Research Article

Exploring ICT Indicators for 'Smart Cities' in Nepal: Lalitpur Metropolitan City

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Abstract
The study explores the existing technological infrastructure in the proposed 'smart cities' in Nepal. It follows the proponents of structural existence and interactivity patterns according to the Structuration Theory by Anthony Giddens (1991). This study incorporating qualitative as well as quantitative data has attempted to compare the digital status of Nepal with Asian and South Asian countries.. It is found that local administrations in towns and in villages are continuously working to bring their areas under connection by the installation of CCTVs, smart poles, smart maps, internet infrastructure and other ICT infrastructure. The study used content analysis of documents and survey conducted in Lalitpur Metropolitan City (LMC). The study recommends the four main areas viz., strict policies and practicable guidelines/directives; installation of ICT infrastructure; implanting skill and ICT qualified human resources and construction of robust websites. If the Government of Nepal works in these four areas then the country will step in the track of formation of 'smart cities' in Nepal.

Introduction

Deloitte (2017) showed, "Smart Cities" as cities that utilize ICT and other technologies to increase public benefit and improve the standard of living. The traditional concept of "Smart Cities" was linked with urbanization and driving solution for problems from the interaction of the infrastructure. However, in the modern age, people find ICT based solutions to most of their problems. Thus, Bronstein (2009) states "smart city" is fabricated by the modern technologies (further discussed in the section below). Therefore, there are discourses on sustainable cities.

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The United Nations has forward 17 Sustainable Goals and 169 targets to its member nations for the sustainable development. The UN states the utilization of ICT accelerates the achievement of all the 17 goals (Wahlen, 2017). There are advocacies about the use of technologies for sustainable cities. The ITU, for instance, has been advocating for smart sustainable city (ITU-T FG-SSC, 2014). It proposed the following definition for a smart sustainable city.

> *"A smart sustainable city is an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social and environmental aspects". (ITU-T FG-SSC, 2014).*

Nepal is a member of the UN bodies. It has to follow UN Guidelines and has to work on its development agenda. Since 2015 onward, after the promulgation of the new constitution, the Government of Nepal has already been working on the direction of "Smart City".

On September 20, 2015 the Constitution Assembly approved to restructure Nepal into 7 provinces, 77 districts and 293 municipalities (including metropolitans, sub metropolitans and palikas) and heralded Nepal into a federal system of governance (The Constitution of Nepal, 2015). To effectively run the administration, the Constitution of Nepal 2015 (part 5, article 54) stated that the state power should be divided into federal, provincial and local in accordance with the constitution. The Executive Cabinet Ministry amended the existing provisions of ministerial portfolios and added many ministers as in independent portfolios as ministers, state ministers, assistant ministers and others (ibid: Part 7, article 74). The state started to function in three tiers of governance - federal, provincial and local (ibid, part 5). However, practically, the right and duties of the "three tiers of governance" (Rai & Poudel, 2011:9) are yet to standardize and more than that work responsibilities of municipals and ward offices (the smallest unit of public administrations within the municipality) are not very clear (Karki, 2017). Depending on the location, Palikas or municipals have been holding different work responsibilities like citizenship processing, birth registration, death registration, migration registration, social security and even information dissemination. But the Government of Nepal recognizes it as efforts to optimise the utilization of local resources, decentralize the development works and smoothen the service deliveries. Though contradictions exist in service delivery, the local administration has started functioning and strengthening public trust on their governments (Karki, 2017). The local

public administrations have continuously been providing services and addressing public issues.

The word "smart" was originated in around the last quarter of the nineteenth century. According to Online Etymology Dictionary, with reference to devices, word "smart" was first attested in 1972 (etymonline.com). In the same dictionary, it explains further that with reference to devices, it meant the sense of behaving as though guided by intelligence as in smart bomb. The word 'smart' is connected with the solutions derived from the utilization of technologies. The concept of 'Smart City' was originated about ten years ago when International Business Machine (IBM), a computer company came up with the idea of "Smart Planets" in 2008 (IBM, 2008). The company presented a historical description about the uses of information technologies for sustainable development.

'Smart City' has been defined by many scholars in various ways (Albino et al., 2015). Sadiku, Shadare, Dada and Musa (2016) state that 'smart cities' is a fuzzy concept and there is not a one-size-first-all definition of the concept. However, they agree that 'smart' can be used to describe any device that can process information and can communicate. The concept of smart city is rooted to optimum utilization of information technologies for many purposes - comfort, safety and sustainability to the citizens (NTPCO, 2019).

