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BUSINESS ANALYSIS

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SMARTCITY: ***Innovative Approach Towards A Master Program On Smart Cities Technologies***

SMART CITIES SURVEY

1. Smart Cities Survey

1.1. INTRODUCTION

Global Smart City projects focus primarily on addressing problems in the city. The aim of the project team is to find a solution to the specific needs of Ulaanbaatar city. The current situation of infrastructure in Ulaanbaatar, the social mentality of the public and the ethics of civil servants varies greatly from other cities in the world. It is necessary to resolve these issues in the right direction, combining the most pressing issues and the distant future.

In developing the Smart City master plan, the best solutions of the world will be adapted to Ulaanbaatar's features. To achieve this goal, a comprehensive survey of Ulaanbaatar needs to be done and a great deal of testing is needed.

The purpose of the program is to create a safe and safer city to provide a compact and well-organized, culturally-efficient, technologically-oriented and live-in administrative structure that seeks to resolve the development of the new century's urban development, technological progress, citizen aspirations, and change of business environment.

1.2. SMART GOVERNANCE

Smart Governance: Establish a governance system that is open, transparent, and citizen engagement, legal reforms, and e-governance

Develop a smart governance at the city to create a civilized environment with intelligent structures and smart decisions, transparent operations. The following activities will be carried out within this framework:

- Re-planning of urban development policy and operations
- Optimization and reform of the legal framework
- Restructuring of Capital City Organizations and Operational Reforms
- Good governance and operational productivity management of the city
- Create transparency, open and fair environment

Smart Governance	**Participate in decision making**	**Citizens' representative represents number of citizens**
		Political activity of Citizens
		Political influence and role
		Percentage of female representatives
	Public and social services	Per capita expense
		Kindergarten and nursery
		School
	Open Government	Bureaucracy
		Corruption

1.3. E-SMART ECONOMY

Smart Economy: Support businesses to improve the business relationship and to promote sustainable urban development and to a knowledge-based economy.

- Become innovative city:
- Creating a pleasant environment for entrepreneurship:
- Optimize public-private relations and transfer duties to the private sector:
- Promote investment:
- Establishing brand of Ulaanbaatar:
- Activate Labor Market:

Characteristics	Factor	Indicator
Smart Ecomoiny	Innovation Environment	Support research
		Knowledge based economy
		Patent, copy right
	Business	Self-employed
		Registered new business
	Brand, reputation	Decision making centre
	Work Productivity	Employees' average income

	Labour market	Unemployment rate
		Level of part time job workers
	Competing internationally	Company in international capital market
		Air passenger transportation
		Air freight

1.4. SMART MOBILITY

Smart Services: Develop an urban information environment and infrastructure to be flexible, accessible and reliable. Implement a comprehensive solution of simplifying of public service.

1.4.1. Civil service:

- The public service center will be built on a regional basis depending on population density and space.
- Interact with citizens by one window of a citizen.
- Research the livelihoods of citizens regularly.

1.4.2. Government-Business Services:

- Simplify and electronicize government and business services.
- Hear the voices of the business owners against government bureaucracy and increase the role of the business
- Support and advice businesses to compete in foreign markets.

1.4.3. Access speed and accessibility of public services:

- Improve condition of exchange information among organization in order to reduce necessary documents from civil. Transfer no-paper technology.
- Introduce broadcasting video and electronic control systems to public services.
- Introduce cloud technology to public service.

1.4.4. Operative management of public services:

- Establish operative integrated management center
- Integrated controlled information should be used by civic

Smart Mobility	**Transportation system**	**Number of public transportation**
		Quality of public transportation
		Satisfaction of public transportation
	International transportation	International transport
	Infrastructure of Information technology	Household with computers
		Mobile service
	Road Traffic	Eco-friendly vehicle rental
		Eco-friendly vehicles
		Road and traffic safety

1.5. SMART ENVIRONMENT

Smart Environment: Providing a comfortable, healthy and safe environment to work and live

1.5.1. Create healthy and safe environment:

- Establish system for update the Healthy and Safety index (HSI) regularly and required interventions.
- Green economic solutions will be introduced to provide environmentally friendly grades to all types of vehicles and buildings.
- Transfer to the integrated management system of unexpected disaster.

