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OPEN DATA FOR URBAN PLANNING IN NEPAL

Unveiling Perspectives from Planners and Allied Professionals in Kathmandu Valley

by

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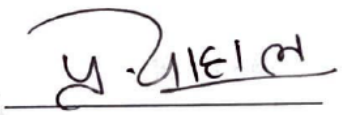

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Abstract

In the dynamic world of urban development, the effective utilization of data has become essential for urban planners everywhere. Given that most people on the planet now reside in urban locations it is imperative that services be provided to meet their demands. To achieve this, urban planners must embrace, adopt, and utilize data literacy. Open data provides several advantages for the economy, performance, and society as a whole. It is a form of (online) data that is freely available for reuse and redistribution. Nepal, an undeveloped nation, is at an important junction whereby the strategic use of open data offers the potential to significantly boost economic growth, improve indicators of performance, and advance overall well-being. Given this, an analysis of the state of open data utilization in urban planning in the Kathmandu Valley becomes relevant not only to the growth of the country but also presents a chance to leverage the transformational potential of open data in tackling developmental issues. Kathmandu Valley, being the hub of urban development in Nepal is a good place to review the state of use of open data in planning in Nepal. In order to understand the state of use of open data in planning cities in Kathmandu Valley and how the planning fraternity is using open data, a mix of qualitative and quantitative methods has been adopted on this research. Engagement of stakeholders through key informant interviews, expert consultations, online data/documents search, and planners' survey has been carried out in addition to review of relevant literatures. In Kathmandu Valley, an open data environment is still developing. Government websites mostly host data in non-interoperable PDF formats but encouraging efforts such as the NSO's interactive data portal and the post-earthquake data portal demonstrate progress. It is revealed that approximately half of sectoral data for development is openly available. Also, planners often do not share the data they produce. A cross-case study indicates that a city-level portal with regular updates and standardized datasets is required. Planners recognize the value of open data for effective planning, even though they may not be aware of it. Challenges of lack of a guiding open data policy, lack of coordination between stakeholders and government authorities are revealed. With the help of existing national efforts as well as international examples, an open data policy and city level open data portals could help develop and promote the open data ecosystem for urban planners in Nepal.

Keywords: *open data, data, open data portal, governance, transparency, urban planning, informed decision-making*

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Sincerely,

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Abbreviations

BCN	Barcelona City
CBS	Central Bureau of Statistics
DUDBC	Department of Urban Development and Building Construction
G8	Group of 8
GIS	Geographical Information System
ICT	Information and Communication Technology
IOE	Institute of Engineering
IT	Information Technology
IUDP	Integrated Urban Development Plan
KII	Key Informant Interview
KLL	Kathmandu Living Labs
KVDA	Kathmandu Valley Development Authority
LGOA	Local Government Operations Act
LISA	Local Government Institutional Capacity Self-Assessment
MoCIT	Ministry of Communications and Information Technology
MoFAGA	Ministry of Federal Affairs and General Administration
MoUD	Ministry of Urban Development
NDRRMA	National Disaster Risk Reduction and Management Authority
NSO	National Statistics Office
NUDS	National Urban Development Strategy
ODIN	Open Data Inventory
OECD	Organization for Economic Cooperation and Development
OGD	Open Government Data
OSM	Open Street Maps
PDF	Portable Document Format
PMC	Pune Metropolitan City
SDG	Sustainable Development Goals
UN	United Nations

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1. Introduction

1.1. Background

Globally, 55% percent of world population was residing in urban areas in 2018, according to the World Urbanization Prospects 2018 (United Nations, 2019). By the year 2050, it is expected that 68.4% world population will be living in urban areas (United Nations, 2019). The world has come a long way from the stone age to agrarian societies to a mix of urban and rural areas. There have been many developments in the ways of life of people. With a greater proportion of people living in urban areas, the demand for improved living standards and urban services has increased significantly. In order to properly understand the needs of increasing population and deliver services to cater their needs, traditional systems of data keeping, and analysis are becoming obsolete. In the wake of the digital revolution, the field of data has become far too important to leave only to data scientists. Urban Planners need to become aware of the data they use, their sources and how they are generated.

Humans have been keeping records since time immemorial. From cave paintings in Lascaux, France to Sumerian Tablets in ancient Mesopotamia (present day south Iraq); from the Egyptian hieroglyphs to stone inscriptions of the Lichchhavis in ancient Nepal, there is a well-documented history of recording, creating, and displaying data. The first industrial revolution, also known as the Mechanical Revolution, changed the economy, transportation, health and medicine, and gave rise to many inventions in the history of mankind (Landes, 1969, Lucas 2003 as cited in Groumpos, 2021). The Mechanical Revolution was followed by the Electrical and the Automated Revolution, which were followed by the fourth Industrial Revolution – the Digitized Revolution (Hobsbawm, 1990 as cited in Groumpos, 2021). In the digital revolution, the world population is affected by data – especially the urban population which has access to gadgets like smart phones and computers. Smart devices have become an inseparable part of urban life. In this context, it is imperative to understand how data is produced in an urban area, how it is used and what are the policy implications associated with data.

While there are various types of data available in the world, Open Data is an important type of data in the field of urban planning. Open Data or Open Government Data is information gathered, produced, or paid for by public agencies and made freely available for re-use for any purpose, and the terms of use is included in the license (European Commission, n.d.). The open-source, open-science, and movements for government transparency and accountability all served as the foundation for the open data movement (Badiee et al., 2021). The term "open

data" first appeared in On the Full and Open Exchange of Scientific Data in 1995, which advocated for making environmental data available to the public so that scientists may research the global environment that transcends borders (Badiee et al., 2021).

The advantages of open data are numerous, such as enhanced efficiency in public administration, economic growth in private-sector and societal welfare (European Commission, n.d.). Culture, Science, Finance, Statistics, Weather and Environment related open data have many potential uses and applications (Open Knowledge Foundation, n.d.-b). People in the digital age amply use open data in the form of google maps, open-source maps, national survey data, data from world bank, data from the UN, *etcetera*. In the field of urban planning, open data are used to make various kinds of analysis to aid planning in the form of maps, written documents, policy recommendations and so on.

Open data supports participatory and democratic planning processes. People get access to the data prepared using their tax money in a form that they could access, make sense of and/or analyze. Open data is crucial to developing smart and tech-friendly cities where the use of ICT is a must. Open data plays a fundamental role in driving innovation, fostering collaboration, and harnessing collective intelligence and creativity of the stakeholders to build a more sustainable, inclusive, and livable urban environments.

The meaning and scope of open data may vary in different countries and different sectors. In the context of urban planning in Nepal, open data is available and used in form of data from National Statistics Office (formerly CBS), Open-source mapping, pdfs of various reports in various government websites, freely available survey department data, etc. The use of google earth and google maps data has been instrumental in various urban planning projects in recent years. Though google provides data only in forms that cannot be easily manipulated on the google platform itself, planners use graphics derived from google maps and/or earth to create annotated graphics that are relevant to their projects.

There are high expectations for Nepal, which is currently decentralizing to a new federal system, to advance an open government agenda and create a culture of more accountability and transparency (Lokshin & Pande, 2018). The data in Nepal is mostly in first and second stages of open data journey. Anyone can look, search, store, change and share the data in open license data release in pdf, image or spreadsheet format in the one-star open data; while in two-star open data, data are released in machine readable structured formats that require proprietary software (Ontotext, 2012). The three-star open data is in a format like csv that does not require

proprietary software to analyze; the fourth and fifth stars are linked open data that can be used to discover more and more interlinked information while using the data (Ontotext, 2012). In Nepal, the publicly available government datasets are typically only shared as PDFs or printed booklets, and they are frequently restricted to aggregate findings. These datasets may be "public," but they are not "open," because software developers and other potential users are unable to use them in truly useful and innovative ways due to their technical restrictions (Lokshin & Pande, 2018). Despite being a melting pot of diversity of actors and actions, as well as being a center of power and infrastructural development, cities in Kathmandu Valley share data mostly in the first and second stages.

There is a famous sloka विद्याधनम् सर्व धनं प्रधानम् (Sanskrit) equivalent to Nepali saying ज्ञान जति बाड्यो त्यती बढ्छ *Jñāna jati baḍyō tyatī baḍhcha* which translates to “The more knowledge we share, the more it grows.”. This philosophy helps to validate the need and support for open data ecosystem in the Nepalese context.

In order to understand the use of open data in Nepal in the field of urban planning, cities in Kathmandu Valley can be good study areas. Kathmandu Valley is the most densely populated region in Nepal, with high concentration of population living in metropolitan cities, municipalities, and rural municipalities. Likewise, Kathmandu Valley is a rapidly urbanizing center of Nepal with various developmental challenges. At the same time, Kathmandu Valley has good availability of open data initiatives with higher concentrations of open data resources and initiatives. Kathmandu Valley, being a relatively urbanized and technically connected region, the context to study adoption, challenges, and benefits of open data in planning is relevant. Importantly, studying the use of open data in Kathmandu Valley can provide insights and recommendations to policymakers and urban planners, mostly concentrated in the valley, for informed decision making and improving urban planning practices. Because of its high population density, urban development issues, availability of open data projects, technological improvements, and policy importance, Kathmandu Valley is an appropriate research location for evaluating the use of open data in Nepal.

Kathmandu Valley has historically been the region of administrative power- being home to various government agencies. Likewise, it holds offices of research institutions and organizations that generate and collect data, including data related to urban planning. Kathmandu Valley, being political and administrative center, often plays a focal role in any

innovative initiatives like open data. The presence of several academic institutions, and tech startups in the valley has positively impacted research and innovation ecosystems. These entities have been leveraging the use of open data for various urban planning related projects and examples of best practices in Nepal may be derived from study in Kathmandu Valley.

Figure 1-1 Location of Kathmandu Valley in Nepal

The state of use of Open Data in Planning of cities in Kathmandu Valley has been generalized with the help of engagement of stakeholders of IT section of Budhanilkantha Municipality and Changunarayan Municipality, thorough examination of availability of Open Data for preparing an Integrated Urban Development Plan for Madhyapur Thimi Municipality, expert consultation as well as Key Informant Interviews of planning professionals positioned in Kathmandu Valley, and conducting a survey of urban planners primarily situated and practicing in/from/at Kathmandu Valley.

This research on the use of open data in urban planning in Kathmandu Valley addresses a significant need in the research area for evidence-based decision making and attainment of sustainable development goals. Rapid urbanization, population growth, and a wide range of socioeconomic difficulties demand effective and knowledgeable urban planning techniques. This research intends to examine how open data is used and accessed. This might help to create more inclusive and efficient urban planning processes by analyzing the function of open data

in this context. This study aims to provide significant insights and recommendations to policymakers, urban planners, and other stakeholders involved in determining the future of Kathmandu Valley's cities by studying the possible benefits and problems related with open data implementation.

1.2. Problem Statement

Open data and digital literacy are two main parts of the digital revolution. These are interrelated with one another and the awareness of one lead to the other. Around 73% of the Nepalese households have smart phones and almost 38% have access to the internet (National Statistics Office, 2021). Despite the large reach of smart phones in Nepalese households, digital literacy is generally quite poor. Research shows that the digital literacy rate is 31 percent in Nepal (Puckett, 2021). This is reflected in the current state of open data in Nepal.

There are limitations in the field of open data in Nepal, including a lack of empirical research and systematic analysis that specifically focuses on the use of open data in urban planning. There is limited technical infrastructure, data quality issues, limited awareness and capacity among stakeholders, and unclear legal and policy frameworks. There is also a system of getting data easily through a network of people who know each other rather than making data open to the public. These challenges hinder the successful integration of open data into effective urban planning practices in Nepalese cities. Despite global momentum in open data initiatives, there is lack of comprehensive knowledge and analysis regarding the use of open data in urban planning of Nepal, preventing effective adoption and implementation of open data practices in urban planning processes. Limited research on setting up infrastructure for open data and caution against misuse of open data makes discussion on open data difficult in the Nepalese context. While various smart cities initiatives have been discussed and many smart city plans have been made, there is hardly any discourse and/or discussion on open data ecosystem of Nepal for urban planning.

1.3. Rationale of Research

The constitution of Nepal (Nepal Law Commission, 2015), under article 27, provides right to information. It mentions that every citizen has the right to ask for and acquire information on any topic of personal or public interest. Provided, however, that no one shall be compelled to divulge information on any topic where secrecy is required by law. With over 66% population living in urban municipalities (National Statistics Office, 2021), the demand and need for data

and information has increased dramatically in the recent years. This study aims to provide light on the importance of open data in enhancing the effectiveness, transparency, and inclusivity of urban planning practices by looking at the current state of open data initiatives in Nepal and evaluating their integration into urban planning processes.

Open data usage in urban planning can result in better decision-making. Open data promotes collaborative approaches to city planning by making data available and transparent to a variety of stakeholders, including government organizations, urban planners, researchers, and the public. In the context of Nepalese cities, especially cities of Kathmandu Valley- where good planning is essential for tackling rising urbanization and the associated issues, this thesis seeks to investigate how open data might contribute to better informed and inclusive urban planning.

Though open data projects have gained popularity worldwide, their use and effects in underdeveloped nations like Nepal are still in their infancy. Planners in Nepal are found to be using open data from the National Statistical Office (formerly known as Central Bureau of Statistics), Open-Source Mapping, Google Maps, Survey Department and some other government and private institutions. The goal of this study is to examine the challenges and constraints that urban planning procedures in Kathmandu Valley confront in integrating open data, including issues with technical infrastructure, data quality, legal and policy frameworks, and capacity building. Understanding these difficulties enables the study to offer suggestions and insights for removing these obstacles and fostering the successful use of open data in Kathmandu, thereby assisting in the sustainable urban development- aiding the achievement of sustainable development goals. Investments in open data-based techniques, along with the use of geospatial data and geographic information systems (GIS), can yield significant resilience dividends for cities (UNISDR, 2018).

To tackle the problems created by the Covid-19 pandemic in health, social and educational sectors, the importance of resilient governance and strong digital and statistical infrastructure was felt by the entire world, and the need for timely, relevant and accessible government data has been made clear (Chaudhari, 2023).

The Open Data Charter (2015) highlights six key principles of open data which includes making data open by default, making data timely and comprehensible, accessible and usable, comparable and interoperable, using data for improved governance and citizen engagement, and for inclusive development and innovation. These principles are very much in line with the expected outcomes of any urban planning projects in Nepal. This study is therefore relevant

and useful to gain insight into the situation and use of open data in urban planning in the context of Kathmandu Valley.

With the help of improved open data ecosystem in Kathmandu Valley, there will be enhanced data quality and governance, building of capacity of the cities in valley to withstand various shocks and stresses, building of awareness in open data use and importance, and fostering of collaboration among the stakeholders associated with urban planning. With the help of open data, cities in Kathmandu Valley can support evidence-based urban planning and sustainable development.

1.4. Research Purpose

1.4.1. Research Questions

The main research question of this research is:

What is the state of use of open data in the planning of cities in Kathmandu Valley and how is the planning fraternity using open data?

The sub-questions are:

i. What is the definition of open data and what is the state of availability of open data in the context of city planning in Kathmandu Valley?
ii. What are the uses, benefits, and challenges of using open data in urban planning of cities in Kathmandu Valley?
iii. What are the gaps in policies related to open data in planning and what could be the recommendations for the effective implementation of open data practices in planning of cities in Kathmandu Valley?

1.4.2. Scope and Limitations

This research involves an in-depth examination of literature, academic papers, relevant case studies, and about open data and urban planning. Key stakeholders such as urban planners, government officials, researchers, and representatives from civil society organizations have been the focus of the primary data collecting techniques, which has included qualitative and quantitative research techniques including interviews, questionnaires, and survey. To evaluate the current state of open data in Kathmandu Valley, the research has also analyzed existing datasets, open data platforms, and urban planning documents.

The research has been carried out in the context of Kathmandu Valley- meaning the key stakeholders that are interviewed and/or surveyed are linked to planning of Kathmandu Valley in one way or the other. It is expected that the learnings and recommendations from this research can be used for cases of use of Open Data in Planning of cities outside of Kathmandu Valley as well. The research is expected to encourage more research and discussion about open data in urban planning.