Ishida (2002:1) states, "It established a connected community that combines broadband communications infrastructure... to meet the needs of government, citizens and business." Along with the new discoveries, urbanization of cities grew around the world. The cities have been fancied by modern fashionable displays and fabricated by the new technologies (Bronstein, 2009). People started to call it a 'digital city'. So, the "smart city" has emerged in recent decade as a solution to the urban issues (NTPCO, 2019). Some of the scholars like Harrison et al. (2010) and Lazaroiu and Roscia (2012) agree that 'smart city' is the utilization of the technologies to derive quick urban solutions.

The New Town Project Coordination Office (2019) states that 'smart city' has not been clearly defined by the government in any official document. The 'Smart Cities' Mission Statement and Guidelines of India 2015 (referred as SCM Guidelines 2015) indicates that a 'smart city' includes the following: adequate water supply; assured electricity; sanitation, including solid waste management; efficient urban mobility and public transport; affordable housing, especially for the poor; robust Information Technology connectivity and digitalization; good governance, especially citizen participation; sustainable environment; safety and security of citizens; and, health and education (Government of India, 2015). However, smooth communication is the first and foremost by-products a smart

city. Partridge (2004) agrees that ICT strengthens the freedom of speech and the accessibility to public information and services.

This study investigates the communication indicators for 'Smart Cities' in Nepal which has been proposed in the smart city directive, *Indicators for Smart Cities in Nepal*, developed by New Town Planning Coordination Office in 2019.

Theoretical Review

The study follows Structuration Theory by Anthony Giddens (1991). The theory states about the interactions with the structures of the society. The social values and norms will be set and updated by a continuous interaction between the agents and the systems. Giddens terms it as 'duality of structure'. There are various levels of structures in a society - tribal, organizational, national. Giddens (1991) divided the structures into three categories - individual, social/organizational and national. They lay ancient norms, values and cultures in every society, but they are modernized through the interaction and practices of the agents. According to Giddens, the interactions of the individuals either reform or make the new rules and regulations, and sets up the systems. The adoption of the technologies has been setting up new structure in the societies. The foundation of the Adaptive Structural Theory (AST) by Gerardine DeSanctis and Marshall Scott Poole laid on Anthony Giddens' Structuration Theory (Giddens, 1991). The AST is the further extension of a strand of Giddens Theory of Structuration. DeSanctis and Poole have studied the changes of the society by the adoptions of technologies (DeSanctis & Poole, 2015).

The Structuration Theory explains about the societal adaption behaviour of people that leads towards the formation of modern society. Technology plays a pivotal role in raising the work efficiency of people in the modern society. Giddens generally refers to rules and resources and more specifically the structuration properties that allow bindings along with the time, space and social systems. He states that the similar social practices exist for longer time and the dissimilar vanishes out.

DeSanctis and Poole has further extended Giddens' proposition through adaptive characteristics of the Structuration Theory in the technological age. DeSanctis and Poole argued that in the technological age, the interaction exists within both the technological artefacts and the work environment within which these artefacts are applied (DeSanctis & Poole, 1994). The technological adaption has a great impact in personal life, social and administrative functioning. Studies like Orlikowski & Robey (1991), Scott (1987) and Culnan (1986; 1987) have been done on how the utilization of technologies has been changing the structure of the societies. These studies reflected that the technologies can bring changes in the

society because of the impact on culture, social norms, values and agencies of people.

DeSanctis & Poole (1994) utilized the Structuration theory to study changes brought by the technologies in an organization. The authors have found out that the technological structures and work environment in the organization constantly interact and bring potential changes for the organization's betterment. Finally, DeSanctis and Poole proposes for the study of interactions in multiple levels even outside the organizations.

Smart cities have evolved in many countries around the world. It incorporates the development of the core physical infrastructures like supply of water, power, sanitation, waste management system, public transportation, housing, school, hospitals and other (Ranjit, n.d.). As per the theory, the durability of any social systems depends on the interactivity of people. In this modern age, interactivity mostly occurs through the use of technologies. In a 'smart city' the social systems should have technology-based intervention such as traffic system using camera, public transportation tracking system using mobile application, online payment systems and more (ibid). Therefore, the theoretical framework consists of the theoretical foundation of the Giddens' theory and its further extension in the form of AST by DeSanctis and Poole.