1.5.2. Establish information technology infrastructure of Ulaanbaatar city:

- Establish cloud data center of city
- Improve network accessibility and quality. Become a wireless internet city
- Electronic security and data security

1.5.3. Soft information infrastructure:

- Connect to soft infrastructure horizontally and vertically
- Improve the quality and use of database resources.
- Provide special opportunities for private companies to use the databases.

1.5.4. Mobility and equal accessibility of database :

- Increase the use of smart devices
- Introduce smart solutions for public transportation

- Build smart vehicle environment with car sharing, bicycle sharing system

1.5.5. Urban Technological Equipment (IoT):

- Develop service ATM, self-service electronic devices and systems (ATMs, e-Maps, e-Guide)
- Use smartphones, Smart Sensors, QR codes, and NFC services to simplify city service

1.5.6. Infrastructure Reform:

- Power engineering smart network will be introduced
- Effective waste management, environmental pollution control, maintenance and effective recycling
- Upgrade Ulaanbaatar water supply and reuse technology

Smart Environmnet	**Environmental condition**	**Days with sun**
		Green plant
	Pollution	Smog
		Trash
		Infectious disease
	Environmental protection	Citizen's participation in environment protection
		Understanding of environment protection
	Applied infrastructure management	Water supply
		Power supply

1.6. SMART PEOPLE

Smart Citizens: Create an environment for the development of science, technology and innovation systems based on national intellectual capacity.

1.6.1. Educated and knowledgeable citizen:

- Establish a non-formal education network.
- Cooperate with Individual Development, Books and Knowledge partnerships
- "Informed citizen-environment"

1.6.2. City Culture-Pride of Citizens:

- Organize clean Ulaanbaatar campaign

- Improve the utilization of shared property and farming systems
- Maintain norms, customs and ethics in public places and services
- Build standard of service culture

1.6.3. Healthy and active person:

- Support the initiative which is "Right lifestyle – national wide campaign"
- Implement “Family- respect campaign”, “healthy-person”, “Healthy physical fitness” projects

Smart people	**Skill level**	**University, Research centre**
		Special qualification of citizens
		Foreign language
	Life-long learning	Library
		Online learning
		Foreign language course
	Multi-national culture	Ccitizens from abroad
		Graduates from abroad
	Flexibility	Possibility of hiring job
	Productivity	Workers in new technology industry
	Sociable	Participation level for election
		Travellers to abroad
		Social knowledge
	Social works	Political activities
		Volunteer avtivities

1.7. SMART LIVING

Smart Living: Establish infrastructure, apartment, service senders, living environment, buildings, where citizens can get the necessary information and services from home.

1.7.1. Safe life:

- Establish no criminal, well controlled city and well lighted city
- Install special facilities and construction to reduce construction and traffic accidents.

1.7.2. Smart education system:
- Create “Primary school-kindergarten” system near home
- Create smart school and class

1.7.3. Smart health:
- Health services, insurance will be in line with world standards
- Introduce smart health system

1.7.4. Develop comfortable accommodation, leisure, recreation and tourism:
- Provide intelligent, economical and remote-controlled smart buildings and residential areas
- Increase travel sightseeing points for leisure

Smart Living	**1. Culture**	**2. Cinemas**
		Museum
		Theater
	Health	Average age
		Hospitality
		Doctors
		Health system
	Safety environment	Number of criminals
		Mortality due to crime
		Protection system against criminal
	Household, apartment	Level of housing
		Per person space
		Satisfaction
	Education	Students
		School
		Quality education
	Travel	Entertainment, attraction place
		Number of travelers
	Poverty	Number of poverty

		Poverty risk

ANALYTICAL OVERVIEW OF THE PROBLEM STATUS IN THE PARTHER REGIONS

2.1. GENERAL CONSIDERATIONS

Smart Ulaanbaatar program and Smart City project:

The "Smart Ulaanbaatar" program aims to build a smart city with a fast-paced service, understandable, clear and well organized in order to make optimized solution for citizen demand, changes of business environment, suitable for city-centered urban development trend, technological advancement. Within scope of the program, the main goal is to change the city's activities through Smart Governance, Smart Economy, Smart Citizen, Smart Government and Smart Life.