The research largely focuses on finding and analyzing the advantages and challenges related to using open data in the urban planning processes in Kathmandu Valley. It explores how open data can promote better decision-making, encourage transparency and citizen participation, and support sustainable urban development. Along with addressing these issues, the research also discusses technical infrastructure, data quality, legal and legislative frameworks, and capacity building as barriers and constraints to integrating open data. Although the research offers recommendations for the effective implementation of open data policies, the focus of the study does not extend to how these recommendations should be put into practice.

1.5. Expected Outputs

The expected outputs of this study are:

- ✓ Enhanced understating about open data and its benefits in urban planning in the context of Nepal by using Kathmandu Valley as a case area.
- ✓ Recommendations for effective integration of open data into urban planning process by identifying areas of improvements for infrastructure and policies to effectively promote and produce open data in Kathmandu Valley.

2. Conceptual Framework and Methodology

2.1. Conceptual Framework

Research can be described as an activity that entails discovering new things in a more or less organized manner (Walliman & Walliman, 2011). Methodology is the philosophical framework within which research is carried out or the basis upon which research is built (Brown, 2006). O'Leary (2004, p.85) defines methodology as a framework accompanied by a certain set of paradigmatic assumptions that will be used to perform the investigation. When conducting any research methodology, following two criteria should be met (Joyner et al., 2005): Firstly, the approach should be the most suited for achieving the research objectives. Second, it should be possible to replicate the methodology employed in other similar studies. The examination of the use of open data in planning of cities in Kathmandu Valley is carried out with the help of various methods supported by literature, case study, interviews, survey, and comparative matrix. The conceptual framework of the study incorporates gathering knowledge about open data, use of open data in urban planning and benefits of use of open data in the realm of urban planning. While examining these, the right to information and privacy of the citizens are also to be considered.

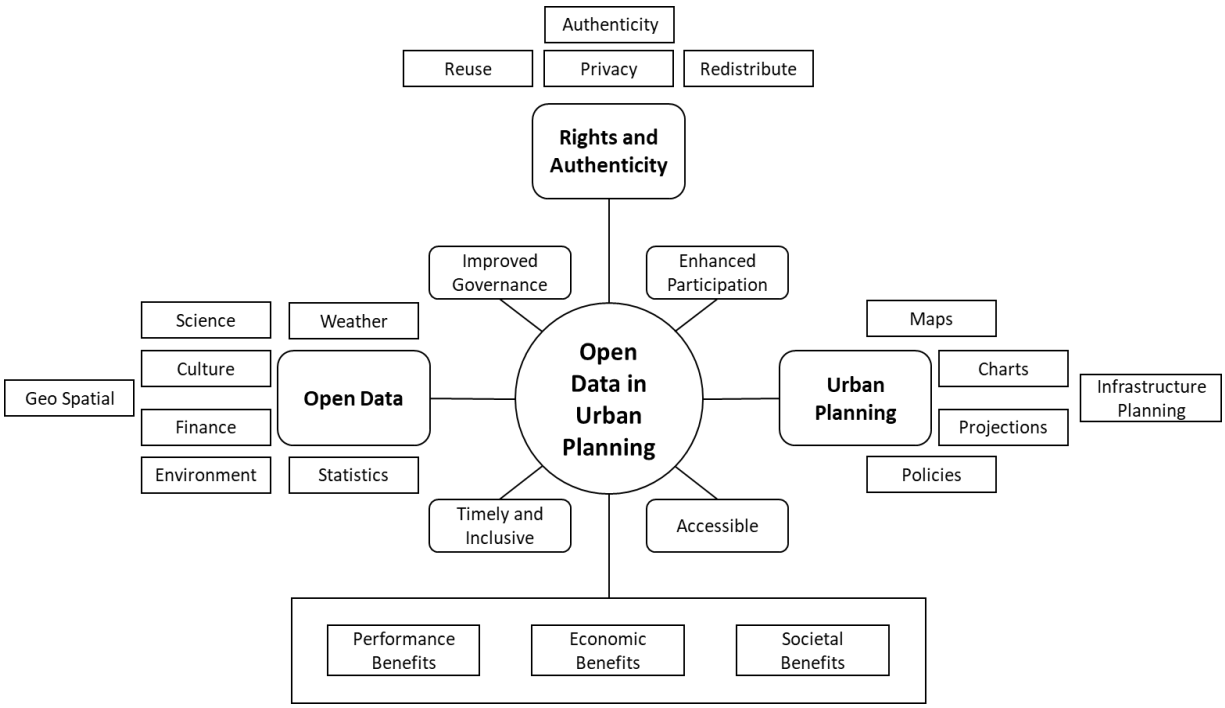


Figure 2-1 Conceptual Framework for the Study

2.2. Research Paradigm

According to Kuhn (1963), research paradigm is a collection of accepted ideas and viewpoints among scientists regarding the proper understanding and resolution of issues. This research belongs to the pragmatist's paradigm which Uprety (2022) describes as being a paradigm where the researchers believe that the reality needs to be constantly negotiated, debated, and interpreted. Pragmatic paradigm has the freedom to use mix of methods by understanding their limitations and complementary nature. Mix methods use quantitative and qualitative data to better understand reality.

Pragmatism involves our interaction with reality rather than representing or conceptualizing it. This research on examination of the use of open data in urban planning of cities of Kathmandu Valley is mostly qualitative in nature involving study of literature and analyzing practices of open data in planning in the world, and interviews with key informants and experts. The research seeks to explore, describe, and explain the social reality of urban planners with respect to use of open data.

The ontological claim and epistemological position of this research is discussed in the following paragraphs:

Ontology

The ontological claim of this study is Open data integration in urban planning of cities in Kathmandu Valley encompasses a variety of sources, stakeholders, and challenges, with potential benefits for informed, participative, and geospatially informed urban development.

In pragmatism, value is placed on action (Paul, 2005 as cited in Quest Philosophy, 2021). Open data can be used in urban planning in various ways. There are various kinds of open data that are used in urban planning for a variety of reasons. To examine how open data has been used so far in urban planning of cities in Kathmandu valley, meaning and situation of open data in Kathmandu valley needs to be explored, practicing planners need to be interviewed and active discussion with the experts needs to be carried out. The reality about the use of open data in planning can vary based on various known and unknown factors, and therefore, the reality of the situation needs to be examined using the best available tools. There is not one single truth associated with the use of open data in urban planning.

Epistemology

Epistemologically, the valid source of knowledge for this study is the study of social process and direct interaction with the experts which requires adoption of various methods and strategies for the generation of the knowledge out of the literature study, interviews, case study, and cross case analysis.

In pragmatism, knowledge is understood to be built and modified through actions and interactions with people (Paul, 2005 as cited in Quest Philosophy, 2021). Active methods of inquiry are necessary because methods and knowledge impact one another and create one another in pragmatism (Paul, 2005 as cited in Quest Philosophy, 2021). In pragmatism, the impact of knowledge is as important as the accuracy of the knowledge. In this research, examining the use of open data in urban planning has impact on the future research as well as on policy makers to help make amends to old policies or frame new policies related to open data in urban planning. Importantly, the research seeks to prevent any wrong practice in open data for urban planning. This research helps to create new knowledge about the use of open data in urban planning of Nepal and how planners perceive it by having an active discussion with the experts and practitioners. This new knowledge is useful for future practical works or deriving and/or validating new knowledge about use of open data in urban planning.

Basis for Pragmatic Paradigm

In this research, the use of open data in urban planning of cities in Kathmandu Valley is assessed along with finding gaps in policies related to the use of Open Data in urban planning. The use of open data is not a naturally occurring phenomenon. It is socially constructed. The results obtained via this research are not universal, nomothetical or related to natural science- but are qualitative which may be substantiated by few quantitative data. Likewise, the research is not carried out in a controlled environment but in an urban planning social environment with various actors of urban planning. This research, therefore, cannot be carried out under the positivist paradigm.

The use of open data in urban planning is not something that can be measured or quantified perfectly but we can do so imperfectly. Descriptive research within the post positivist paradigm is an approach that can be used in this case. In descriptive research, the researcher believes that there is no absolute truth and there is subjectivity (Uprety, 2022). In this research, the use of open data in urban planning may represent different types of findings if the research area and

research subject is altered. This is typical of post positivist research where the idea of truth or reality cannot be universal. The research also intends to make recommendations for enhanced open data ecosystem for urban planning, for which the interpretation of the policies and practices is required. This is done under the interpretivist paradigm which suggests that the reality is socially constructed. Interpretivism also substantiates the results for the examination of use of open data in planning.

Because the research is not carried out in a controlled environment where variables are controlled and manipulated, it is not experimental research under positivist paradigm. Likewise post positivist emphasis of empirical observation and systematic and rigorous research method to uncover objective truth is not fully applicable in the research, for the research requires multiple perspectives and acknowledges role of context and values in sharing the research outcomes. Therefore, this research is done under pragmatic paradigm. This research will produce knowledge that can be applied to real-world problems – generating actionable insights and solutions that are relevant to the needs of stakeholders.

2.3. Research Strategy - Mixed Methodology

This research utilizes mixed methodology as a research strategy. It can be understood, from the aforementioned points, that this research falls under pragmatic paradigm. Descriptive strategy within the post positivist paradigm, inductive logic system within the interpretivist paradigm, as well as abductive logic within the interpretivist and pragmatic paradigm is utilized to address the objectives of the research. It is important to note that this is not an intermix of paradigm but use of two different paradigms for different objectives. A single methodology out of single paradigm cannot solve the research problem, hence pragmatism is adopted for use of mix of various methodologies.

Pragmatism accepts a flexible approach for developing solutions. There is no one technique to solve a problem, according to pragmatism, but a mix of methods can help solve a problem and expose the truth. Pragmatists believe that there is no single reality, but rather multiple realities. The pragmatic paradigm employs both post-positivism and interpretivism to address problems. As a result, this research paradigm suggests carrying out research using a mixed-methods strategy. A mixed-method approach suggests that the study will use both qualitative and quantitative methods.

Mixed methodology enables gathering a broader range of information, capturing diverse perspectives, and gaining comprehensive understanding of the research topic. The overview of the research strategy for the research can be summarized with the help of following diagram:

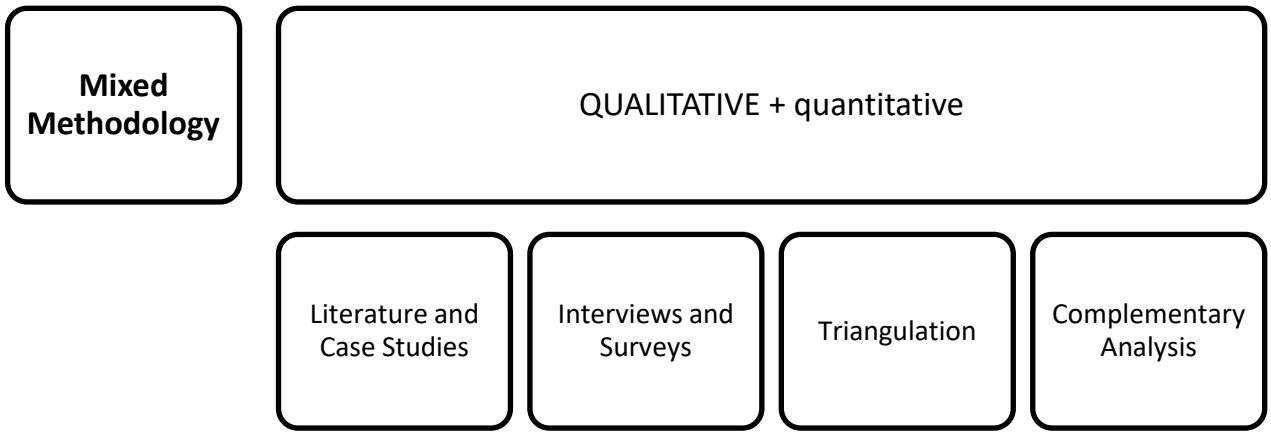


Figure 2-2 Overview of Research Strategy

Case Studies

Case Studies are utilized in research to exhibit real-world instances, investigate the implementation and influence of open data in urban planning processes, and draw conclusions or offer recommendations based on the findings. Case Study strategy involves gathering qualitative data through document analysis to identify patterns, challenges, and success factors in the use of open data for urban planning.

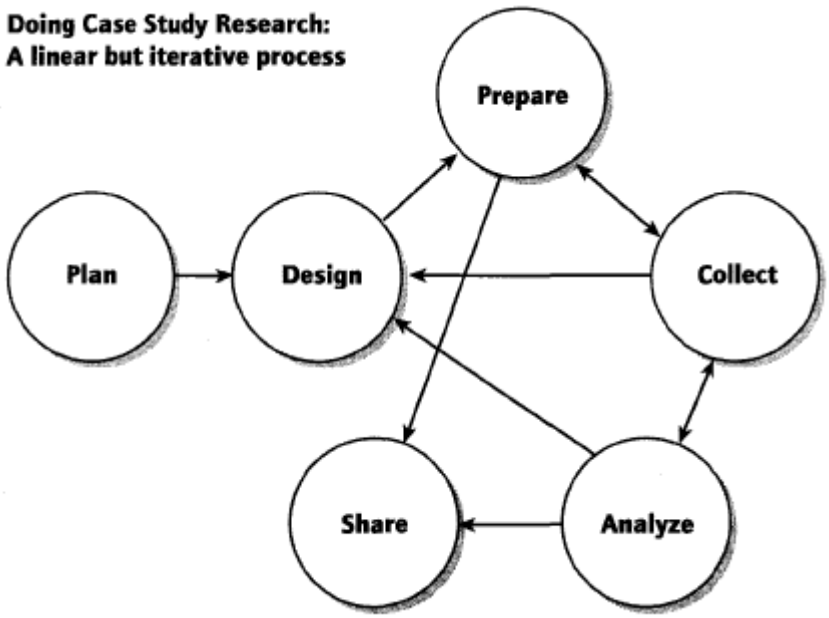


Figure 2-3 Process of Case Study Research (Yin, 2009)

Interviews and Surveys

Interviewing and surveying urban planners, government officials, and stakeholders participating in urban planning processes can provide significant insights into the benefits, problems, and potential implications of using open data in urban planning in the Kathmandu Valley setting.

Triangulation

In this research, there is need to cross-validate and compare findings by using several data sources, such as interviews, document analysis, and observations, to confirm the reliability and validity of the results, to increase the comprehensiveness and credibility of the study.

2.4. Research Design

2.4.1. Methods

Mixed methodology utilizes various mix of methods. Mixed-methodology research uses both quantitative and qualitative methods. A mixed methods research design involves the collection, assessment, and "mixing" of both qualitative and quantitative methods in a single study to better understand a research problem. The main methods used in this research along with their use are highlighted in the table below:

Table 2-1 Research Methods

Research Method	Primary or Secondary	Qualitative or Quantitative	Use
Literature Review	Secondary	Either	To situate research in an existing body of work or to evaluate trends within a research topic
Key Informant Interview	Primary	Qualitative	To gain more in depth understanding of topic and get information about the use of open data
Survey	Primary	Both	To understand the use, and challenges of using open data in planning
National Case Study	Primary + Secondary	Either	To examine the use and trend in use of open data in the case area
International Case Study	Secondary	Either	To evaluate trends in the world scenario

Literature Review

A literature review is a critical examination of existing academic sources that offers an overview of current knowledge and research on a particular issue. It is used in a thesis to lay the groundwork for current information, identify research gaps, and guide the study's direction.

Case Study

A case study is a qualitative research approach aimed at comprehending the intricacies, dynamism, and contextual aspects associated with the use of open data in urban planning in Kathmandu Valley. Interviews, document analysis, and observations is used to detailly examine the unique characteristics and experience of using open data in urban planning.

Key Informant Interview

A key informant interview engages with experts who have expertise and insights on "open data in urban planning of cities in Kathmandu Valley," with the goal of gathering firsthand data as well as perspectives. In this thesis, it is used to collect qualitative data, develop a thorough grasp of specific aspects, and incorporate stakeholders' perspectives into the study analysis.