Analysing the Existing ICT Infrastructure in Nepal

A study conducted by Frost & Sullivan (2018) included in *Digital Framework* by the Government of Nepal (2018) shows that Nepal is moving very fast in the digital transformation after it instilled political stability following promulgation of the New Constitution of Nepal in September 20, 2015. The same study forecasts that if the same trends have been maintained, the internet penetration rate of Nepal will surpass China in 2025 by 4% and India by 17% (Frost & Sullivan, 2018).

The adoptions of new innovations have been growing rapidly in all the sectors. Nepal has 135.69% penetration of combined wireless and wire line communications. Frost & Sullivan (2018) stated that according to the NTC, internet penetration of Nepal has reached to 63% through mobile. The e-GDI position of Nepal was 0.3458 in 2016. It is in between 0.25 - 0.5, the ranges for the middle stage (UN, 2016). The survey further states that Nepal is moving in the positive direction increasing its e-GDI index.

The Government of Nepal is also using Social Media and direct phone service quite effectively for grievances and complaints handling, for instance @Hello_Sarkar, a Twitter account and Facebook page. Nepal Telecom has initiated to connect east-west highway with optical fibre (Nepali Telecom, 2019). In the mid hill it has been working and has already connected to 2376 km length in total (ibid). In

addition to these, ISPs are working in other sectors, like Worldlink Communications Pvt. Ltd. has been providing free Wi-Fi in some of the tourists' areas for the promotion of tourism in Nepal (Prasain, 2019). The online business/service has already laid its foundation in Nepali markets, for instance, Daraz, Hamro Bazar, Sasto Bazar and other.

The Government of Nepal, the Ministry of Home Affairs came up with the policy of CCTVs installation for security reasons in public places called, *CCTVs Installation and Implementation Directives- 2072*. In banking sectors, the directives of Nepal Rastra Bank (the central bank of Nepal) known as "*Information Technology Guidelines 2012*" state about the installation of CCTV in ATM location and banking office (NRB- Information Technology Guidelines, 2012: 8). These are the examples of how ICTs are being mandatorily used for security and transparency in banking sectors.

Online systems of payments have been expanding its services rapidly. In many department stores, card payment systems have been installed in coordination with banks and financial institutions. The card ticketing system has been started even in Sajha Yatayat, a local bus service. Sajha Yatayat, is one of the popular transportation services in Nepal, which has started its services since 1961 AD (2018 B.S.) under Cooperative Organization Act 1959 AD (2016 BS).

Since 2018 AD, the Sajha Yatayat (Travels) has started e-ticketing for the long distance travellers. The same year, it came again with a new scheme, machine readable card ticketing in vehicles, which is based on banking payment system (https://ictframe.com/sajha-yatayat-started-smart-card-payment-system/).

The installation of digital hoarding boards has commenced on 2013. Kathmandu Metropolitan City (KMC) has initiated a policy to replace all traditional hoarding boards and invited the business owners to install electronic hoarding board in place. Dinapati Sapkota, the Chief of KMC Implementation Department said in an interview, "KMC is tasked with restoring the city's beauty and it is the board owners concern to come up with new technologies to help contribute to our campaign." (Kantipur, July 10, 2013). The digital board has already been installed in the prime locations like shopping malls and multiplexes. Thus the physical structuration of these digital equipment is enhancing digital literacy in people. With respect to digital literacy, Spires and Bartlett (2012) stated that digitization process is divided into three categories: (a) locating and consuming digital content, (b) creating digital content, and (c) communicating digital content. The authors emphasised three aspects - location, creation and communication to strengthen the digitization of the society.

The ICT Policy (2015) aims to make 75% of Nepali people digitally literate, 90% population connected to broadband, every citizen has the access to internet and 80% of government services through online systems by 2025. The Press Council Nepal has registered 1756 online news portals from 2013 to July 2019. Since 2015, the Government of Nepal has started building websites of all its local, provincial and central administration.

