations Interim Force in Lebanon
UNMIL	United Nations Mission in Liber
UNMIS	United Nations Mission in the Sudan
UNMIT	United Nations Integrated Mission in Timor-Leste
UNOCI	United Nations Operation in Cote d'Ivoire
UNOMIG	United Nations Observer Mission in Georgia
UNTSO	United Nations Truce Supervision Organization
UNWTO	World Tourism Organization
UPU	Universal Postal Union
USD	United State Dollar
VRS	Vital Registration System
VoIP	Voice over Internet Protocol
WAN	Wide Area Network
WB	World Bank
WCL	World Confederation of Labor
WCO	World Customs Organization
WFTU	World Federation of Trade Unions
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WMO	World Meteorological Organization
WTO	World Trade Organization
WWW	World Wide Web