2.4.2. Data Sources and Data Collection

The source of raw bills and information obtained for the study purpose, to obtain the right findings/results based on proper data and facts, is defined as a data source. A variety of qualitative and quantitative data sources can be formally classified as primary or secondary based on the type and quality of data they provide.

The data sources for this research are broadly primary and secondary in nature. The various sources of primary and secondary data along with data collection plan used for the research has been tabulated as follows:

Table 2-2 Data Sources and Collection Plan

Data on…	Sources	Data Type	Collection Plan	Identified Data Sources
Definition and decoding Open Data	Literature Review	Secondary	Explore and decode the meaning, importance, and use of Open Data in planning. Literature Review also provides basis for questions to be asked and analysis to be made on the qualitative and	*Convenience Sampling :* Based on availability, accessibility.

			quantitative data obtained from other sources.	
Open Data Availability	Government Data and Repositories	Secondary	Accessing and analyzing open data sources provided by government agencies (National Statistics Office, Survey Department, DRR portal)	Government Agency Websites
	Open Data Initiatives	Secondary	Explore existing open data initiatives and platforms (OpenNepal, opendatanepal, datainnepal, nepalindata)	Open Data Portals – Government, Private (review licensing) Data Format/Type (open data stage) – 1* , 2*, 3*, 4*, 5* (whichever available)
	Published reports and studies	Secondary	Review of relevant reports and studies related to open data	National context – World Bank study in 2020
	Interview and Survey	Primary	Gather insights on availability of open data for planning from relevant stakeholders.	*Expert Sampling*
Use, Benefits, and Challenges	Interview and Survey	Primary	Gather insights on use, perceived benefits, and encountered challenges from urban planners, government officials and relevant stakeholders.	*Expert Sampling :* Local Government (Municipality) ; Federal Government(DUDBC /MoUD/MoCIT, Survey Department) ; Private Consultants ; Academia
	International Case Study	Secondary	Perform case study of a specific projects (eg: Plan of some city in Europe) where open data has been used	City of Barcelona (Spain), City of Pune (India)
	National Case Study	Primary and Secondary	Perform case study of a specific projects (eg: IUDP or profile of cities in Kathmandu Valley) where open data has been used, Engage with relevant stakeholders	*Convenience Sampling :* Kathmandu Valley : Profile of Budhanilkantha Municipality, IDUP of Madhyapur Thimi Municipality
Gaps in Policies	Policy Analysis	Secondary	Review of existing policies, regulations, and guidelines related	*Purposeful Sampling :* NUDS 2017, Smart Cities in Nepal –

			to open data in national and international context (National : NUDS, Statistics Strategy International : Pune, Open Data Charter)	Concepts and Indicators 2015, Data Privacy Act of Nepal, MoCIT Acts/Policies, Constitution and LGOA, Right to Information Act 2007
	Expert Consultation	Primary	Engage with experts in urban planning as well as open data field to gain insights and recommendations.	*Expert Sampling :* Kathmandu Living Labs, Open Knowledge Nepal, Survey Department, Former IT Officer of Changunarayan Municipality

The main methods employed for primary data collection were Key Informant Interviews, Expert Consultations, and Survey of Planners.

For Key Informant Interviews (KII) of planners, senior urban planners in Kathmandu Valley were chosen based on convenience- on their availability and snowballing. A total of 8 senior planners were consulted. Semi-Structured Interviews were carried out to get answers for the research questions. In order to carry out Expert Consultations and Key Informant Interviews other than planners, again, convenience and snowballing was employed. A total of 13 interviews were conducted. A complete list of KII and Survey participants has been included in the annex.

For the survey of planners, an online survey form was generated in google docs. Some of the practicing planners in Kathmandu Valley were identified by consultations with the supervisor, snowballing, and internet (google) search. These planners were either called, texted, or emailed to request participation in the survey. Likewise, some survey forms were filled in by students of urban planning from the Institute of Engineering who have worked either as architects or engineers but have experience with open data in planning. Conveniently, some of the survey participants forwarded the form to their colleagues as well. A total of 25 entries were received. The entries have been received from a wide range of urban planning practitioners of both sexes and different levels/years of experiences in planning emerging from governmental, non-governmental, academic, and development backgrounds. Full summary of the survey is available in the Annex.

Another important exercise undertaken during this study was making a list of data required to prepare an IUDP. This was done with the help of IUDP guideline prepared by MoUD with the technical assistance of ADB. A total of 114 data under six different sectors were identified. Assessment about their availability online was done for Madhyapur Thimi Municipality.

This municipality was chosen because a recent batch of students at IOE Pulchowk Campus had prepared an IUDP for Madhyapur Thimi for their planning studio. A set of group leaders of various sectors in preparing this project were consulted to assess the availability of open data for preparing IUDP of Madhyapur Thimi. Details of the datasets searched and assessed are present in the Annex.

2.5. Research Process

Firstly, the research topic was identified and proposed. This was followed by preliminary literature review to refine research objectives. Next, the research design was carried out with the help of pragmatic paradigm. The next steps included preparation of questionnaires, secondary studies, and collection data from primary sources (interview and surveys). These were followed by analysis of the collected data and interpretation of the findings.

Desk review was a continuous process during this research. Evaluation of the process and data was carried out throughout the study period by the researcher, research supervisor as well as the jury of research.

The process adopted for the research is as follows:

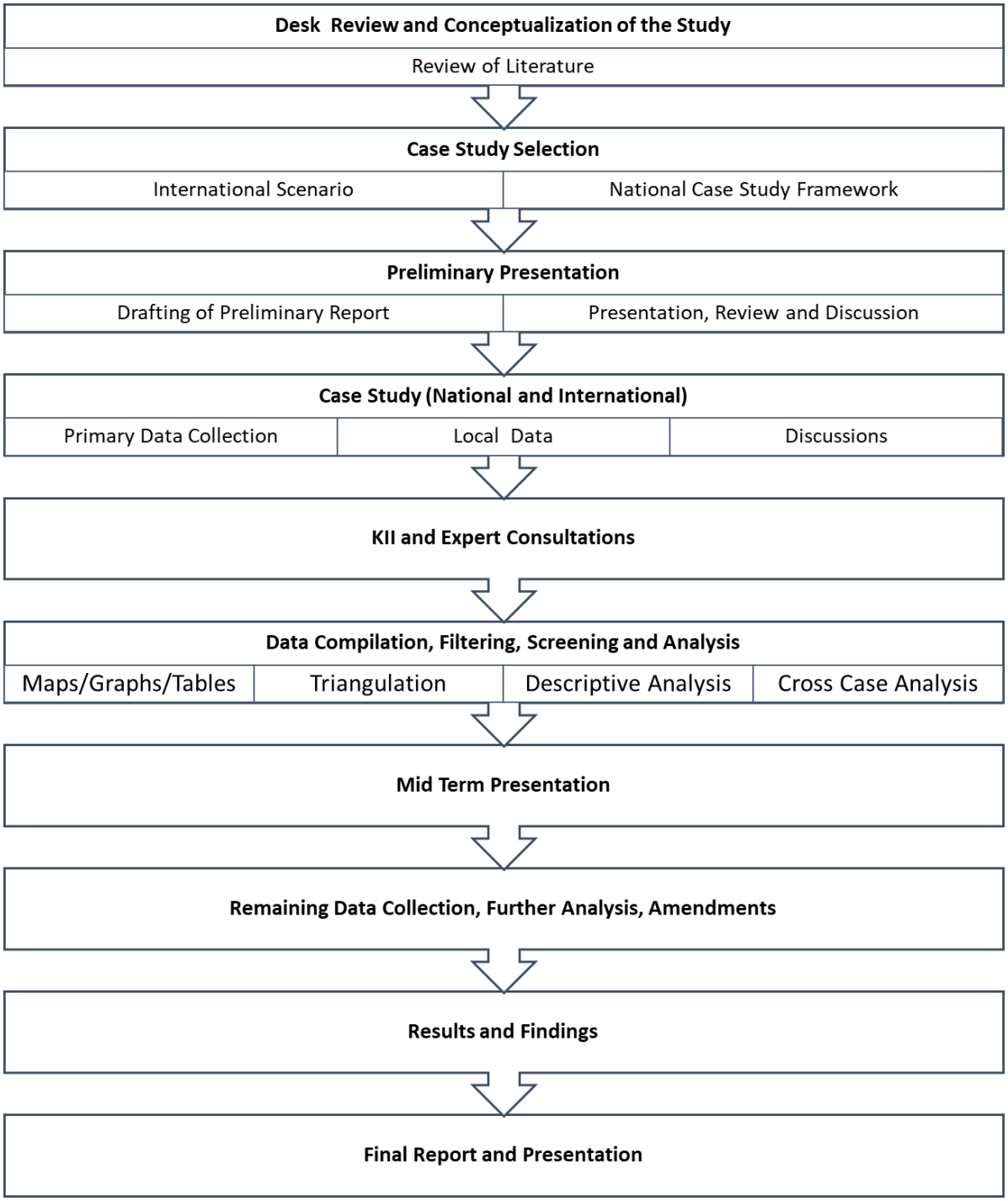


Figure 2-4 Overall Process of the Study

2.6. Research Logic

The purpose of logic is to distinguish between good and bad reasoning, or between better and worse reasoning. Logic is both a science and an art. It is necessary to clarify what logic is and why it is important when studying it. Research logic can be divided into four categories: deductive, inductive, retroductive, and abductive (Uprety, 2022).

Inductive research starts with specific observations of patterns and regularities and tentative hypotheses that lead to broad conclusions or theories. Inductive logic gives the probable truth. Abductive reasoning is a methodical strategy for advancing social sciences through the meanings and interpretations, intentions, and reasons that individuals utilize in their daily lives. Because we are the measurement instrument for the study, a combination of inductive and abductive logic is used in this study. There is a set of observations and facts from the interviews and surveys that must be studied and made sense of using inductive reasoning before moving on to the most likely explanation for the findings. Abductive reasoning results in the kind of daily decision-making that makes the best use of the knowledge available.

2.7. Research Ethics

Teleological ethics is concerned with the outcomes of actions. The optimum course of action is one that maximizes the good in contrast to the bad. In deontological ethics, the ethical criteria and their outcomes are mutually exclusive. A single scenario may lend itself to the application of one or several moral standards. Teleological ethics is a consequence-based approach, whereas deontological ethics is a rule-based approach.

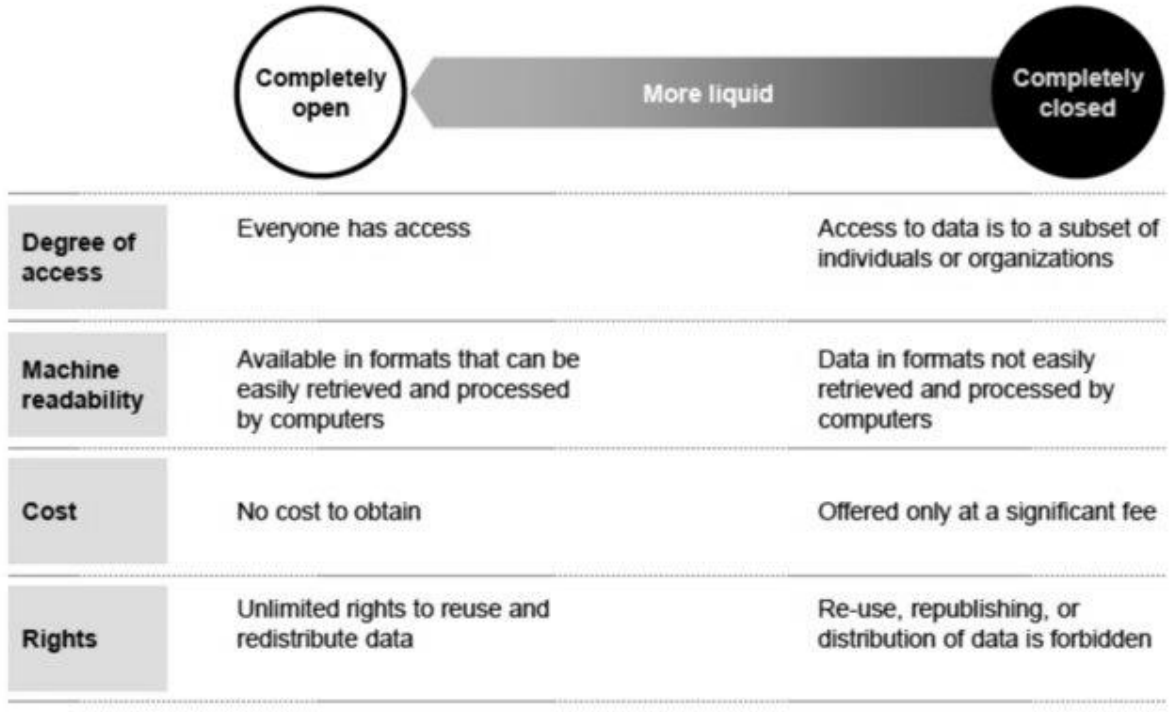
This is a social science study, and it is imperative to consider the rights of participants in interviews and surveys to protect them. It is also important to work on research validity enhancement, and scientific integrity maintenance. Both the interviewer/surveyor and the respondent have been non-biased about the results of the interview/survey and therefore the interviews/surveys have been to be conducted in an ethical environment without conflict of interests. The interviews/surveys have been conducted in a convivial environment, without any intimidation or discrimination based on race, ethnicity, sexuality, gender, religion, disability, age, or any other base. The interviews/surveys have been conducted without hampering working hours. In this research, deontological ethics is considered because the focus is on the process rather than the ultimate result.

3. Literature Review

3.1. Open Data Definition

According to the International Open Data Charter (Open Data Charter, 2015), “Open data is digital data that is made available with the technical and legal characteristics necessary for it to be freely used, reused, and redistributed by anyone, anytime, anywhere”. Open data empowers governments, citizens, civil society organizations, and private companies to make more informed decisions. Effective and timely data access assists individuals and organizations in developing new perspectives and innovative ideas that can provide benefits for society and the economy, consequently improving people's lives all over the world (Open Data Charter, 2015).

Information collected, created, or funded by public agencies and made openly available for reuse for any purpose is referred to as open (government) data (also known as public sector information). The terms of use will be included in the license (European Commission, n.d.). The Open Definition maximizes interoperability and promotes an active commons where anybody may contribute by defining "open" in terms of knowledge (Open Knowledge Foundation, n.d.-a).



Characteristics of open or closed data (McKinsey Global Institute)

For data to be open, the data itself should be publicly accessible over the internet, such as through websites, data portals, and so on; the provided data should be useful and reusable without regard to legal constraints, using and conducting actions on data to create value through analysis, visualization, application development, and other means should be free; and the information must be freely and publicly given (Open Knowledge Nepal, 2017).

Two fundamental characteristics contribute to data being "open". Data must be "legally" open, which implies it is free of stringent copyright limitations and can be legally shared and utilized by individuals, businesses, academic institutions, organizations, and others. Data must also be open in the "technical" meaning, which refers to the distribution of data in a standard, well-defined format, generally via the Internet. (Ayre & Craner, 2017). To comprehend the contours of data sharing, standards, privacy, security, and ownership in the context of the city, a data policy is required. Certain kind of data (for example, a person's tax payments) are clearly private and should not be shared (TATA Trusts & Data Driven Governance, 2019).

3.2. History and Development of Open Data in the world

According to an article in the Paris Tech Review (2013), the term "open data" first appeared in a publication from an American scientific body in 1995. It was focused on the release of geophysical and environmental information. The report's authors assert that "our atmosphere, oceans, and biosphere form an integrated whole that transcends borders." They encourage the free and open interchange of scientific knowledge across countries, which is required for the analysis and comprehension of major global phenomena. According to the paper, open data had roots in scientific praxis long before it became a technical item or a political movement. Researchers were the first to recognize the value of openness and data sharing.

In the year 2010, the UK government started data.gov.uk to help people find and use open government data where visitors can find data published by government, links to download data files, and the website also helps to create account to publish data (UK Government, n.d.). Likewise, in 2013, G8 member countries signed the Open Data Charter to promote open data (Chaudhari, 2023).