The Government of Nepal has been working currently with three policies with respect to ICT education in schools and colleges - IT Policy (2010), SRRP (2009-2015) and Three-Year Plan (2011-2013). These three policies have been helping to integrate ICT in teaching and learning process in all the educational settings in Nepal. In addition to these, Master Plan (2013-2017) included four major components on ICT in education. These components focus on ICT Infrastructure - internet connectivity, human resources, content development and system enhancement. As per the master plan, these infrastructures should be enhanced in major education sectors - School Education, Higher Education, Teaching Education and Training, and Continue Education and Life-long Learning. The uses of ICT in education has been implementing by many stakeholders like NGOs, INGOs, National Centre for Education Development (NCED), CTEVT and many other institutions. For instance, NCED has been providing training to teacher through Radio and FM. Computer courses have been made a subject to study in school. Ministry of Education (MoE) has implemented a pilot project called "One Laptop per Child (OLPC)" to 26 selected schools in six districts.

The central level agencies launched websites to five Regional Directorates (REDs) and District Educational Offices (DEOs) of 75 districts. The Department of Education (DOE) has developed interactive digital learning materials of grades 2 to grade 6 in Nepali, Mathematics, English and Science subjects.

'Smart City' Initiatives in Nepal

The administrative division initiated from the Constitution of Nepal 2015 has forwarded the nation into developmental track in both physical and virtual. Now, the local administration can make their own development plans as per their needs and necessities. Since 2015, municipals have started creating their own websites and currently many of the municipals websites are providing services effectively.

Smart City is the well-facilitated city which has been built up by utilizing the modern Information and Technology (Sharma, 28 July 2017). So, 'smart city' is the expansion of the infrastructure by optimal utilization of the modern technologies. The internet supported technologies has to communicate and facilitate data sharing to strengthen the concept of smart cities.

In Nepal, it needs robust infrastructure for the types of smart city that the political leaders had campaigned during the election (Khatiwada, 2017). According to an official staff at Kathmandu Valley Development Authority (KVDA), the word 'smart' has become a prime agenda after the leaders have used it to get vote in the election campaign 2017. KVDA is the main government body that has been working to give a reality for the ground of smart city. The Government of Nepal has proposed to build 13 smart cities in Nepal. Among the 13 smart cities, 4 cities are located within the Kathmandu Valley. The KVDA has selected three companies for the study of the smart cities in selected areas. The companies are yet to submit the Detailed Project Reports (DPR).

With the base of these existing technological infrastructures the New Town Project Coordination Office has set directive for 'smart cities' in Nepal. The directive includes - pillars, components and targets. The 125 measurements indicators are grouped into 30 components and further the components are incorporated into 4 pillars (NTPCO, 2019). The four pillars for Smart Cities in Nepal are: (1) Smart People, (2) Smart Governance, (3) Smart Infrastructure and (4) Smart Economy.

The four proposed places of the smart cities fall under three districts of Kathmandu Valley - Kathmandu, Bhaktapur and Lalitpur. The biggest smart city will flourish in the areas of 6613.589 hectare (130,000 ropanis) in the North - East of Kathmandu Valley from Nagarkot of Bhaktapur, Talkot road, Jorpati, Mulpani cricket ground in Shankhu, Bhaktapur Purano Bato, Nepal Army Training Academy to Araniko Highway.

The other cities will cover 508.73 hectare (10,000 ropanis) each. The second city will be in the south of Araniko Highway and Balkot area in the east of the Kathmandu Valley. The third has been planned in the south of the Kathmandu Valley that covers Ranikot, Bhaisepati, Khokana, Bungmati and Chhimti and the fourth in the northern side of the Kathmandu Valley that flourishes from Samakhusi, Tokha, Balaju, Kavresthali and Greenland Chowk.

The Government of Nepal has asked DPR from consultant companies and four companies have been selected as per the report from KVDA. The Finland-based consultant firm, Helen and Co has been provided for the preparation of DPR of the biggest smart city with a total cost of Rs. 120 million (Himalayan News Service, 2018). Similarly, the DPR study of the aforementioned second and third projects have been provided to ERMC Nepal for Rs. 20 million each. The fourth smart city has been handed over to Fulbright Consultancy Company for 20 million.

Survey of Lalitpur Metropolitan City (LMC)

The study considered four broad areas stated in the 'Smart Cities' directive developed by NTPCO in February 2019 - e-Government Services, ICT Infrastructures and Public Information, e-Banking and Security, and Innovations and Business Promotions Services. The measurement of the progress of each area has been done with the help of indicators stated in the Smart Cities directive, NTPCO (2019). Each of the following indicators has been surveyed in percentage under four groups (0 to 30, 31 to 60, 61 to 90 and 91 to 100). In the Policy document (NTPCO, 2019), the minimum target of the infrastructure development are different, however most of them are in the ranges of 31% to 60% and 61% to 90%. Therefore, on the same basis, the data presentation has been made by dividing the ranges of percentages.