Based on the feedback and demand from the citizens of Ulaanbaatar and research of the difficulties of business organizations, the complexity of the interrelationships between government institutions, the challenges of infrastructure and the global smart governance practices, the recommendation of the National Security Council of Mongolia, the Smart City program was developed. Also, this program is the implementation of the "From big state to a Smart State" initiative by the President of Mongolia,

In doing so, with respect citizens' interest, support the business organization, improvement and provision of the good interrelationship among all activities, with establishing integrated database environment, the citizens of the city will be able to get the services of the city administrations to the citizens, without having to pass through many stages. The best new technology, innovation in developed countries will be introduced to Ulaanbaatar.

2.2. ANALYTICAL ESSENCE OF "APPROACH OR PHILOSOPHY" OF SMART CITIES

2.2.1. In total, 57 organizations including the Capital City Governor's Office, the Mayor's Secretariat, the City Governor's Office, the Implementing Agency, the Affiliated Office, Local Owned Enterprise and the District Offices have 540 different kind of services are rendered to citizens and business organizations. It is possible to digitize 78 services which is 14 percent of these services, integrate 40 services which is 7 percent (citizen can get service from one stop public service center), and simplify 303 services which is 56 percent of all public services. These works should be resolved in a rationale, properly structured. Also, these operational and technological changes should be handled appropriately.

2.2.2. From 1992 to 2013 years, there are 3200 civil servants working in Ulaanbaatar city. These servant office workers need to work throughout all over 179 districts and municipalities in Ulaanbaatar to implement and verify compliance with 110 rules, regulations and their enforcement. The duplication of rules, the distortion of their implementation, the multi-stage of service and the public service culture have been the main source of people's discomfort in urban business development. There is an urgent need to improve the governance of the capital and to bring the cooperation between government and citizens to the new stage.

2.2.3. The city is a large compound system that combines a wide variety of infrastructure, activities and livelihoods. The Smart city solutions will enable the large system to be integrated and managed in accordance with the theory of integrated systems. Transition from separated management system to integrated management system is the primary duty for Management Information system of all operations and activities of the Smart city.

2.3. ANALYSIS OF EDUCATION NEEDS

Improve the skills of urban residents and promote urban culture. The following activities will be carried out within the main activity framework:

2.3.1. Education and knowledgeable citizen

- Establish a non-formal education network.
- Collaborate with NGOs, book and knowledge communities.
- Create environment of citizen with good information

2.3.2. City Culture – Citizen Pride:

- Clean Ulaanbaatar
- Common property regulations
- The norms and customs of the public area
- Standards of cultural service

Technology support and solutions:

- Develop massive open online course and provide learners with certificate
- Establish online reading room and place in Ulaanbaatar
- Establish integrated portal and call center

- Information about 10 attraction locations of Ulaanbaatar city will be provided through media, television and social media. This will create competitive pride among residents
- Develop an integrated registration, management and monitoring system for shared ownership
- Create social information systems that works for distinguishing the incorrect and correct information among residents and community
- Operate information and evaluation system about city culture service
- Manage information culture and evaluation system

Expected outcomes:

- Increasing number of people with higher education and skills
- Each individual will improve his/her self-esteem
- Information flow will be understandable
- Create a clean and beautiful city where people want to live
- Every property is controlled and profitable for everyone
- Become a city with people who are in good attitude without stress
- Improve public service of public area

2.4. TRENDS IN INDUSTRIAL DEVELOPMENT

From 2018 to 2023 years, the following steps will be taken during the "Smart Green Development Ulaanbaatar-Smart-UB" phase. Introduce eco-technologies to the all infrastructure to establish fundamental of green economy city. Waste and impure water will be reused.