The Group of Eight (G8) nations formed the G8 Open Data Charter (2013) with the purpose of encouraging openness and transparency in government data. The fundamental concepts of the charter stressed data release by default, high-quality and timely information, user-friendly formats for accessibility, and harnessing open data for better governance and innovation. The

charter aims to empower citizens, entrepreneurs, and researchers by making non-sensitive data freely available to the public, supporting economic growth, and driving the development of innovative services and applications. The G8 Open Data Charter Technical Annex supplemented these concepts by offering detailed technical guidance and standards. It included topics such data formats, metadata, licensing, APIs, data catalogs, and safety concerns. Governments aimed to improve the efficiency of their open data programs by adhering to these technical requirements, which facilitated smooth data sharing and utilization while retaining the essential safety measures to protect sensitive information.

Apart from national governments, international organizations also made their contribution in Open Data ecosystem of the world. In 2010, the World Bank declared that their database will be made open. OECD, in 2013 started to work in the field of Open Government Data, and in 2015 UN General Assembly released Open Data Charter which led to United Nations Statistics Commission establishing Open Data Working Group in 2018 and approval of “Open by Default” concept in 2021 (Chaudhari, 2023).

According to the UN Common Agenda (2021), a technology track including all relevant stakeholders—governments, the UN system, the private sector (including tech companies), civil society, grassroots organizations, academia, and individuals, including youth—calls for a Global Digital Compact to be put in place at the Summit of the Future in September 2024. The Global Digital Compact will "outline shared principles for an open, free, and secure digital future for all" (Malaccorto, 2023).

The Open Data Watch Annual Report (2021) mentions that 187 nations' official statistical data coverage and openness were evaluated by the Open Data Inventory (ODIN) 2020–2021. Less than half of them meet more than 49% of the ODIN requirements for data coverage and openness across all data categories, as indicated by the median ODIN country score for 2020 of 48.8. However, this is a 7-point improvement over the 2018 ODIN evaluation. In 2020, the global median ratings for openness and coverage are 51.8 and 48.2, respectively. The research also highlights the areas in which lower-income nations have the greatest challenges in releasing data, underscoring the need for greater funding and capacity-building to support the publication of data in machine-readable versions and regular data collection.

3.3. History and Development of Open Data in Nepal

In Nepal, the idea of open data is still relatively new; in fact, its popularity has only just begun to grow. In recent years, there has been a noticeable increase in the number of new projects, organizations, and individuals seeking to address some of the challenges facing open data in Nepal and enhance sharing and use in the country. (Open Knowledge Nepal, 2017).

For the first time, Nepal's Constitution, established in 1990, guaranteed citizens' right to information as a basic right. One of the first nations in South Asia to enact a Right to Information Act in 2007, Nepal has made significant progress in implementing the Act under the direction of the National Information Commission. The government produced a Citizens Charter, designated a dedicated information officer to each government department, and created websites with documents accessible for download in compliance with the Right to Information Act. However, there are still difficulties in gaining access to information, particularly the underlying data. Despite the "Information Officer" banner that can be found in every ministry's entrance and website, obtaining access to information is usually a lengthy and complicated bureaucratic process. While there is no shortage of knowledge and data, a significant portion of it is locked in pdf files and is not provided in an open format that allows users to freely access, reuse, and redistribute it. (Data for Development in Nepal, 2018).

Initiatives such as the large-scale mobile data collection to determine the extent of the earthquake's damage, the National Planning Commission's self-assessment of data gaps in measuring progress toward the Sustainable Development Goals (SDGs), the Public Procurement Monitoring Office's launch of the Public Procurement Transparency Initiative in Nepal (PPTIN), the sharing of registered business data by the Office of Company Registrar, and the submission of the Open Government Data show the presence of Nepal government in open data – mostly aided by civic space (Open Knowledge Nepal, 2017).

On August 23, 2017, The National Information Commission submitted the Government of Nepal with the National Action Plan (2017) on Open Government Data (OGD). This plan explained how to effectively implement OGD activities. The strategy emphasized the international significance of Open Government Data and advocated for its incorporation into Nepal's policies and practices. For more than a year, the Commission collaborated closely with the United Nations to align Nepal's efforts with the global trend of Open Government Data adoption. The plan underlined the importance of translating laws, implementing OGD into national policies, and coordinating among many stakeholders such as government agencies,

professionals, researchers, and civil society leaders. It emphasized the importance of Open Government Data in meeting citizens' right to information and recommended automating the dissemination of pertinent data in accordance with legislative requirements.

The National Action Plan (2017) on OGD was a result of various discussions, seminars, and interactions with Open Data activists, government bodies, civil society, and professors and experts in the field of data and statistics (Chaudhari, 2023). The foundation for this action plan was provided by a program implemented by United Nations Department of Economic and Social Affairs (UNDESA) titled "Strengthening Capacities of Developing Countries to Provide Access to Information for Sustainable Development through Open Government Data" that incorporated Nepal, Bangladesh, Uruguay, and Panama.

Under the National Strategy for the Development of Statistical System (2019), the National Statistics Office has strategized to adopt the concept of open data for easy access to statistics in order to regulate the regular supply of statistics by producing reliable and quality data for evidence-based policy formulation, development management, and addressing user demands.

Similarly, in its fifteenth plan, the National Planning Commission (2020) has planned to use open data as a best practice for user-friendly data dissemination, publication, and communication in order to increase the use of current technology in statistical activities and to adopt technological advances.

Various national, and international organizations are working in the field of Open Data in Nepal at present- including National Statistics Office, the Asia Foundation, Data for Development, Open Knowledge Nepal, and the World Bank. Some of the well-known open data portals in Nepal are nationaldata, opendata, nepalindata, censusnepal.cbs.gov.np.

An example of organization actively working in the field of Open Data in Nepal is Kathmandu Living Labs. Kathmandu Living Labs (KLL) is a pioneer civic-tech enterprise. It was established in 2013 to further the OpenStreetMap (OSM) movement. KLL believes in using the power of open-source technology to improve people's lives. KLL seeks to challenge the current quo of the knowledge production paradigm, from which the vast majority of the world's population is excluded (Kathmandu Living Labs, n.d.). KLL has developed and nurtured OSM communities of thousands of people from Nepal and other Asian countries over the last eight years. Climate change and resilience, youth development and skill-building, civic participation, map-based surveys, and digital governance are all areas in which the organization works. KLL

has created and maintained a global network of thousands of volunteers, partners, and supporters (Kathmandu Living Labs, n.d.).

Similarly two examples of good practice of Open Data in government sector include the recently launched data portal of National Statistics Office and the integrated and comprehensive national disaster information management system – BIPADPortal. The National Strategy for Development of Statistical System (Central Bureau of Statistics, 2019) provided the basis for publishing data openly and the efforts of various civil activists and experts helped to provide shape to the idea of open data portal- as a result of which an interactive data portal with graphics has been made available openly. BIPADportal was created by bringing together all credible digital and spatial data from various government agencies, non-governmental organizations, academic institutions, and research groups on one platform in order to enhance preparedness and early warning, strengthen disaster communication and emergency response, enhance coordination post incident, and promote evidence based planning, decision and policy making (NDRRMA, 2020).

Nepal's data ecosystem must be built around three parallel aspects that fueled the global data revolution: data generation, data sharing, and data usage, all of which must be supported by a strong data governance structure. In Nepal, the emphasis has so far been on data generation. Additional data generation, however, will not contribute significantly to the ecosystem's growth and vitality unless data sharing and data utilization are improved (World Bank Group, 2019).

A study by the World Bank (2020) that assessed the effectiveness of data sites in Nepal evaluated 22 publicly available data portals of Nepal and found out that majority of sites are not optimized for search engines- leading to less traffic on the sites. Likewise, the study shows that most sites are available only in English and most of the sites were missing metadata, despite many sites having data in machine readable formats.

3.4. Importance and Benefits of Open Data

Open data can provide full and correct information regarding specific issues and problems. This helps in improving evidence-based decision making. Likewise, open data improves access of people to data that helps to improve services and solve issues related to development. At the same time, open data encourages innovation and creativity, while creating an environment of

cooperation between stakeholders. Importantly, open data helps to improve transparency and accountability of public sectors.

Evidence demonstrates that data availability and sharing can result in positive social and economic benefits for data producers (direct effect), their suppliers (indirect impact), and data users (indirect impact), as well as the wider economy (induced impact) (OECD, 2019). The benefits and cost-effectiveness of open data may be classified into five major areas. For starters, open data promotes more openness, accountability, and user empowerment, particularly when it comes to cross subsidizing the creation of public and social goods. Second, it stimulates new business prospects, resulting in the formation of startups, particularly for data intermediaries and mobile app developers. Third, open data encourages competitiveness and collaboration inside and between industries and nations, allowing for the seamless integration of value chains. Fourth, it promotes crowdsourcing and user-led innovation. Finally, open data increases efficiency by combining and integrating data from many sources (OECD, 2019).

Open Data in public health has numerous advantages, including fostering scientific collaboration and partnerships, improving research capabilities, allowing for early detection of health and environmental risks, facilitating real-time response monitoring and option analysis, guiding interventions and policy-making, strengthening evaluation capacities and performance metrics, increasing public engagement, and promoting transparency and accountability. (Huston et al., 2019).

The use of Open Data in the public sector increases transparency and integrity by allowing for the tracking of public finances and throwing light on market trends that intersect with social, political, and environmental contexts (Smith, 2022). It enables real-time change recognition, response, and even prediction, as well as accurate assessments of the consequences of various changes via modeling and simulation. Furthermore, by identifying and correcting inefficient practices, productivity is increased, while environmental effects are decreased by simplifying source identification and assisting with compliance with environmental requirements. This approach also encourages customized solutions that address identical concerns across legislative systems and populations (Smith, 2022).

The benefits of Open Data shared by the World Bank (n.d.) website on data is as follows:

- Transparency : By improving openness, open data facilitates oversight by government and aids in the decrease of corruption. For instance, tracking government operations

like public budget expenditure and its effects is made easier with the use of open data. Additionally, by giving information on voting procedures, places, and ballot issues, it supports democratic societies and promotes greater public involvement in governmental affairs.

- Public Service Enhancement : Open data can allow citizens to interact with their governments and contribute to the enhancement of public services. As an example, citizens may use open data to offer opinions on service quality to government agencies or to take part in public planning.
- Economic Value and Innovation : Public data is a valuable resource for social innovation and economic success if it is made available and reused. By giving individuals access to data on public services, open data empowers governments to work with citizens and assess public services in unconventional ways. Open data is being used by companies and entrepreneurs to better research possible markets and create innovative solutions centered around data.
- Efficiency : Government organizations may identify and use data from other ministries more easily and affordably thanks to open data, which also reduces acquisition costs, overhead, and redundancy. By informing governments of gaps in publicly accessible databases and providing more accurate information, open data may also empower citizens.

The use of Open Data has proven to be highly beneficial in the context of disasters as well. Open data contributes significantly to the effectiveness of resilience-building initiatives by providing insights into various climates and disaster-related details, allowing communities to stay informed about pre-, during-, and post-disaster situations, revealing vulnerabilities, and providing decision-making tools (Parajuli et al., 2020).

3.5. Decoding the meaning of Open Data in Urban Planning

Urban data is critical in urban planning and development. It enables us to examine the urban environment, analyze objects and processes within it, and address complex urban concerns using information gained via integration and collaboration. For urban planning and development, urban data provides environmental (geographical, architectural) and societal (economic, social) information. Furthermore, urban data improves city intelligence by providing applications for healthcare, transportation, housing, and social life. It contributes to

the creation of a sustainable and resilient urban environment, as well as the design of efficient public services for the well-being of inhabitants (Iurev, 2020).

Globally, there has been a rise in the use of open data, which has been beneficial to several initiatives, including better public service delivery, citizen-government interaction, and government transparency. Open data has shown to be beneficial, even in the global South where socioeconomic problems occasionally obstruct progress (Open North, 2022). Open data is a vital tool for democratic involvement at a time when disputes and civil actions about who has a "right to the city" are becoming more frequent in the global South. Open data may be used as a development tool to help a variety of stakeholders by increasing outcomes transparency, incorporating the public in planning procedures, and creating initiatives that strengthen local government (Open North, 2022).

The enormous volume of data gathered by the urban data ecosystem—sensors integrated into buildings, surroundings, machines, and devices—helps to provide projections and offer insights for the development of cities. It has also created new frameworks for sustainable urban development (Aguilera et al., 2017; Calzada, 2017; Meschede & Siebenlist, 2019; Wang, Fang, Liu, & Horn, 2018, as cited in Neves et al., 2020). Owing to its effects on a number of municipal sectors, including the energy, economy, environment, transportation, health, education, and quality of life, open data is among the most potent tools that cities can offer to their residents and the society at large (Ojo et al., 2015; Schieferdecker, Tcholtchev, Lämmel, Scholz, & Lapi, 2017, as cited in Neves et al., 2020).

Academics studying the built environment, health, and policy now have the chance to monitor and follow their city's development and compare local outcomes across cities worldwide, provided that the data and methods used are of appropriate quality (Boeing et al., 2022).

A chapter (Landry, 2019) of book on State of Open Data by African Minds and International Development Research Centre states that Open data is gaining traction in the field of urban planning, where it is strongly associated with the concepts of "smart cities" and "urban resilience." The chapter further mentions that the initial focus on hackathons as a way to produce public services cooperatively with other experts has shifted. The emphasis has now switched to the improvement of data standards, infrastructure, and in-house analytical capabilities within municipal administrations. Intermediaries, especially publicly supported organizations such as libraries, play an important role in assisting citizens in obtaining value from open urban data in this progression. Landry also cautions that in order to avoid open data

being regarded as a selectively deployable tool inside smart cities, initiatives to develop practitioner communities and establish clear agendas are required.

The convergence of SDG 11's emphasis on cities as drivers of sustainable development and SDG 16's goal of universal access to information highlights the potential of open urban data to foster smart and sustainable urban developments, providing critical metrics for tracking progress toward the SDGs and impacting individuals, policies, and technological innovations (Meschede & Siebenlist, 2021).

Managing urban expansion in a way that enhances cities' resilience to natural disasters and the consequences of climate change is becoming a more challenging task, requiring reliable, updated spatial data about the built environment. This is because urban populations are growing and so is their vulnerability. Innovative, economical, accurate, transparent, dynamic, open, and cost-effective data collection and mapping techniques that enable urban expansion and disaster risk reduction are needed to address this problem (The World Bank, 2014).

3.6. Principles of Open Data and its use in Urban Planning

According to the Open Data Charter (2015), following are the six principles of open data:

i) Open by Default

This implies an important shift in the way the government functions and interacts with the public. In order to get precise information, users usually have to approach officials. By suggesting that all entries should be given to be public by default, Open by Default transforms this. Closed data must be justified by governments, citing security or privacy concerns. Citizens must be assured that their right to privacy will not be infringed by open data for this to be successful.

ii) Timely and Comprehensible

Open data is only useful if it remains relevant. The ability to publish information rapidly and comprehensively is critical to its success. Governments should release data in its original, unedited form as much as practicable.

iii) Accessible and Usable

Ensuring data is machine readable and easily accessible will facilitate its dissemination. One way to do this is using portals. The user experience of those gaining access to data, especially the file formats in which the information is

provided, must also be taken into account. Information needs to be publicly accessible under open licenses, such those offered by Creative Commons.

iv) Comparable and Interoperable

Data has a multiplying impact. The potential usefulness of high-quality datasets increases with the number of them available and the ease with which they may interact with one other. Widely recognized data standards are essential for making this happen.

v) For Improved Governance and Citizen Engagement

Citizens (and anyone involved in government) may be able to learn more about the activities of elected officials and legislators thanks to the availability of open data. Holding governments responsible and enhancing public services are two possible benefits of this transparency.

vi) For Inclusive Development and Innovation

Promotion of inclusive economic growth can be encouraged by open data. Increased data accessibility, for instance, may be applied to fight climate change or boost agricultural productivity. Although most of the time open data is associated with improving government performance, open data is also quite profitable for a wide range of businesses.