As per the directives, the areas and measurement indicators are shown in Table 1.

1. E-Government

As per the measurement indicators shown in the Table 1, the survey has been done in LMC about the availability of e-government services. The Fig. 1 shows the result of the survey.

Table 1: The areas and measurement indicators

Components	Indicators
E- Governance	e-literacy: knowledge of ICT Devices
	Municipal e-services
	Population accessing e- municipal services
	online grievance redressal system
	ICT Based Land Information System
	Micro Data centre with City
	Cloud Services Access
	Government Integrated Data Centre
	Use of e-Procurement System
	Grievances addressed
	Online tax filing services
	Access to real time traffic information to citizens
	Digital Signage

Table 1: The areas and measurement indicators

Components	Indicators
ICT Infrastructure and Public Information	Smart Pole (with solar panel)
	Availability of open data (Budget information, Citizen charters, directive, policies, development reports etc.)
	ICT Based Urban Map and addressing system
	Digital Information Boards at Public spaces, main commercial area and streets nodes
	Early Warning System
	Access to telecommunication
	Population using internet facilities
	Public Internet Access Point (Kiosk)
	Public Wi-Fi Hotspot
E- Banking & Security	Number of CCTV Surveillance
	Population with card technology (ATM/Credit/Debit) etc.
	Access to formal credit (Green enterprise and others)
	Digital payments (e-sewa etc.)
Innovations and Business Promotion	E-registration for innovative business registration
	Innovative Business Initiatives/Registrations
	Online Services/ Home delivery
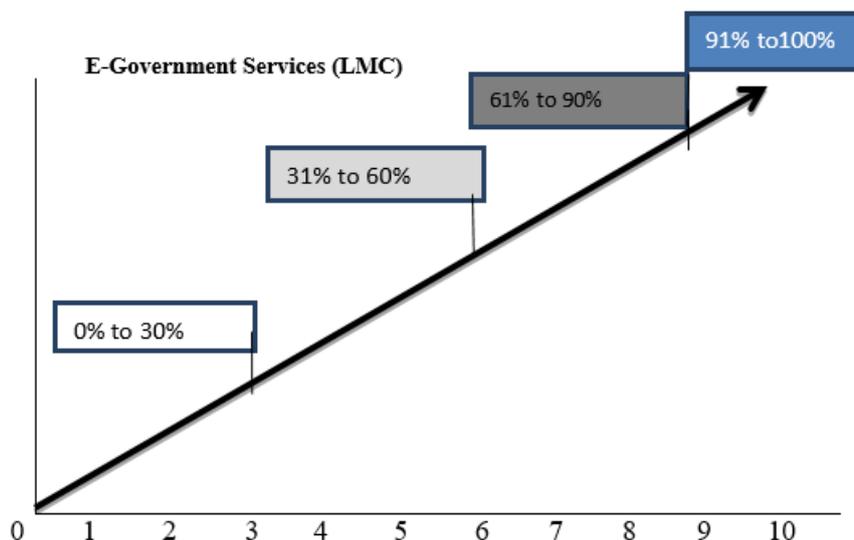
Fig. 1: e-Government Services (LMC)

| Index	Measurement Indicators
0% to 30%	• ICT Based Land Information System • Micro Datacentre with City • Population accessing e- municipal services • Cloud Services Access
31% to 60%	• Municipal e-services • Online tax filing services and warning to defaulters
61% to 90%	• e-literacy: knowledge of ICT Devices • online grievance redressing system • Government Integrated Data Centre • Grievances addressed
91% to 100%	• Use of e-Procurement System

Service access is in 0 to 30% progress. As like this, two services that municipal has been providing - e-municipal services and online tax filing and defaulters warning systems are in 31 to 60% progress category. The survey found five services above average in the Lalitpur Municipality in the range of above 60%. The services like e-literacy, online grievance addressing and redressing system, and Government Integrated Data centre in the range of 61 to 90%. Finally, the e-procurement system has been ranged from 91% to 100%.