2.4.1. Saving and controlled power energy systems "Smart Grid-Smart Network". Building energy management system (BEMS), Household Energy Management System (HEMS), Factory Energy Management System (FEMS), Community Energy Management System (CEMS) network

2.4.2. Develop the public transport and logistics management system

2.4.3. Manage water-supply, water-management system "Smart Water Management System"

2.4.4. Create a smart city with smart streets, smart buildings and eco green environment

2.4.5. Build ecofriendly environment where everybody lives healthy and safe throughout establishing Smart universities and hospitals a lot

Financing of the program will come from a variety of sources. The program will be funded by the following sources:

- State budget
- Local budget
- Investment and loan from donor countries and international organizations
- Loans from international financial institutions
- State and government bonds
- Private Sector Investment
- Other sources
- Total funding will be concentrated on a special fund and spent from the fund.

2.5. FACTORS THAT ENHANCE THE CREATION OF SMART CITIES IDEAS

There is a real need to develop new models of adaptive development to the growing population of Ulaanbaatar. The global population growth and the pattern of live hoods have created many unpredictable problems. The population of Ulaanbaatar was 14.0% of gross population of Mongolia in 1956, 22.3% in 1969, 43.6% in 2010, and 46% in 2012. At the end of 2012, 1,318 thousand people live in UB. Due to population growth, traffic congestion, air and environmental pollution, and service burden have increased, and the urban population has become frustrated.

There is a need to establish good governance that meets the demands of population growth and business competitiveness in long-term sustainable urban development.

It is our goal to establish a community-based city where citizens are able to live in a safe and healthy environment, to achieve economic growth, to reduce costs and to introduce fast-paced, technologically-oriented solutions.

One of the essential situations for establishing a smart city is the introduction of green technologies, green facilities, new recycling solutions and technologies, establishing green cities, and controlling environmental pollution and creating a healthy environment.

2.6. CRITERIA FOR IDEAS SELECTION

When implementing a Smart City program, the following basic principles must be followed to ensure proper business relationships for a sustainable city development and a knowledge-based economy. These include:

- All activities and operations implemented within the program will be combined with innovation and technological solutions.
- Within program implementation activities in local administration organization, private sector, and citizen's productive cooperation, optimal initiatives and solution will be promoted with innovative form of encouraging systems which are concession agreement of high technology-oriented, provisional competition of projects, special regulation of private investment
- All tasks within the program will be performed by a skilled project team. A well-trained professional team will be involved in the program implementation procedure. Quality and speed of each activity implementation will improve and the implementation should be following an international high standard.
- Transforming project activities of capital city government organizations from business-oriented and public-service-oriented into planning, regulative, control-dominant pattern is essential procedure of the project.
- All program activities and operations are designed to respect citizen's interest, to provide citizens with good interaction communication system, to build up integrated database environment, to work compact administrative structure, to emphasize outcomes, to improve productivity.

2.7. TECHNICAL-ECONOMIC DEPENDENCIES IN SMART CITIES CONCEPTS

Strategically important programs and projects implemented in Ulaanbaatar, capital of Mongolia /2014-2015 years/:

- Smart Ulaanbaatar
- Ensure the safety of drinking water in Ulaanbaatar
- Friendly Ulaanbaatar
- Against corruption
- Economic development strategy of Ulaanbaatar
- Develop capital's public transportation system until 2020
- Improve waste management of Ulaanbaatar
- Build flood protection construction in Ulaanbaatar before 2020
- Mongolian livestock sub-program
- Improve lighting of the public owned street, road, apartment, ger district
- Neighborhood control

- Establish the industrial and technological park in Ulaanbaatar
- “Coming back home” campaign which support homeless people to come back home
- Kids- friendly Ulaanbaatar

Citywide projects in Ulaanbaatar:

- Tuul river complex
- Reduce the heat loss of the building
- Renovation of heat-technic of building od school and kindergarten
- Eco park
- Light industrial and technological park
- Construction material production, industrial and technological park
- Ulaanbaatar metro
- Mongol Naadam
- Remodeling and renovation old buildings of Baga toiruu
- Provide Ulaanbaatar with gas
- Tuul highway
- Establish integrated logistic transportation center in left area of Ulaanbaatar