Open data provides opportunity to create new, evidence-based policy solutions while also promoting economic and social development for all members of society (Open Data Charter, 2015). The following are some points highlighted by the Open Data Charter as to what open data can contribute to the world. These points are very much relevant to the field of urban planning in a democratic world:

- Supporting evidence-based policy making: Urge governments to employ data in the creation of policies and evidence-based decision-making, since this promotes long-term social and economic progress and improved public policy outcomes.
- Enabling cross-sector collaboration: Encouraging cooperation in the creation of policies and the provision of improved public services between governments, individuals, civil society, and businesses in the private sector.
- Following the money: Governments are incentivized to prove they are spending public funds responsibly by disclosing how and where they are spent.

- Improving governance of natural resources: Increasing public knowledge of the ways in which nations use their natural resources, spend the money they receive from them, and trade and manage land.
- Monitoring impact: Assisting with the evaluation of public programs' impacts so that governments, civic society, and businesses may better address the needs of their communities.
- Promoting equitable growth: Fostering the development of new markets, companies, and employment in order to promote sustainable and equitable growth.
- Geolocating data: Geospatial and earth observation references can be supplied to provide comparability, interoperability, and efficient analysis by enabling data to be layered spatially.; and
- Improved decision-making: Enabling people to make better judgments about the services they use and the kind of service they should anticipate

3.7. Application of Open Data in Urban Planning

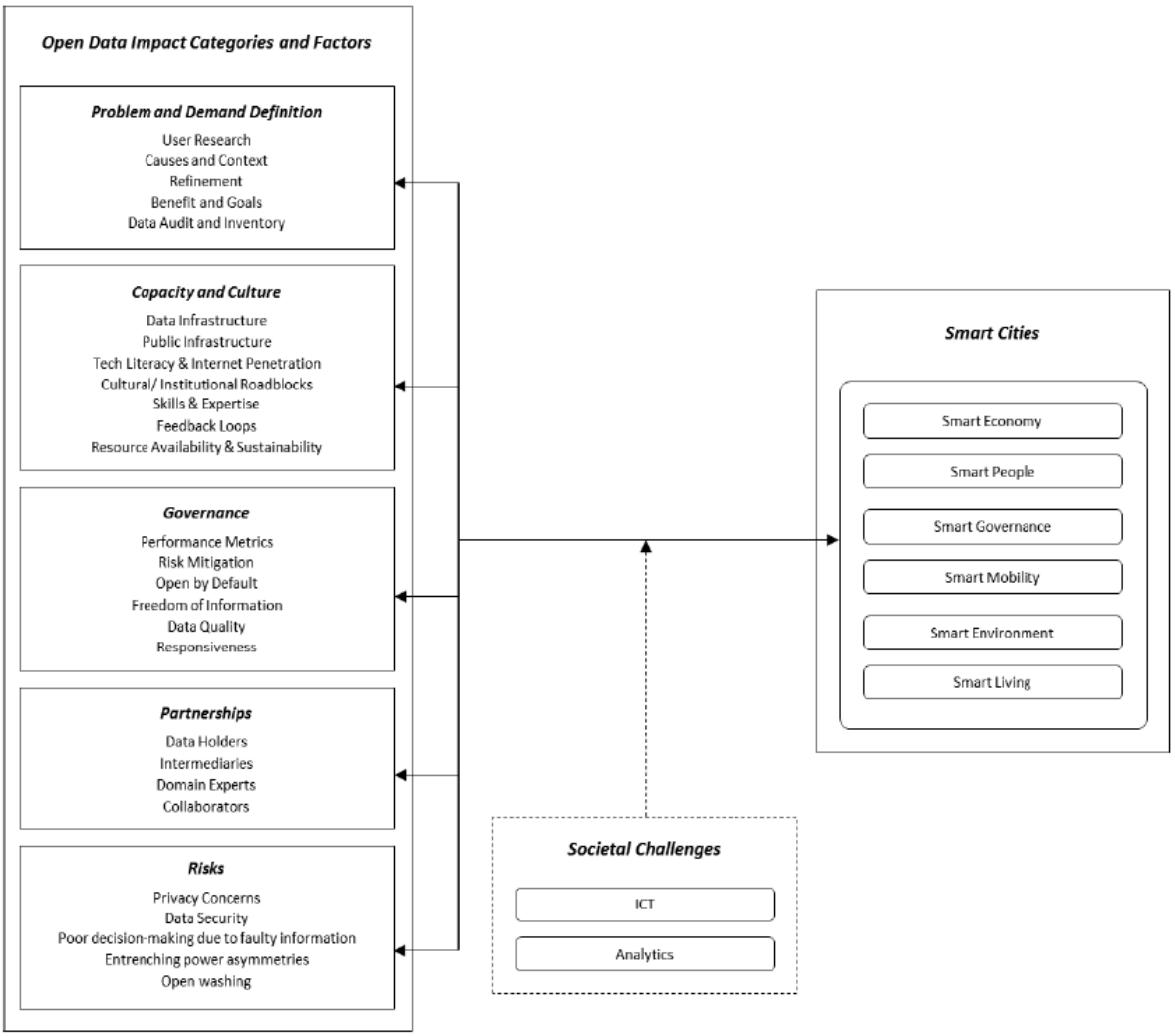
It is essential to comprehend the advantages of using urban data applications in order to defend its place in urban planning and development. Urban data not only improves decision-making and urban intelligence, but it also makes innovations possible in many different urban sectors. It enhances infrastructure effectiveness as well as the capabilities of security organizations. Data generation and analytics may assist in reducing environmental impact and provide new business prospects. Open data helps urban players communicate with one another, which benefits local companies and citizens as well as the government (Iurev, 2020).

The quality and scope of datasets grow as open data progresses, and cities share increasingly meaningful information regarding the influence and performance evaluation of open data. Thus, the most crucial factors for the success of open data initiatives are the standards of the data provided and how it is used (Neves et al., 2020).

In addition to being highly beneficial in emergency circumstances, open-platform geospatial information might also significantly improve early recovery, prompt responses, and preparedness for disasters (Bhanumurthy et al., 2017, as cited in Parajuli et al., 2020).

Data is an important instrument of influence in a modern city characterized by uneven access to information, political power, and other resources (Elwood, 2008, p. 83). They may be seen

as the cornerstone for citizen empowerment and more involvement in decisions about policy and development (Chakraborty et al., 2015).



A conceptual model for the impact of open data on smart cities (Neves et al., 2020)

Open data initiatives can accomplish the transformational results needed to meet the goals of the smart city initiative when they are planned to influence one or more smart city components. It happens in response to certain enabling and disabling factors in order to improve government, give citizens more authority, provide economic opportunities, and help solve public issues in order to address social challenges and sustainability in cities (Neves et al., 2020).

Cities have a wide variety of priorities and commitments. The unifying thread among many of these is still open data. Clear arguments and proposed strategies to connect city open data projects to other domains could encourage more policy alignment and collaboration within

local government. Communities will be able to make greater use of existing open data programs and guide them toward specific goals as a result of this (Open North, 2022).

Here are two examples of the application of Open Data in improved infrastructural delivery, extracted from Global Infrastructure Hub (Fernz, 2022):

- The Republic of Korea's KONEPS e-procurement system is an example of the time and cost efficiencies that open data can bring at the entire government level (not just infrastructure). KONEPS implementation has quickly decreased bid processing time from 30 hours to two. Since its inception in 2002, it has also saved the government an estimated USD1.4 billion and businesses an estimated USD6.6 billion in costs.

- The Government of Nuevo Leon in Mexico recognized considerable competitiveness and monitoring gains by disclosing infrastructure project and contract data on the Infrastructure Abierta platform. Because of the aggregation of information for prospective tenderers, the number of bidders has increased by 25%. This resulted in improved tendering outcomes, including a reduction in procurement corruption. Because of its success, the Federal Mexican Government is attempting to replicate the platform across the country.

3.8. Five Star Linked Open Data

"Linked Data" is a term used for a collection of design guidelines for the Web that facilitate the exchange of machine-readable interrelated data. Open data is information that is freely utilized and shared by anybody, with the exception of sharing and attribution requirements. Datasets that are both open and connected are known as linked open data (Ontotext, 2012).

Sir Tim Berners-Lee proposed a five-star deployment plan for linked open data in 2010. The concept would start with one star and confer additional stars to data when linkages and proprietary formats are added and deleted (Ontotext, 2012).

One-star open data is defined as any data that may be found online in any format as long as it has an open license. Users have the ability to see, search for, save, modify, and share data with anyone.

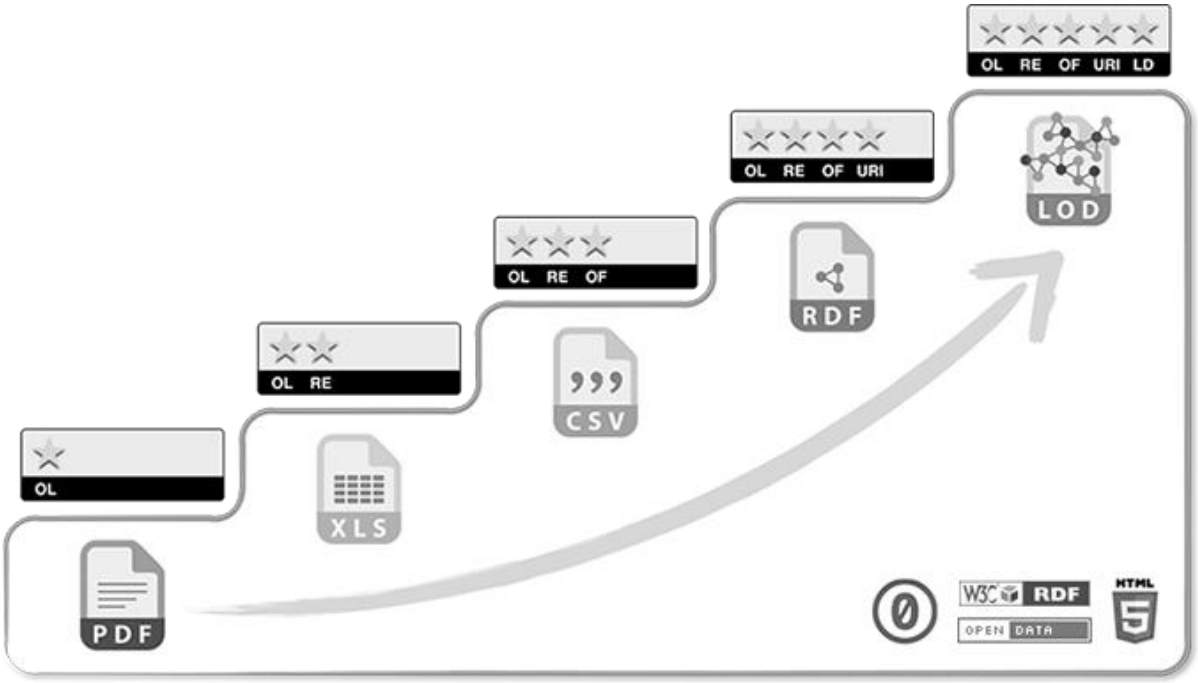
An excel spreadsheet or other machine-readable structured data, as opposed to an image scan of a table, is required for the open data to be awarded a second star. In addition to doing

everything that users of 1-star open data may do, users of 2-star open data can directly process the data using proprietary software and export it in another structured format.

The third star is given to data that does not require a special software product to evaluate. The comma-separated values (CSV) format, which stores tabular data in plain text, is one example of this.

Data that uses W3C open standards, such RDF and SPARQL, to identify things earns an additional star. Semantic graph databases employ RDF (Resource Description Framework) standards. This graph database, often called an RDF triple store, is a semantic technology that may be used to manage, store linked data and interpret it.

Data producers give context by linking their data to other people's data using W3C standards and Linked Data concepts. This is a requirement for obtaining the fifth star.



Stages of Open Data (Open Data Charter)

3.9. Five Stars of Open Data Portals

A group of tools created to facilitate the use and benefit of open data is known as an open data portal (Open Knowledge Foundation, n.d.-a). To make data usable, it must be adequately documented and tools for re-users must be available. To transform the data into knowledge and valuable information, it must be of high quality. Open Data Portals should be used for the same purposes as the original data: eliminate barriers to data reuse, make sure tools are co-created

with the reuse community, and strive to participate in efforts outside of an organization to use data quality (Colpaert et al., 2013).

A five star system for Open Data Portals, as proposed by Colpaert et.al. (2013) that highlight the requirements for each star is summarized below:

- **One Star Open Data Portals : A Dataset Registry**
  The problem of dataset ownership and placement may be resolved with ease by using a dataset registry, which is a well-managed collection of links to datasets or other portals. It contains direct links to datasets with various licensing statuses as well as external pages/portals that host datasets. Furthermore, it serves as a point of contact for dataset requests and aspires to become a resource for Open Datasets within the organization, involving ongoing and future projects and raising data awareness internally.

- **Two Star Open Data Portals : A Meta-Data Provider**
  This category builds on the "one star" Open Data Portal category by retaining additional dataset metadata. The meta-data includes details such as the license used, the geographic context, how frequently they are updated each week, and so on. Meta-data can also be published as Open Data (if it is licensed under an Open License). As a result, these registries will be available for inclusion in additional Open Data Portals.

- **Three Star Open Data Portals : A Co-Creation Platform**
  By permitting data interaction and discussions, the "third star" Open Data Portal category surpasses the features of the one- and two-star Open Data Portal categories. To promote spontaneous reuse, discussions regarding the datasets themselves should be easily enabled; the data should be easily available and unrestricted by mandatory processes (e.g., requiring an email address before downloading a dataset). Conversations may also inspire hack days, data dives, and co-creation events, which would foster discussion about idea generation and code reuse while uniting developers and citizens. Meta-data regarding datasets must be maintained in addition to data-on-data re-use (apps, concepts, and ideas) (as in the two-star category).

- **Four Star Open Data Portals : A Data Publishing Platform**
  Genuine dataset providers use the Data Portal to offer meta-data. The datasets are presumably made available through the portal, reflected by the fourth star category for

Open Data Portals. After that, the URIs may be maintained using the Data Portal's URI method, creating URLs and URIs that never change. The Data Portal becomes a platform for producing Linked Open Data by virtue of data publication being moved there. Data quality may be protected since the authorized source will automatically get feedback on newly supplied data. After the data is approved, it may be readily accessible using open formats (such as JSON, XML, and CSV) and can be handled using standard tools.

- **Five Star Open Data Portals : A Common Data Hub**
  Serving as an interface for information, the Data Portal gathers data from internal and external sources that might be valuable to the organization. Different versions should be compatible with one another even while they are maintained separately. This means that updates made to one version should be able to combine with updates made to another, both in terms of meta-data and actual data. This covers the data itself in addition to app concepts, data tools, and visualizations. Consequently, the Open Data Portal acquires self-correcting data as a result of user input. Meta-data about datasets, app concepts, and the actual data itself are also used to link data.

3.10. Quality of Open Data

To assess the quality of open data, various tools and techniques may be used. One of the ways used by a research team in Colombia (Mahecha Moyano et al., 2017) is to use the three metrics : traceability, completeness, and compliance. The existence or absence of metadata pertaining to the creation and updating of a dataset is indicated by traceability. Completeness is defined as the extent to which the data are extensive, sufficient in scope, and deep enough for the task at hand. The ability of data to abide by legal norms, customs, or standards as well as comparable specifications pertaining to usefulness, productivity, safety, maintainability, and other factors is referred to as compliance.

Another research from University of Talca in Chile, (Máchová & Lnenicka, 2017) used a benchmarking framework with definition of quality dimensions and particular metrics for each of them based on literature review. The framework proposed is broken into two components. Broad characteristics like the technology dimension, the availability and access dimension, and the communication and participation dimension are all included in the first. The second assesses the metadata quality in addition to the overall attributes of the datasets.

3.11. Licensing in Open Data

A license that places certain limitations on the use of the licensed material or data is known as an open license. With an open license, people can develop new material or data, republish the content or data while charging for access, republish the content or data while charging for products that use the information or data, and so on (Dodds, 2013).

Licensing can be done in different ways. One can make their content or data available under one of three license levels (Dodds, 2013):

- A public domain license imposes no restrictions (technically, this means that the licensee waives their rights to the content or data).
- An attribution license requires re-users to credit the creator.
- According to an attribution and share-alike licensee, re-users must provide attribution and share any derivative content or data under the same license.