2. ICT Infrastructure and Public Information

The illustration shown in Fig. 2 presents data of ICT Infrastructure and availability of public information with the ranges of measurement indicators. It shows that 7 indicators fall under the categories of 0% to 30% ranges progression. The availability of Smart Poles (Solar panel and other things in poles) is the only one category of indicators that fall in 31% to 60% range. Similarly, availability of open data and population using internet under the range of this municipality categorized in 61% to 90%. Under the Open Data category, it is defined as the availability of usable information for general people like Policy, Development Reports, Budget information and other in public domain like websites. With respect to ICT Infrastructure and Public Information category, one indicator was found in better position that is access to telecommunication. The access to telecommunication has been categorized in 91% to 100%.
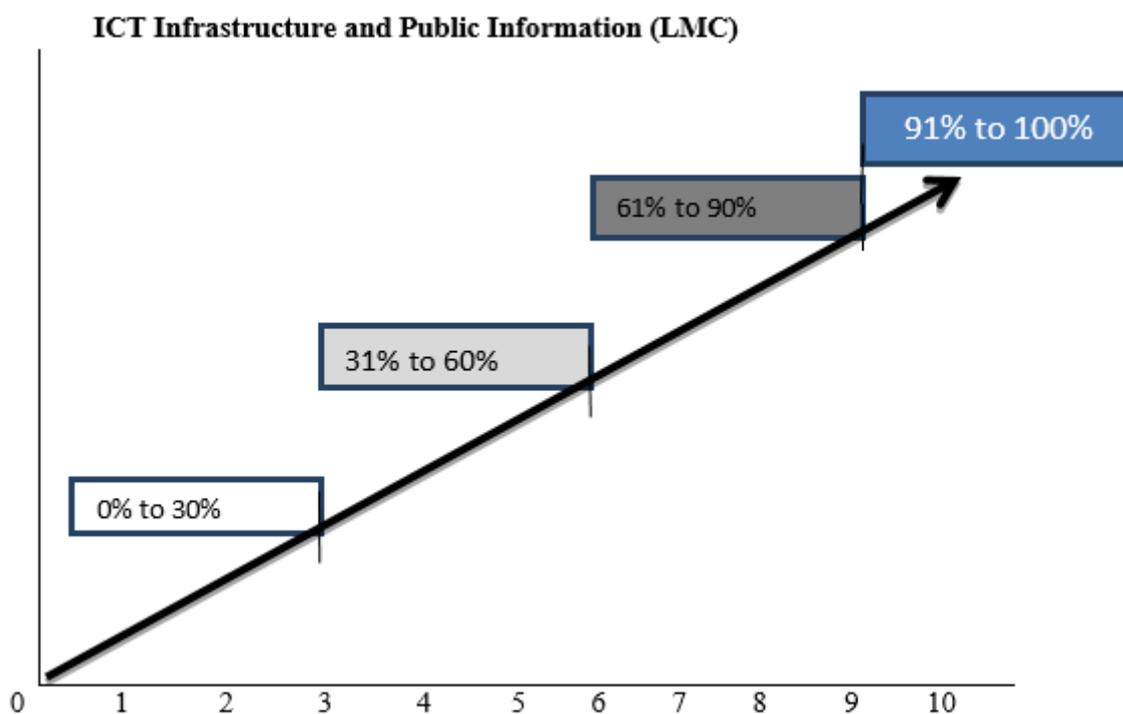
Fig. 2: ICT Infrastructure & Public Information (LMC)

Index	Measurement Indicators
0% to 30%	1. Access to real time traffic information to citizens 2. Digital Signature 3. ICT Based Urban Map and addressing system 4. Digital Information Boards at Public spaces, main commercial area and streets nodes 5. Early Warning System 6. Public Internet Access Point (Kiosk) 7. Public WiFi Hotspot
31% to 60%	• Smart Poles (with solar panel)
61% to 90%	• Availability of open data (Budget info, Development Reports, Policies, Directives and other) • Population using internet facilities
91% to 100%	• Access to telecommunication

3. E-banking and Security

With respect to e-banking & security, the data shows average performance. It is found that CCTV has been connected in most of the locations but yet 100% has not been achieved. Four measurement indicators have been surveyed in 'e-banking and security'. The Fig. 3 shows the survey result.