2.8. ANALYSIS OF BUSINESS ENVIRONMENT

2.8.1. Become an innovative city:

- Establish Smart Innovation centers
- Establish a place for development of young generations’ technical skills in each district
- Establish a research institute of competitive ability of city
- Establish broker for land exchange

2.8.2. Optimize public-private relations and communication. Transfer some state functions and activities to the private sector:

- Restrict business activities of affiliates of the city. Transfers to the private sector except where essential services are available to the government. Reorganize the city-owned enterprises

2.8.3. Encourage an investment:

- Improve the legal environment to support foreign and domestic investment in the city
- Expand the activities of private funded projects in UB

2.8.4. Create UB brand in Ulaanbaatar:

- Create Ulaanbaatar city's brand products that have special features including Mongolian or city culture, ornaments, brand food, and establish green complex building and area. Those should be different from other cities of the world
- Create green environment, organize Trees for Ulaanbaatar campaign regularly. Make it volunteer work

2.8.5. Enabling Labor market:

- Make citizen's employment research of every citizen. Labor agency activities will be conducted at the committee level and by volunteers
- Employment online index registration will be done
- Develop micro-finance system. Establish zones to support small and medium enterprises and create stimulating environment for employment

2.9. TRENDS IN INNOVATIVE DEVELOPMENT OF SMART CITIES CONCEPTS

Features of Smart City Infrastructure

The smart city will be built to deliver comfort, safety, healthy environment for residents using modern, advanced technologies. The main principle of the establishing "Smart city" is to build up conductive environment of all social services directed to the citizen and businesses of the city, without time and space restriction and establish safety and comfortable living environment.

All urban infrastructure including information technology, transportation, communication, public transport, electricity, clean and waste water supply, heating system will be connected to each other with fibre optic networking system. This system will be essential fundamental of establishing Smart city with high technology, integrated management, integrated big databases and developing, controlling and organizing it.

In order to establish Smart City , it is very important to use modern high technology such as "U-IT Infra" information technology infrastructure including internet technology (WiBro, HSDPA, DMB, GPRS), modern computer technology Super Computer, Grid Computing, Hardware, Software), space communication technology (GPS, Satellite TV & Radio), mobile communication technology (GSM, CDMA), wireless information communication technology (RF, ZigBee, Bluetooth), high sensitive sensors.

ANALYTICAL OVERVIEW OF THE PROBLEM STATUS IN THE PARTHER REGIONS

To developing a Smart city infrastructure related with information technology, following four areas are essential directions:

2.9.1. Convenient City
2.9.2. Healthy City
2.9.3. Safe City
2.9.4. Clean City

2.9.1. Convenient City

- U-Traffic System
- U-Bus System
- U-Home Networking
- U-Building
- RFID & QR Code Shopping System
- RFID Product Registration System
- E-Banking, U-Business, U-Administration, U-Education, U-School
- U-Tourism & Culture

2.9.2. Healthy City: Эрүүл хот

- U-Hospital
- U-Health Care

2.9.3. Safe City

- U-Baby Care System
- U-Building Access Control Integrated System
- U-Special Object Security System

2.9.4. Clean City: Цэвэр хот

- U-Air Pollution System
- U-Water Pollution System
- U-Soil Pollution System

2.10. FOURTH INDUSTRIAL REVOLUTION INDUSTRY 4.0 AND IMPACT ON INTELLIGENT CITIES

Smart City Program will be implemented in three stages. These include:

- 2014-2019, Cyber Ulaanbaatar
- 2016-2021 Technologically Ulaanbaatar
- 2018-2023, Smart, Green, and developed Ulaanbaatar

If Smart Ulaanbaatar project will implement comprehensively, the city will change following:

- City serve to its citizen without burden, fairly, affordable
- City will have smart management system
- Become a business-friendly city and without corruption
- Good governance
- Integrated system
- Public servicing speeds up from 50 to 90 percent
- Criminal percentage reduce down 20 to 50 percent.
- Efficiency of the city governance increase from 10 to 100 percent
- Citizen receive more than 300 services from one-window service
- Create a channel for every citizen to get necessary information

Cyber Ulaanbaatar

Combining innovation and technological advances changes Ulaanbaatar city to the modern new city.