Standard Licences that are used for open data are as follows (Korn et al., 2011, as cited in Khayyat, 2014):

- Creative Commons Attribution
- Creative Commons Zero (CC0)
- Public Domain and Dedication License (PDDL)
- Open Data Commons Attribution Licence (ODC)
- Creative Commons Attribution Share Alike (but limited interoperability)
- Open Government License (OGL)

3.12. Concept of Metadata in Open Data

Metadata is essentially structured information that facilitates the retrieval, usage, or management of an information resource (Lisowska, 2016). In reality, metadata helps users find a dataset by providing an explanation of its structure. The following fundamental components are typically present in the data: the title, the publisher, the publication date, the frequency of updates, and the license associated with the dataset. Unlike "structural metadata," which provides information like page layout or an object's component and their connections (for instance, chapters or tables in a book), they are categorized as "descriptive metadata".

Since they are connected to the metadata standards that they employ, the data that the open data portals publish—such as statistical, geographic, or financial data—controls the metadata

production process. These standards directly address the need for detailed, well-organized information on open data for every particular subject (Lisowska, 2016). For example, the need to address the particular metadata requirements for geospatial information led to the creation of the INSPIRE Infrastructure for Spatial Information in Europe standard (INSPIRE metadata schema), which is based on the ISO 19115 standard.

3.13. Risks and Challenges of Open Data

Martin et al. (2013, p. 301-309) have identified following risks related to open data:

- Risks related to government issues.
    a. Open data vs open government : a misunderstanding
    b. Reluctance of civil servants
    c. Inconsistency of public policies
    d. Relevant administrative level
    e. Lack of dialogue between data providers and re-users
- Risks related to economic issues: costs and return on investment.
    a. Cost of opening data
    b. Benefits and return on investment.
    c. Sustainable business models for production of data
- Risks related to licenses and legal frameworks.
    a. Heterogeneous licenses across datasets
    b. Stacks of rights over individual datasets
- Risks related to data.
    a. Data accuracy and bias
    b. Data quality because of a high-quality production process
    c. Data available in heterogeneous format
- Risks related to metadata.
    a. Lack of single standard to describe datasets.
    b. Incomplete metadata
- Risks related to access.
- Risks related to skills.
    a. Language barrier
    b. Skills related to information literacy and domain knowledge.

Chaudhari (2023) has pointed out following challenges in using Open Data:

a) Indicators and quality control measures for Open Data
b) Making correct and important data openly available
c) Security of personal and sensitive data – maintenance of privacy
d) Preventing misuse of data
e) Development/Promoting required capacity/skills
f) Manage disputes related to ownership of open data

3.14. Ten Building Blocks of an Open Data Initiative

The ten building blocks of Open Data Initiative as proposed by Davies (2012, as cited in Khayyat, 2014) helps to understand what are the items that need to be considered while thinking about an open data ecosystem.

- **Block 1: Leadership and Bureaucratic Support**
  "A top-level mandate" from senior politicians and "an engaged and well-resourced middle layer of skilled government bureaucrats" are needed to guarantee the release of open data (Hogge, 2010).

- **Block 2 : Datasets**
  Datasets serve as the foundation of open data. It is necessary for datasets to be legally open, technically open (in a non-proprietary format), and accessible (usually online) (Eaves, 2009).

- **Block 3 : Licenses**
  Datasets are subject to a variety of copyright and intellectual property restrictions. Without a clear license, re-users working with data—sharing, merging, and creating commercial services based on datasets—will not be aware of their legal rights and permissions. For this reason, it is imperative to have an explicit license. Supporters of open data simultaneously stress the need of allowing licenses with the fewest restrictions and recognizing the data's original source.

- **Block 4 : Data Standards**

  Describes a dataset's fields, their typical representation, and the procedures that should be followed for exchanging dates, locations, categories, and other common aspects.

- **Block 5 : Data Portals**

  Through the retention of meta-data about them, a data portal provides users with open dataset access and the ability to search for relevant datasets.

- **Block 6 : Interpretations, Interfaces, and Applications**

  In addition to building data interfaces and visuals to show trends and patterns, third parties can contribute their own interpretations or analyses to static reports and publications. They can also develop interactive apps with practical usefulness.

- **Block 7 : Outreach and Engagement**

  Data will not be used just because it is posted publicly. Participation, outreach, and community development are all crucial. The five stars of open data engagement state that an open data endeavor should be demand-driven, offer context-driven data, facilitate data-related dialogues, develop networks, capacity, and skills, and foster cooperation on data as a shared resource.

- **Block 8 : Capacity Building**

  Building capacity is often necessary for an open Data initiative's supply and usage sides.

- **Block 9 : Feedback Loops**

  Provide channels for receiving and addressing input, either via enhancing the available data or taking appropriate action.

- **Block 10 : Policy and Legislative Lock-in**

  Establish a legal basis by passing laws pertaining to the "right to data" or by specifically including open data in agreements and standards.

4. International Case Studies

This chapter includes two international case studies of Open Data Initiatives and a review of Open Data Policy in an international context. Firstly, the chapter delves into the experiences of two very different cities, Barcelona, and Pune, in order to shed light on their unique approaches to leveraging open data for effective urban development. By examining the practices and outcomes of these international exemplars, this chapter aims to enrich understanding of how open data initiatives can contribute to city planning processes and sustainable growth, providing valuable insights that can be adapted and applied to the unique challenges faced within the Kathmandu Valley. Next, the study and review of International Open Data policy will help understand the contents, policies, and strategies required to draft an open data policy in the context of planning of cities in Kathmandu Valley.

4.1. Open Data in Planning of City of Barcelona

4.1.1. Background and Context

Barcelona, a cosmopolitan capital of Spain’s Catalonia region, recognized for its rich history and vibrant culture, has embraced open data as an important tool in urban planning. In response to rising urbanization and urban challenges, the city has used open data to improve transparency, community involvement, and efficiency. Barcelona's initiatives, as an emerging "smart city," prioritize accessible access to information, collaborative decision-making, and data-driven policy formulation. The incorporation of open data continues to affect Barcelona's urban development, balancing history and innovation for a dynamic urban future.

The Open Data BCN website provides information about the regulations associated with Open Data. Reusable public information is handled according to a set of guidelines established by European Directive 2003/98 / CE, dated November 17, 2003, on the re-use of public sector information. Directive 2013/37/UE was updated on June 26, 2013, and Law 18/2015, of July 9, was enacted at the state level to alter the earlier Law 37/2007, of November 16 on the reuse of public sector information. The basic regulation of the legal framework that applies to the reuse of documents created or maintained by public sector administrations and agencies is the goal of Law 18/2015. However, there are further laws that pertain to the release of public data. These include State law 19/2013, of December 9, which addresses transparency, access to public information, and good governance, and regional law 19/2014, of December 29, which addresses the same topics. By requiring public bodies to answer to the citizens in line with the

principle of accountability, their actions, and the management of public resources, these laws seek to encourage citizen engagement (Open Data BCN, n.d.).

4.1.2. Open Data Initiatives in Barcelona

There are a few Open Data Initiatives platforms in Barcelona. The Open Data BCN is the official public portal developed by the Barcelona City Council. Additionally, there is the Barcelona Open Data Initiative, a group established to advance open data in Barcelona and the surrounding region. The group wants to empower people to use open data, offer resources for personal open data development training, raise awareness, and assist open data-based entrepreneurship (Iniciativa Barcelona Open Data, n.d.). Other initiatives or portals include Municipal Data Office (OMD) Portal, CartoBCN, GeoPortal BCN, Transparency Portal, and Barcelona Cultural Data Observatory.

The 2010-born Open Data BCN (n.d.), which launched the portal in 2011 and is now a component of the Barcelona Ciutat Digital strategy, aims to support a pluralistic digital economy and create a new urban innovation model based on the public sector's transformation and digital innovation and the interaction of businesses, governments, academia, organizations, communities, and individuals, with a clear public and citizen leadership.

4.1.3. Datasets

While this report was being prepared, there were a total of 571 datasets in the Open Data Barcelona Catalogue. These were classified into five major themes : Territory, Population, City and Services, Administration, and Economy and Business. There was a separate classification by Main Sustainable Development Goals (SDGs) as well. There were 103 Administration datasets, 200 City and Serviced datasets, 18 Economy and Business datasets, 118 Population datasets, and 132 Territory datasets. While there were around 40 formats of data available, the most popular formats were CSV, JSON, and XML. All the datasets were made available through Creative Commons Attribution 4.0 licensing. Of the 571 datasets, 176 were geolocated with map view, 62 were geolocated with no map view, and 333 were not geolocated. The portal showed that 171 data sets were updated annually while 64 were updated monthly, and 126 were updated on a weekly basis.

4.1.4. Impacts and Benefits

There are multiple benefits and impacts the portal has had on various institutions and individuals including local government, business, transport management, environmental and

geological studies, and academia. Some examples of application of the datasets are presented below:

The Local companies in Spain website repurposes publicly available datasets of companies that are published on the websites of many Spanish city-level administrations. The Google Maps mapping service is used to place the businesses, enabling the 'Directions' feature to navigate them. In Barcelona, 61,335 businesses are indexed and positioned in the Open Data BCN portal's Census of Economic Activities dataset on the ground floor of the city of Barcelona. These businesses are related to either the 30 closest or the closest of the same category, even though the categories are not coincident.

Large cities, especially those with cosmopolitan and tourist populations, always have a need for integrated transportation, which calls for frequent yet intricate movements in addition to increased efficiency in their use to prevent traffic jams and time waste. Using Open Data BCN information, the "Barcelona Metro Bus Rodalies Bici" app aims to address travel planning issues and enhance public transportation use in terms of time savings and environmental effect. Additionally, it gives the user a basic tool that helps them plan and anticipate the actual wait times for transportation. It also addresses a particular issue that arises when people wander around since they may not be familiar with the city or region in which they are located. The Bicing service, bus stops, and parking are the subjects of the Open Data BCN datasets that were utilized.

The mobile device application CleanSpot makes it simple to find specific containers (clean places) in cities throughout the world, including Barcelona, where one may deposit unusual garbage such as batteries, electrical equipment, light bulbs, used oil, clothes and shoes, toys, books and school materials, coffee capsules, and so on. Green points in Barcelona are the dataset utilized from Open Data BCN.

The app Arbres de Barcelona brings trees from the city of Barcelona to citizens and assists them in identifying them. It displays the species of trees that are closest to the user based on the device's location. It displays the tree's common name in many languages, in addition to the scientific name, as well as a photo linked to Wikimedia Commons to aid with identification. It is primarily intended for mobile devices with GPS localization systems, such as smartphones and tablets. The following datasets from the Open Data BCN portal are used in the app: City of Barcelona Street trees and Barcelona city zone trees.

4.1.5. Limitations

To ensure maximum availability and quality of service, the following access limits will be enforced in online dataset searches and resource downloads:

Datasets: 30 petitions/minute online search

Resources:*

Download rate: 1 petition per second or 60 petitions per minute

API access: 30 petitions per minute

These limits are subject to change in order to provide the best service possible to users. In the event that the access limit is reached, the code 503 will be returned.

4.2. Open Data in Planning of City of Pune

4.2.1. Background and Context

Pune, a developing metropolitan hub in its own right in the western Indian state of Maharashtra, has recognized open data's potential as a catalyst for informed planning and decision making. In the face of urban development and modern demands, the city has embraced open data as a means of improving openness, engagement, and efficiency in governance. The efforts to become a technologically proficient city center on democratizing data access, creating collaborative governance, and harnessing data insights to develop policies aims to appeal the diverse population of Pune. Pune is one the 100 smart cities declared by the Government of India for development under the Smart Cities Mission.

4.2.2. Open Data Initiatives in Pune

In 2016, Pune became the first city in India to launch a municipal open data store. Pune Municipal Corporation (PMC) conceptualized the initiative, which resulted in the creation of 50+ datasets at various degrees of aggregation and timeframes in the first phase (TATA Trusts & Data Driven Governance, 2019). Pune was also among the first cities to join Tata Trusts' City Data for India Initiative, which seeks to provide the first worldwide standard on city data—the ISO 37120 framework—in order to empower and equip Indian cities to use data as their new currency of planning and development (TATA Trusts & Data Driven Governance, 2019). The open data policy of Pune Metropolitan City (2019) anticipates the use of open data sets to support innovative activities for social and economic advancements as well as to help identify and provide the government with practical and effective solutions.

Figure 4-1 Features of Pune Datastore (PMC)

4.2.3. Data Sources and Datasets

Pune's open data site was established in October 2016. The availability of data sets is a priority; in the last few years, over 400 data sets have been posted. The Departments of Health, Property Tax, Education, and Environment are the main contributors in terms of volume, richness, and time series (TATA Trusts & Data Driven Governance, 2019).

By the end of 2022, there were more than 560 datasets in the data portal. There was data from 27 departments, taken care of by 14 data officers. The website was accessed via waybackmachine because the portal was down during the drafting of this report). The data were categorized in several ways, one of them being based on the departments that created them like Bhavan Rachna, Census, Civil Roads, Disaster Management, etc. The portal also contained reports produced by the PMC. The file formats available were XLS, XLSX, XML, JSON, ODS, CSV, DOC, PDF, and JSONP. There were no shape files category in the search format. A feedback link was also clearly available on the portal. The portal also showed how many views per day the portal was receiving, how many downloads, feedback, and users per day that the portal was getting.

4.2.4. Impacts and Benefits

The impacts and benefits of Open Data has been listed in an article (TATA Trusts, 2020) reviewing open-data platform in Pune. The list is replicated below:

- With the use of its open data platform, the Pune Municipal Corporation (PMC) has geo-mapped postal pin codes to accurately depict the streets and structures that are part of each ward in the city.
- Pune's population figures varied widely, but the total was reduced to 4.3 million by comparing data from the census and elections.
- Information on air pollution is derived from the relationship between the quantity of new car registrations and the increase in pollution as shown by the air quality index.
- Where there is the greenest cover, where to locate uncommon and medicinal species, where to focus conservation efforts, what kind of trees should be planted, and other information may all be found by using an app that gathers data on 4 million trees.
- A city health meter in Pune that gathers data on ward-by-ward basis using both positive and negative indicators (air quality index, number of citizen grievances, number of hospitals, tree cover, etc.) might help inhabitants learn more about their communities.
- An app that analyzes the language used by citizens tweeting their complaints using machine learning and forwards them to the appropriate PMC department.

4.2.5. Challenges and Limitations

It is important to manage time and stakeholders effectively to make open data portals work. The process of making data open means each dataset needs to be validated and provided in a machine-readable manner. Obtaining the necessary data necessitates frequent and multiple coordinating efforts (TATA Trusts & Data Driven Governance, 2019).

4.3. Summary and Review of Open Data Policy of Pune

4.3.1. Summary

The City Open Data Policy for Pune (2019), prepared by the IT Department of Pune Metropolitan City in 2019, was developed recognizing the timely and consistent access to public data as an essential component of an open, transparent, collaborative, and effective government.

The Pune Municipal Corporation (PMC) is a major Indian city administration that is focusing on digital transformation and becoming a Smart City. PMC has moved its IT applications to the cloud and created web portals and mobile apps to facilitate citizen interaction. Pune features a GIS platform that digitally maps the city's different elements. PMC has also made significant advances in health, education, civic infrastructure, water projects, and other areas. With significant data created across different projects, including between 5000 to 5500 RTI requests each year, PMC intends to establish a comprehensive data governance structure that is available to various stakeholders for economic, scientific, and developmental goals. PMC already had an Open Data Portal and a dedicated City Data Officer, demonstrating its commitment to data-driven decision-making before the Open Data policy was introduced.