According to info-graphic illustration shown in Fig. 3, 'e-banking and security' issues under the four measurement indicators as shown in index. Three indicators population using cards (ATM, Debit and Credit) and access to credit card for enterprises, and digital payments facilities are ranged under 31% to 60%. The better result was seen with

respect to installation of CCTV for surveillance. The CCTV surveillance is found in 61% to 100% ranges. Other categories are found blank.

4. Innovations and Business Promotions

In the Innovations & Business Promotion category, it is found in the functioning, but in the initial stage. For the progress, it is necessary to take initiation from both the party - public and government.

The info-graphic shown in Fig. 4 illustrates progression in percentage about Innovation and Business Promotion in Lalitpur Metropolitan City. Three indicators were considered for the measurement. All the three indicators were found in 31% to 60% progress.
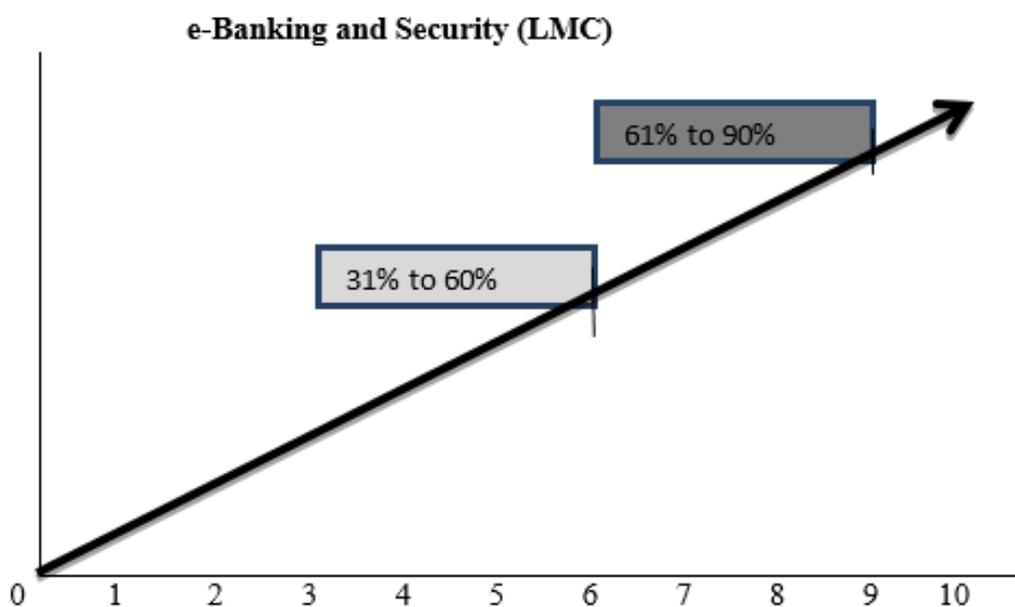

Fig. 3: e-Banking & Security (LMC)

| Index	Measurement Indicators
31% to 60%	1. Population with card technology (ATM/Credit/Debit) 2. Access to formal credit (Green enterprise and others) 3. Digital payments (e-sewa etc.)
61% to 90%	• Number of CCTV Surveillance

Innovations and Business Promotion (LMC)
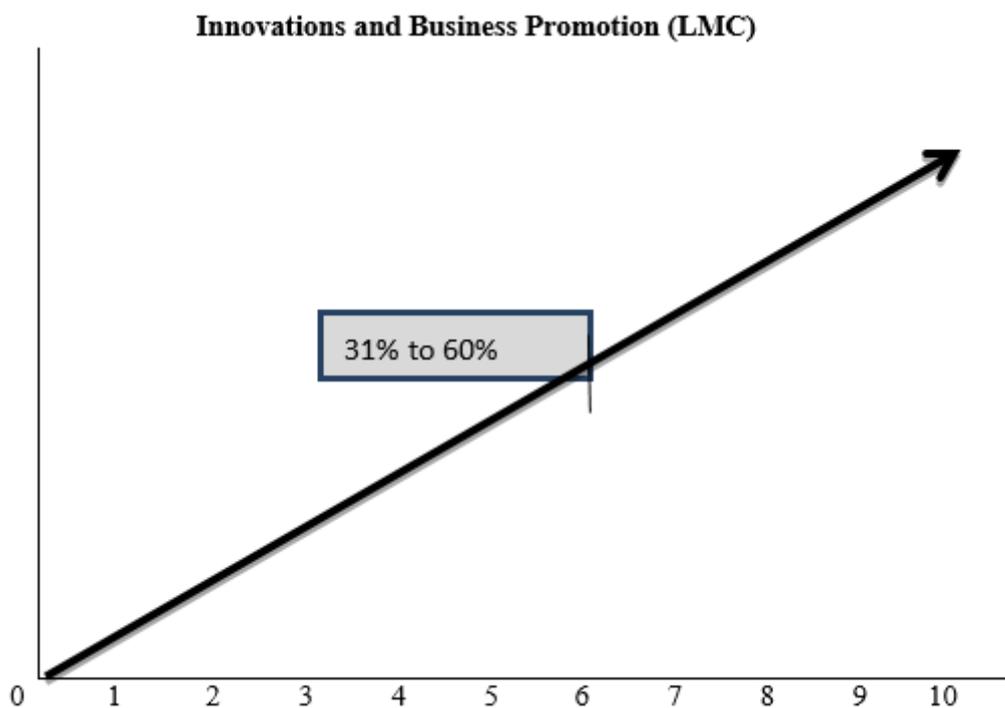
31% to 60%