- High-tech Ulaanbaatar city
- Manage infrastructure smartly
- Establish a wireless zone in Ulaanbaatar city
- Citizen can get necessary information from anywhere, anytime
- Every citizen can control his living environment, house and work place from his smartphone and computer and get services as well.

Technological Ulaanbaatar

By implementing this program, citizen will not only be provided affordable, fast and fair services, but also accumulate database to manage city smartly and establish good governance which are business- friendly and no corruption across the city. By integrating information and data's, advanced technology will be introduced efficiency. So, it is possible to become ecofriendly, healthy green city.

3.1. EXISTING INFRASTRUCTURE ON PARTNERS REGION

The Smart Ulaanbaatar program is designed to support many issues through smart solutions and advanced technology.

Public e-services is the most important part of the Smart Ulaanbaatar program to implement within first 3 years.

The basic infrastructure is the information technology infrastructure to integrate and to regulate all subsystems within Smart Ulaanbaatar project. Information Technology infrastructure is the main window for accessing, monitoring and integrating information about all other sectors. Informational technology infrastructure consists of two main parts:

- Hard infrastructure
- Soft infrastructure

Smart city project itself and its sub-projects need to be consistent, interdependent, smart, and estimated the future development of demand, provided the interrelationship and mutual balanced between all sectors.

Smart City project develop integrated information technology environment throughout city. Introduce the integrated system to meet the following basic criteria. These include:

- Develop an integrated system to connect city administration and citizen, communities
- The integrated system should be easy to expand and improve
- Develop an additional cost-effective system
- Connective all infrastructure throughout this integrated information technology infrastructure
- Use the latest advanced high technology

Combining innovation and advanced technology will change Ulaanbaatar city to new and modern city:

- Become high tech city
- Become wireless internet Ulaanbaatar city
- Anyone gets necessary information from anywhere and in anytime
- Every citizen will be able to receive services from their mobile phones, computers and from home and office

3.2. **CYBER SECURITY**

From 2014 to 2019, the following activities are being performed at the “E-Ulaanbaatar”.

3.2.1. Create powerful Data Centre. All city information, data will be integrated in this data centre.

3.2.2. Create a secure network. City will be developed with wireless internet.
3.2.3. Global security system will be introduced into all e-services and networks.
3.2.4. Every citizen of the city is able to get all information and public services from their homes and nearest one window public service centre.
3.2.5. All public and government officers of the city will be included in the integrated information system. The duplication of the information and data across the city will be completely eliminated.
3.2.6. Civil and government officers will be able to exchange the information and data from anywhere, in anytime, in any form and implement their work. Create cloud computing centre.
3.2.7. Provide private business sectors with the opportunity of introducing of many kinds of service using hard and soft infrastructure.
3.2.8. Analyse the demand for professional Information technology developers, labour forces. Train information technology labour forces in domestic and foreign university and vocational school.

Cyber security, data security

Implemented work and technological solution:

- Develop integrated cyber security network and solution of data centre
- Introduce and install security system in data centre
- Establish the security team for securing and protecting data centre
- Establish special structure for data separation and protection
- Create privacy protection system
- Create a system to ensure continuous operation
- Install system to protect from all kind of unauthorized access, attack and virus protection
- Use of electronic signature widespread

Expected outcome:
To reach e-services, information and data network, security of data centre and data at the international level.

3.3. PRIVACY CONCERNS

Healthy and active person

Support “Accurate person” initiative. Activities:

- Increase and create non-alcohol and non-smoke environment, advertise right use of it

- Encourage communities' initiatives to get rid of wrong habits

Implement "healthy person and physical fitness projects". Activities:

- Increase public physical fitness area
- To provide Healthy activities and food place and restaurant with permission easily
- Improve the control for healthy and safety food
- Support activities that promote active and interesting life
- Create voluntary community partnerships

Ethics and family relationships

Support proper actions. Activities:

- Support and promote right and accurate life and actions
- Regulate time-follow activity
- Improve the procedure for assisting elderly, infant and disabled.