The policy establishes standards for integrating open data frameworks into current and future systems and procedures, as well as covering data generation, collecting, and management at the city level. The major goals of the policy are:

- Data Availability and Accessibility to citizens within defined Legal and Legislative framework
- Improve public understanding of City Operations and other Information concerning their communities
- Spreading a word amongst the citizens to generate economic opportunity for individuals and companies that benefit from the information created by Open Data
- Empower City employees to be progressively effective, better coordinated internally, and recognize chances to better serve the public
- Encourage the development of innovative technology solutions that improve quality of life

The policy discusses the lifecycle management of data including data standards, data categorization, data classification, data security and privacy, and updating and maintenance of

data sets. It also highlights the factors for data sets provisions and identification, viz, need, influence, data market potential, legal implications, and evading conflicts/opposition.

To successfully execute the open data objectives, the policy also recognizes cooperation and stakeholders, both inside and outside PMC. Government to Government, Government to Citizen, and Government to Business interactions are all included in the strategy. The policy establishes the team organization and data management framework for PMC's open data ecosystem.

Roles and responsibilities of City Data Officer, Open Data Champions, and Open Data Coordinators are recognized and highlighted. An implementation plan including components of initiation, planning, execution, and continuous improvement is presented in the policy that helps to provide a roadmap for effective implementation of the policy. A set of Standard operating procedures for data collection, processing, cleaning, quality assessment, publishing, and engagement of stakeholders is also present in the policy to help achieve consistency and standard practice.

4.3.2. Review

From a planning perspective, the policy is an important tool of setting standards and providing a good base for development of open data to improve informed decision making. The policy helps to foster open data ecosystems for planning professionals and academicians. It is important to note that the policy highlights roles and responsibilities of stakeholders and collaborations for successful implementation of open data policy. At the same time, standard operating procedures provide a good base for maintaining overall quality and standard of open data in the city.

There are some things that could have been better. For instance, the implementation policy could have been more comprehensive with implementation strategies. The implementation strategies would guide effective open data implementation- and help achieve the goals efficiently. Likewise, the importance of geolocated data has not been highlighted in the policy while the document establishes that Pune is a smart city. The policy does not include a clear idea about data licensing for open data. While it would be a complex task, the concept of crowd data sourcing and engaging private consultants and international organizations into the open data platform via the policy could have been included.

The Open Data Policy of PMC, which exemplifies transparency and collaboration, is critical for urban planning. The strategy is consistent with national standards like the National Data Sharing and Accessibility Policy 2012, because it makes a large dataset available to a wide range of stakeholders, including citizens and organizations. PMC's advances in data-driven urban development are optimistic, implying that Pune will have a more sustainable and resilient future. Furthermore, assuring the quality, relevance, and timeliness of shared data is critical for meaningful utilization. Additionally, the policy's long-term viability and mechanisms for dealing with any data privacy and security concerns must be carefully considered. Overall, while a positive move, Pune's Open Data policy will only succeed if it is closely monitored, and these practical issues are addressed.

5. Analysis and Findings

5.1. Open Data Availability in Planning of Cities in Kathmandu Valley

The awareness about open data has been in Nepal for more than a decade now with engagement of civil societies and data enthusiasts actively promoting an open data ecosystem. An important development in the field of open data in Nepal has been witnessed in aid management. Aid Management Platform / Aid Data of Nepal has been made open, which has been serving various government bodies and development partners. This is a good progress in developing country like Nepal where the national economy and finance is very much linked with and dependent upon international aid. Urban Planning can benefit from this since the openly available knowledge about aid can be instrumental in recommending budget sources for various action plans made for planning projects.

The key informants consulted during the research as well as the survey conducted reveal that various government, as well as non-government agencies produce a plethora of data in Nepal, but they are shared mostly in pdf form, and mostly via government websites.

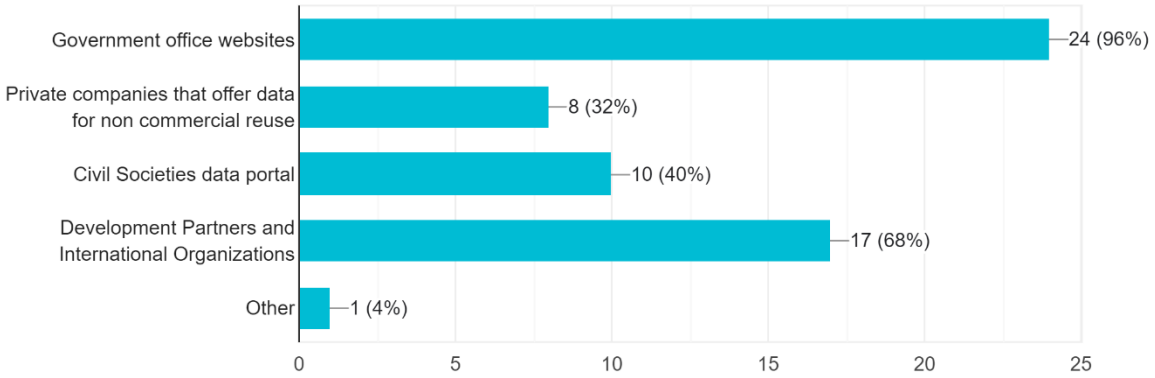


Figure 5-1 Sources of Online Data in Nepal as per survey respondents

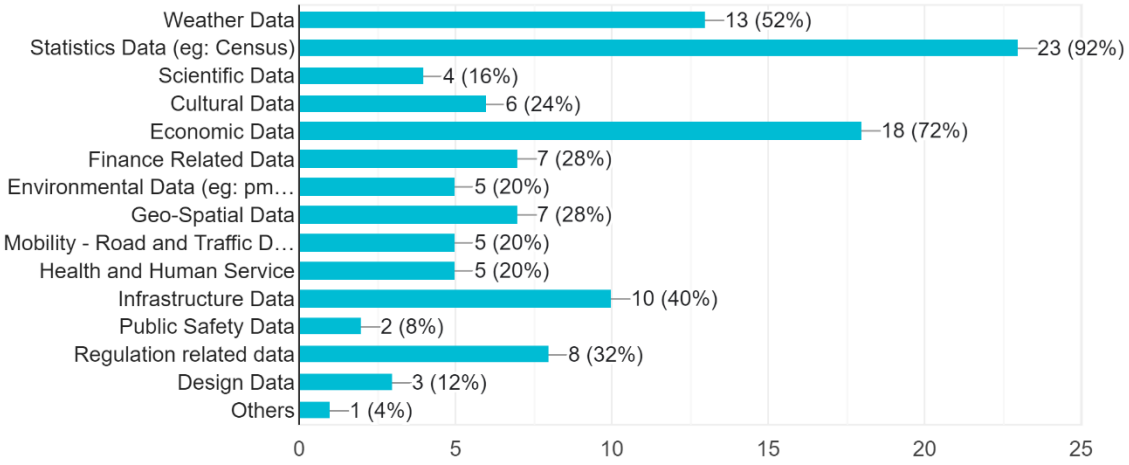


Figure 5-2 Types of Data Available Openly for Reuse according to survey respondents

Several efforts have been made to make various kinds of data open. From Figure 5-2, we can see that urban planning practitioners confidently believe statistical data related to the census is openly available. The National Statistics Office, funded by the UNFPA, was able to create an interactive open data portal to provide demographic data to the people. Efforts of Open Data enthusiasts and open data activists advocating for Open Data in Nepal and raising awareness among the key stakeholders at the NSO of the technicalities associated with Open Data made the data portal successful and open. An interview with the officials revealed that the office plans to publish any future data via an open data initiative as supported by their National Strategy for Development of Statistical System (Central Bureau of Statistics, 2019).

Figure 5-3 Open Data Portal of NSO for National Population and Housing Census 2021

Similarly, open geo-spatial data is available for use in planning in cities of Kathmandu Valley in the Open Street Mapping (OSM) repository. OSM is a mapping system that is built by a community of mappers that emphasizes local knowledge and use of aerial imagery, GPS devices, and low-tech field maps to verify data. OSM data includes at least 29 primary features that could be helpful in geospatial analysis.

Research reveals that about 80% of data used for urban planning are geo-referenced. It is important to have open data in spatial form in urban planning. Nepal was the leading country in OSM in South Asia when it was first introduced. There are more data in OSM

> than in google maps for many places of Nepal. India has dominated the OSM movement in the region now. (N. Budhathoki, personal communication, July, 2023)
>
> Looking back a decade in the field of data in Nepal, local bodies have shown interest in maps and are preparing maps (which requires data). A lot of visualization exercises are being done but their implementation for decision is still not explored/utilized. (S. Maharjan, personal communication, September 2023)

A KII revealed that there was an initiative to make government contract related data and data from office of company registrar open. The initiative/practice could not be successful due to various technical issues – including a strong legal framework to support open data.

Another good example of open data initiative in the field of planning is BIPADportal managed by NDRRMA under the Ministry of Home Affairs. The portal brings together digital and spatial data from various governmental, non-governmental, academic and research institutions on one platform and help in evidence-based planning by providing data in machine readable formats.

Other initiatives have also come up, but most of them became unrealized due to various issues like loss of institutional memory as someone leaves the institution or hurdles in bureaucratic processes. A KII with the IT Officer at Budhanilkantha Municipality revealed that the datasets from past data related efforts like household surveys, and municipal transport master plan have not been transferred from consultants to the municipality. The problem lies in negligence of the municipality as well as incompetency and/or irresponsibility of the consultants in transfer of data ownership. One way to address this is by making sharing of data in usable form mandatory in terms of references of the project and timely following up with the concerned teams.

Despite several efforts, availability of Open Data for urban planning works is quite low. Urban Planning requires various types of data that can be clustered in sectors, viz, Physical, Social, Economic, Environmental, Disaster and Climate Change, Financial and Budgeting. Different planners work on different types of projects that may include all these sectors, or a sub-set of them.

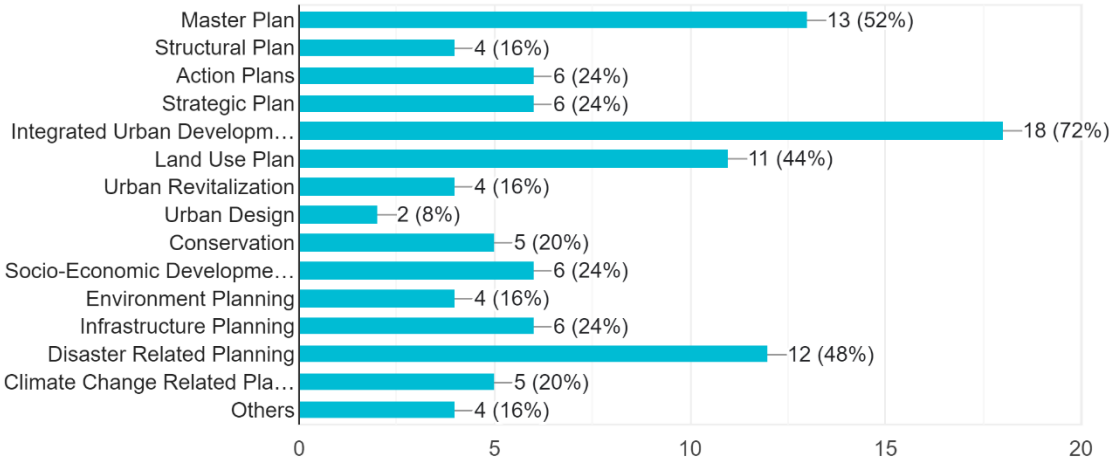


Figure 5-4 Different types of Urban Planning Practices that the Survey respondents are engaged in

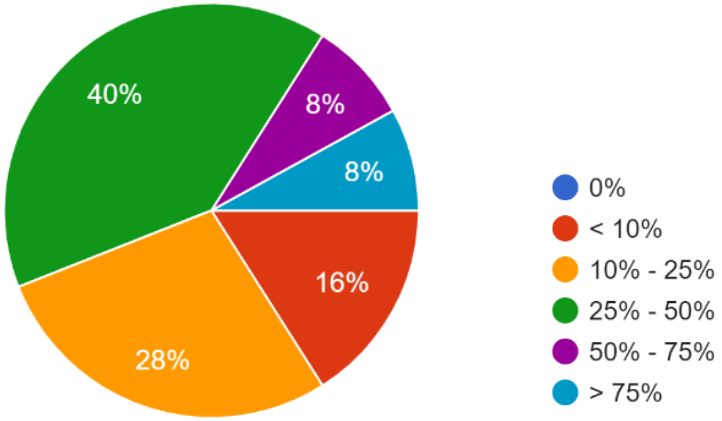
Based on various factors, interests and initiatives, the percentage of open data available for planning of these different sectors varies. Preparation of Integrated Urban Development Plan is a popular planning practice amongst the survey participants which includes an integrated planning of all the aforementioned sectors. The survey of urban planners as well as search of online datasets for preparing an IUDP of Madhyapur Thimi Municipality reveal that the percentage of data available openly for planners is around 50% (if we consider any form of open data – which includes PDFs, otherwise, the percentage is less than 30%).

Table 5-1 Online Availability of Datasets for preparation of IUDP of Madhyapur Thimi Municipality

DATA TYPE/SECTOR	FULLY OPEN	PARTIALLY OPEN	UNAVAILABLE	TOTAL
PHYSICAL	1	12	16	29
SOCIAL	6	4	7	17
ECONOMIC	6	8	17	31
ENVIRONMENTAL	0	9	15	24
DISASTER	1	4	1	6
FINANCIAL	0	7	0	7
ALL	**14 (12.3%)**	**44 (38.6%)**	**56 (49.1%)**	**114**
TOTAL	**114**			
Fully Open – Machine Readable Format, Partially Open – PDFs				

Table 5-2 Online Availability of Datasets for preparation of IUDP of Madhyapur Thimi Municipality

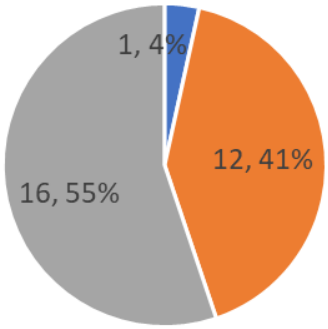
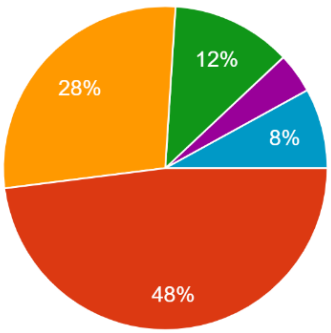
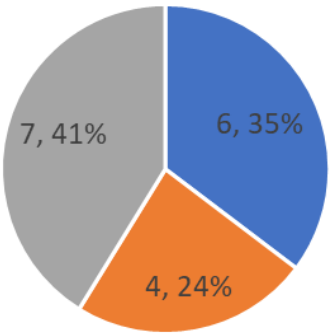
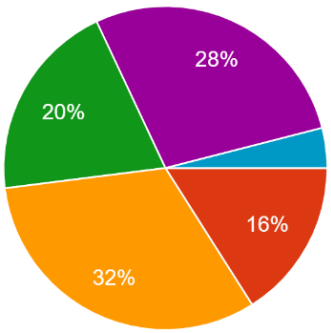
DATA TYPE/SECTOR	OPEN/PARTIALLY OPEN	UNAVAILABLE	TOTAL
PHYSICAL	13 (45%)	16 (55%)	29
SOCIAL	10 (59%)	7 (41%)	17
ECONOMIC	14 (45%)	17 (55%)	31
ENVIRONMENTAL	9 (37%)	15 (63%)	24
DISASTER	5 (17%)	1 (83%)	6
FINANCIAL	7 (100%)	0 (0%)	7
ALL	**58 (51%)**	**56 (49%)**	**114**



Mean – 32%, Mode – 37.5%

Figure 5-5 Percentage of Data Openly available as per Survey Participants' Experience

Table 5-3 Table comparing % of Availability of Open Data of various sectors between Online Search and Survey

SECTOR	% Openly Available in Madhyapur Thimi (S1)	% Availability per Survey Respondents (S2)	Remarks
Physical	 *O/PO – 45%*	 *Mean : 20.6%* *Mode : <10%*	While S2 reveals that only around 20% data is available openly, S1 shows around 45% data are open. On average, around **30%** of data are open.
Social	 *O/PO – 59%*	 *Mean : 34.1%* *Mode : 10-25%*	S1 reveals around 59% data are openly available, S2 has the mean value of 34%. On average, around **45%** data ae open.