Fig. 4: Innovations & Business Promotion (LMC)

Index	Measurement Indicators
31% to 60%	1. E-registration for innovative business registration 2. Innovative Business Initiatives/Registrations 3. Online Services/ Home delivery

Conclusions

It is appreciable that Government of Nepal has come up with directive of 'Smart Cities' in February 2019. The study showed that it needs to conduct rigorous studies in ground level to find the state of the existing infrastructures, only after that, it would be easier to determine and to intervene the locations with additional supports. There are 125 indicators to determine the functioning of the 'smart cities' in Nepal. Each of these indicators plays a vital role in strengthening the concept of the modern city. It is necessary to conduct studies in each Palikas of the country to find out the state of each indicators, only after that it would be easier to move ahead with policies and projects towards the dream of 'smart cities'.

Interactivity is one of the most important factors in Structuration Theory. According to Giddens agent interacts with structures continuously bring reformation and changes in the system as a whole. In general, it is found that internet connectivity is increasing in Nepal. Interactivity between technologies and people are increasing, the technologies are

bringing changes in system of interaction. Adaptive Structural Theory states about the adaptation behaviour of individuals and changes of the system due to their continuous interaction. It is found that the ICT Development Index (IDI) of Nepal is 140th position in 2017 (ITU, 2017). The Government of Nepal has vision to connect 90% of the population by 2020. The internet penetration has been increasing through different devices. Mobile penetration is increasing rapidly in Nepal and it is expected to cross China and India by 2025. According to the ICT Policy (2015), the Government of Nepal has vision to provided 80% of the services through internet. It still needs to work on this respect as well. All these findings are due to the welfare that technologies are providing to people.

The poorest result has been obtained from evaluation of community school's ICT infrastructure. Only 12% of the schools have ICT infrastructure. In comparison to all, e-banking is strengthening its services but it's not sufficient. With comparison to other Asian countries, e-banking status of Nepal is very poor. However, the study found that people taking services of mobile banking and internet banking are

increasing dramatically. With respect to websites, it is found that Nepal has 56,286 registered websites out of which about 40,000 are commercial websites. The Government of Nepal has developed websites of its entire departments. However, all of them are in primitive stage. They are not providing e-services. The e-services mechanism, information updates and even some of important links are not functioning well.

Preparing checklist and updating the physical infrastructure is one part, understanding the psycho-social area of the people in community is the major areas which can contribute the major pillar of the 'smart city' called 'smart people'. It is necessary to measure the level of the people with respect to digital knowledge and entrepreneurship skills, which needs a bottom up approach. Therefore, this study has pointed out the areas of future studies as well. It is recommended to conducted studies in future in each indicator to determine their state so that implementation of the policy and directive will be easier.

Finally, e-governance is connected with transparency and accountability. Therefore, all the systems of the Government should function with the help of technology. Every type of service delivery should be done through online mechanism. On this regards, it is necessary to conduct studies in other country on how they are providing services through online and by understanding their case, it would be easier to implement in our context as well. The Government should hire external experts and utilize the internal ICT experts to build up the mechanism of service delivery. If all these works will be done, 'smart cities' will have a robust foundation in Nepal.

Acknowledgement

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