"Respect family" campaign. Activities:

- Family strengthen activities
- Create new family day

Technological solution and support

- Cognitive, educational materials will be distributed and advertised
- Healthy lifestyle portal will be developed
- Promote and advertise good life story and kindness
- Promote family value

Expected outcomes:

- Increase the number of citizens with good attitude, income and one's goal in life
- Increase the number of citizens who is active and healthy
- Decrease unemployment
- Decrease criminal
- Encourage proper action, learn to have mind-set to blame inaccurate actions
- Become the city with right, kind families

3.4. INTEROPERABILITY

From 2016 to 2021, following activities will be implemented in the phase of "Digital UB-Technological Ulaanbaatar".

3.4.1. All infrastructures within Smart city project will be equipped with smart devices. Smart small devices with smart operation systems which are Android, iOS will be used everywhere in the city. For instance: Electric meters, household electricity controller devices, water smart consumption adjuster, public transportation controller.

3.4.2. Establish operative administration centre based on smart devices, smart solutions. Manage and integrate all the life process of the city every minute.

3.4.3. High speed (over 40MBPS) WiFi and WiMax service spots will cover whole city. There is not necessary to install fibre optic cable.

3.4.4. All communication tools and technologies will be digitized. All devices will be connected each other via Wireless internet.

3.4.5. Every person, every device will have "IP-Internet Protocol" internet address. Majority of citizen will use smart mobile and computer devices. Every person will have digital Identification card. Citizen identification card (ID) will be installed in his mobile and it will be used in Ulaanbaatar Information System.

3.4.6. New Information Communication system will be accessed. (NFC) "Near field Communication" online connectivity card service will be connected to (O2O)-"Online to Offline" technology.

3.4.7. All appliance and smart devices will be introduced into all business, services, and households. The smart system of the Ulaanbaatar city will be one of the main parts of consumption for the whole life of the citizen and organization. These smart devices will influence on all kind of activities, life-style and rhythm its monitoring, and improvement of the transparency and fair competition environment.

3.5. BENEFITS OF SMART CITIES IN THE PARTNER REGIONS

In order to provide local city services to the citizen without access of multiple stages, it is important to create an integrated information technology environment with providing citizen with respect to the interest, promoting private business interactions and interoperability. The best advanced technology, best innovation that is already used in developed countries, will be introduced in Ulaanbaatar city.

By implementing "Smart Ulaanbaatar "project, Ulaanbaatar city will change as following. These include:

- Citizen will be provided with prompt, affordable and fair services
- To accumulate the data and information to manage city smartly
- Become city without corruption and business-friendly
- Build up good governance across city

- Develop an integrated system of Ulaanbaatar city, no-separate system
- Advanced technology will be introduced in the city efficiency
- Become green city, eco-friendly and healthy

Formulate the objectives of the program in the quantitative terms:

- The speed of public services will increase by 50-90%
- Cost of running business will be reduced by 20-50%
- Crime reduced by more than 20%
- Increase the efficiency of subordinate agencies and land plots by 10-20% in each sector
- Establish a channel to deliver open resources and information to every citizen. Every citizen gets more than 300 public services in one window.
- City administration functions and organizational structure reduce 20-30% and become compact.
- The number of regulations and rules will reduce 30% and become understandable.
- Increase green area and places in the city by 20%

3.6 COLLABORATION BETWEEN INDUSTRY AND UNIVERSITIES IN SMART CITIES CONCEPTS

Today, Mongolian University of Science and Technology became leading engineering university and, research, innovation and cultural centre including 11 faculties and affiliated schools, Graduate School of Business Administration, Graduate School of Engineering, Koosen technological college, Secondary high school, 4 research centre, 46 training-research centres, 18 professorship, more than 20000 students, more than 2000 lecturers, staff and engineers of Mongolia.

Over the past 60 years, we have trained more than 80000 professionals with degree in engineering and technology in more than 140 majors. Our graduates have been working professionally in all over the corners of the country and playing a crucial role in the development of the country. Graduates have been working the field of the construction, transportation, energy, information technology and communication, mining, geology, light and food industry and economics very successfully and efficiency.

Due to engineering and social infrastructure in Ulaanbaatar are in sufficient and cannot catch up the population growth, several topical issues emerge. For instance, due to insufficient housing and apartment with engineering solution, immigrants from rural areas in Ulaanbaatar are increasingly settling in ger areas. It becomes main reason of increasing unplanned expansion of ger areas.

On the other hand, population growth has intensified economic activities of Ulaanbaatar and encouraged the development of the financial sector. There are 84% of bank loan and 64.5% of gross domestic product of Mongolia has concerned in Ulaanbaatar Also, the purchasing capacity of citizen and car consumption have increased sharply. This became main reason for reduction of usage of public transportation and increasing of traffic in the city. Unplanned expansion of ger areas and smog from vehicles are major cause of the air and soil pollution in Ulaanbaatar. Specifically, about 50% of air pollution of Ulaanbaatar city is from burned coal in ger districts and 35% of air pollution is from producing smog of vehicles. Therefore, it is deeply depending on skill, knowledge of our graduates in engineering who are prepared and trained at our university MUST to make optimal solution for these topical issues in Ulaanbaatar.

MUST is preparing our students in 60 undergraduate level programs, 100 master degree's level and more than 100 doctoral degree level programs. Therefore, our students become more professionals using advanced technology and retrained non-degree engineering programs to become high qualified consulting engineer.

We have been working on and implementing the development program and curriculum in stages in order to improve and strengthen triple connection Research-Learning-Entrepreneurship.

3.7 ROLE OF THE UNIVERSITIES IN SMART CITIES CONCEPTS

In the implementation of the action plan of the document of "Outline of the master plan for development of Ulaanbaatar city until 2020, Development tendency until 2030", the main topical issues, insufficient kindergarten, school, hospital, re-planning of the ger district, the projects to improve living standards of citizens, have been included strategically.

Therefore, within the implementation of priorities of Ulaanbaatar city which are Green safety city, Comfortable environment city, there is an important need to invest to main sectors such as the transportation, water supply and green building. Also, the citizens of the city agreed with this need that was expressed in the opinion polls.

For this reason, the engineers graduated from MUST play a crucial role in establishing safe, people-friendly, competitive, energized, comfortable green city and in finding optimal engineering solution while addressing the population growth, providing increased consumption with limited resources and current issues of Ulaanbaatar. To this day, there is important need to bring engineers and graduates into "Smart Engineering" major to retrain and integrate their knowledge and skills.

Skilled researchers, professionals, engineers, graduates who are graduated and trained in leading tendency science, technology, innovational majors of Mongolian universities are main human power, resources to establish knowledge-based, innovation-based, high-tech-based Ulaanbaatar.

3.8 REGIONAL POLICIES FOR SMART CITIES ECOSYSTEMS

- Establish integrated management development policy framework for "Smart Ulaanbaatar"
- Implement "Smart City" infrastructure technological development program
- Develop optimal-planned city pattern
- Establish predictive system based on the bid-data analysis.
- Establish "Right city management" system

- Establish open integrated system of information
- Establish a “Citizen Involvement system” that allow citizens and organizations to influence on the city policy and decision making
- Introduce eco-technologies into all infrastructure which will be good fundamental of the green economy. Recycle waste and used water completely.

Main tasks of the projects are:

- Conducting a database survey related to the activities of the citizens and business organizations registered in the local administration office and municipalities.
- Convert current database into integrated database system.
- Develop e-workplace system to create important but unregistered database system.
- Connect emergency alarm and emergency services to the integrated database system.
- Connect Citizens’ and organization’s information into integrated database and one window service center. Owners are able to control themselves.
- To enhance e-public service, necessary information will be asked from citizen and organization. Improve coherence and interrelationship among databases.
- Establish an integrated inventory and control system for common property and street registration
- Improve the logistic of e-services for citizens