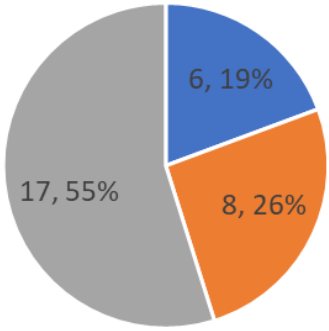
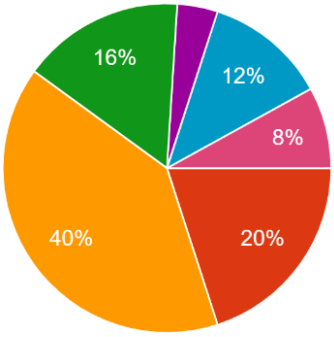
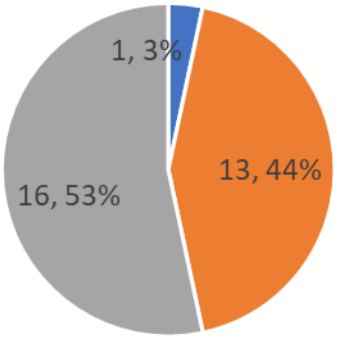
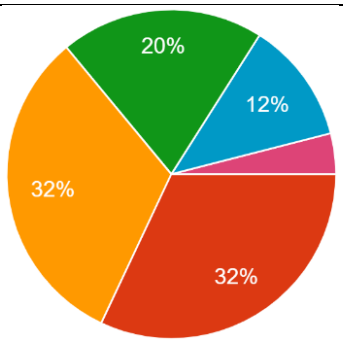
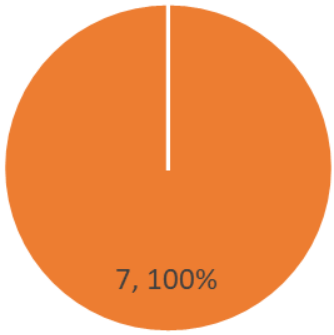
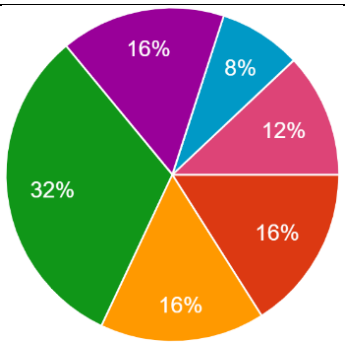
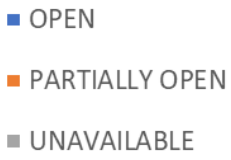
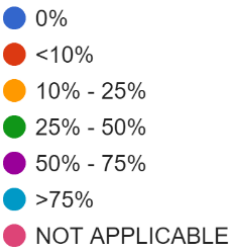
Economic	 *O/PO – 45%*	 *Mean : 28.3%* *Mode : 10-25%*	45% of the data are openly available in S1. For S2 the figure averages 28%. The average of both studies is around **35%**.
Environment and Disaster	 *O/PO – 47%*	 *Mean : 25.4%* *Mode : <10% and 10-25%*	S1 reveals around 45% openly available while S2 indicates around 25%. On average, around **35%** data are openly available.
Financial	 *O/PO – 100%*	 *Mean : 36.6%* *Mode : 25-50%*	S1 indicates all data openly available. S2 reveals around 35% data open. On average, around **65%** of data open.
Legend	 O – Open PO – Partially Open		In S1, Open means Open in machine-readable format, Partially Open means may be open in Pdf form.
Note : The remarks have been made by considering any form of openly available data, irrespective of their machine readability.			

Table 5-2 reveals that data of physical sectors are the most difficult to get in machine readable format. Likewise, the environmental and disaster sector data are also not openly available. Social and Economic data are somewhat available openly, which could be because many

international doner agencies are focusing on GESI and poverty issues. Financial data are mostly available in pdf forms- which shows general tendency as well as capacity of municipality officials to share data in that format.

It is also important to consider what kind of availability is present and to assess if the data shared is truly accessible. A report (The World Bank, 2020) on assessment of effectiveness of data sites in Nepal revealed that 85% of the sites have the most basic machine-readable formats. This is a good percentage considering Nepal is a developing country and most of the work is still carried out in pen and paper.

However, when it comes to urban planning open data, the story is different. Experiences from the survey participants (Figure 5-6) indicate that most data for planning purposes are still available in pdf form, or non-machine-readable formats. This clearly shows a need to increase awareness among the data producers and data sharing entities to share more data in machine readable formats. PDFs are popular for their ease in view, share, and transfer.

> The survey department generates various spatial data. Not all data can be made freely available because they may contain sensitive information. Fee is levied as per the "Digital Data Distribution, Use, and Regulation Guideline 2069". The department is working towards online payment systems so that people do not have to be physically present in the department to get spatial data. (D. Dhakal, personal communication, October, 2023)

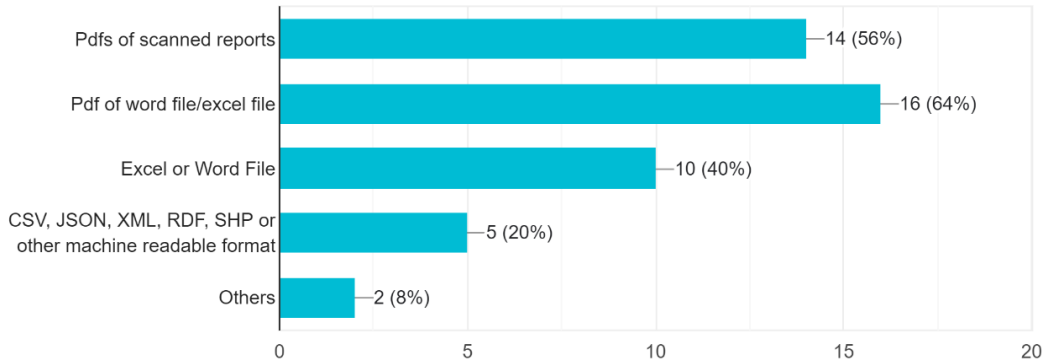


Figure 5-6 Open Data Formats available for Planning works

The survey also reveals that most of the planners are either unaware about whether the data they produce have been shared online, or do not share the data online at all. Because planners are hired as consultants and do not have access to data portals and follow up regarding the upload of data online is not practiced, this scenario has been created. Even the planners who have shared their data online are primarily sharing data in pdf or scanned report forms, resulting

in most data available in the same formats. One of the KIIs mentioned that it is important to understand the expertise and level of awareness of users. Both the service providers and service seekers should be on the same page about data distribution. If the users are not aware of the data they use, it would be difficult to promote an open data ecosystem.

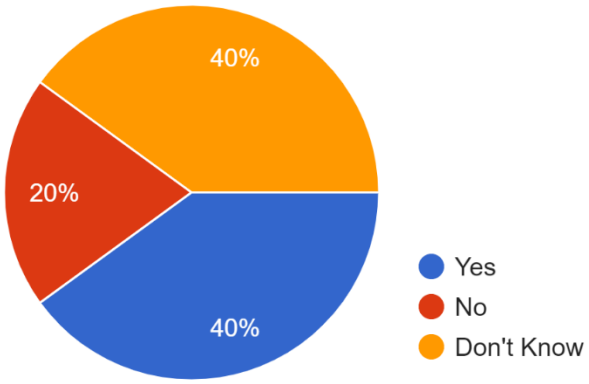


Figure 5-7 Survey Respondents on whether they have made their data openly available online

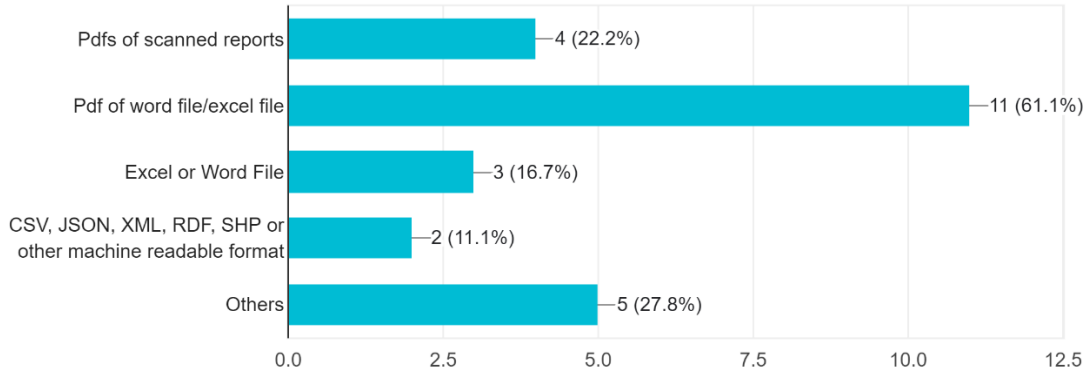


Figure 5-8 Common Data formats shared by Urban Planners when they share data Openly

Two KII conducted shows that there is a mindset of considering Pdf as an easy to upload, download, and use format. This is a probable reason for most data being shared in Pdf format. This indicates that most data are present in one star data format.

On a positive note, this scenario is likely to improve in the coming years. Local and federal level institutions are engaging in conversations about data portals. KII with officers at Budhanilkantha Municipality, Changunarayan Municipality and the NSO reveal that they have been working actively to promote culture of open data and providing data in machine readable format- moving towards a paperless era.

Development organizations like ICIMOD are also sharing some of their data in accessible formats (machine readable re-usable forms) under their data policy. The policy acknowledges that, in order to facilitate more open and critical examination throughout the peer review

process, scientific journals are increasingly requiring the availability of research data alongside published papers. ICIMOD shall make the research data used in its publications available through its institutional repository or an appropriate external repository, unless prohibited by confidentiality or rights of third parties.

> ICF Nepal is currently working on Municipal Asset Management System that is like an inventory of various services and infrastructure of municipality. It contains information on the location, condition, number, and other attributes of following and more: Roads, Drains, Water Supply, Open Space, School, Healthcare Institutions, Educational Institutions, Community Buildings. (S. Basnet, personal communication, July, 2023)

Likewise, an Integrated Data Management System (IDMS) – with government domain and funded by development partners is being developed in some municipalities outside Kathmandu Valley like Tulsipur and Birgung. These systems contain open data in formats that could be easily accessible. The wave of change is likely to catch up with the municipalities in Kathmandu Valley. A KII revealed that Kathmandu Metropolitan city has a dedicated GIS team that is working on mapping of flooding and public transportation systems. Making these data open would be very beneficial to many stakeholders.

5.2. Cross Case Analysis on Availability of Open Data for Planning

Following is a cross case analysis of open data portals from Barcelona, Pune, and Nepal. In lack of open data portal of a city in Kathmandu valley, a data portal of Nepal has been used. The objective is to compare the position of open data initiative in Nepal with that of international context.

Table 5-4 Comparison of Open Data Portals

Basis of Comparison	Open Data BCN	PMC Open Data	Open Data Nepal	Remarks/ Recommendations
Owner of the Portal	Barcelona City Council	Pune Metropolitan City	Open Knowledge Nepal	Cities/Municipality
Country and Continent	Spain, Europe	India, Asia	Nepal, Asia	-
Size (sq km) of City/Country	BCN: 101.9 sq km Spain: 505,990 sq km	PMC: 1110 sq km India : 3,287, 263 sq km	Nepal : 147, 516 sq km	-
Population of City/Country	BCN: 1.62 million	PMC: 4.307 million	Nepal : 29.1 million	-

	Spain: 47.42 million	India : 1.4 billion		
Year the Portal was started	2011	2016	2019	City level portals need to be made
Open Data Policy	Available	Available, 2019	No	Need to draft and implement Open Data Policy for Nepal
Number of Datasets	571	559	629	As many as possible that are of good quality
Major Themes/Categories of Datasets	5 - Territory, Population, City and Services, Administration, Economy and Business	29 Departments (Traffic, Water Supply, Bhavan Rachna, Social Development, etc)	12 – Agriculture, Census, Education, Finance, Health, Legislative, Geo Data	Better to have 5-6 number of themes (could be sectors of IUDP to ease communication with stakeholders)
State of Updating of Data	Very Updated	Updated - Site down	Fairly updated	Should be regularly updated (daily, weekly, monthly, yearly, as necessary and possible)
Popular Formats	CSV, JSON, XML	XLS, XLSX, XML	CSV, XLSX, XML	Machine Readable formats (avoid Pdfs and images)
Number of Shapefiles	22	0	1	Geolocated/Spatial files are crucial for urban planning projects. More shapefiles should be made openly available.
Licensing of Datasets	Creative Commons Attribution 4.0	Unclear	Creative Commons Attribution 4.0	Creative Commons Attribution 4.0 or updated
Metadata	Available for all datasets	Not clear	Not clear	Should be made available. Helps to track and improve quality of data and data source.
Feedback Mechanism	Clear “Contact Us” button at the button of the portal	Small “Feedback” link at the	“Suggest Data” links on top and	A clear and easy to locate button/link should be provided.

		bottom of the portal	bottom of the portal	Engagement of people should be prioritized.
Link with SDGs	Data categorized as per SDGs	No	No	Should be maintained (helps in tracking indices and targets)

Table 5-3 shows that some attributes of Nepal's data portal are quite better than Pune's. The analysis reveals that the open data portal in Barcelona is quite mature. Both India and Nepal can learn a great deal from the quality and standard of open data portal of Barcelona. Nepal has an advantage of contribution from civil societies in the field of open data.

It is a high time cites in Kathmandu Valley started to establish data portals and catch up with the international trend. For that, a national open data policy is required. A national open data portal already exists (although it is not updated). The data portals of cities could be linked to this national portal operated by the National Planning Commission.

5.3. Use of Open Data in Planning of Cities in Kathmandu Valley

Data, in general, is an important asset in the field of urban planning. From the KIIs conducted, it was established that planning relies heavily on the use of data. This was substantiated by the result of the survey as well (Figure 5-9).

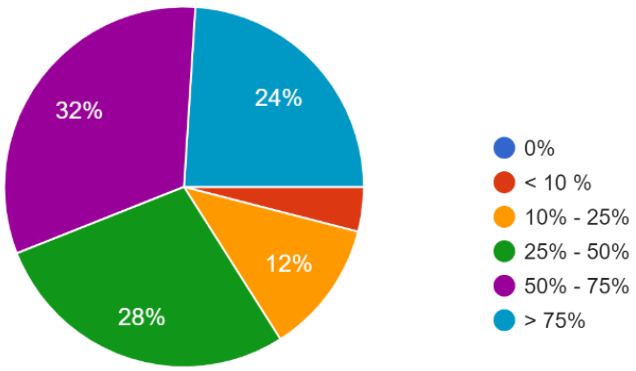


Figure 5-9 Result of survey question - What percent of planning process relies on use of data?

A KII mentioned that planning is supposed to be a fact-based practice that involves projection using existing archives and similar case studies. Data is, therefore, an important aspect of planning. It is also important for the planners to have knowledge about availability of the data- where and how they are available. Another KII mentioned that Urban planning can become a very good tool only if data and GIS are effectively used.

> In Hongkong, there is a planning department website which contains data and information from any planning study completed or going on. There is a good report and information sharing platform (included overall planning, transport department, and online zoning plans). Data up to plot level is available. It is easier to see the change use and apply and/or make decisions. Similarly, in Hawaii, there is a good dataset related to the disaster. The flood level data is timely updated with real-time applications whenever there is a HLF (high flood level). Likewise, GIS data of Tsunami are well maintained that helps researchers and planners to prepare plans. (M. Joshi, personal communication, July, 2023)

Open Data is an important type of data in the field of Urban Planning. Almost every urban planner in Kathmandu Valley accesses open data (maybe in Pdf form) from at least one of the following sources: the NSO (formerly CBS), municipal websites, and OSM via GIS applications. However, the awareness about them being Open Data is not 100%, as shown by the result of the survey (Figure 5-10). A KII also indicated that some planners in Nepal are not even aware about Open Data Portals. It means that there is a need for planners to be made aware that they are using open data and realize that open data and open data portal is important for planning. This way, they may be encouraged to start producing and sharing open data via open data portals.

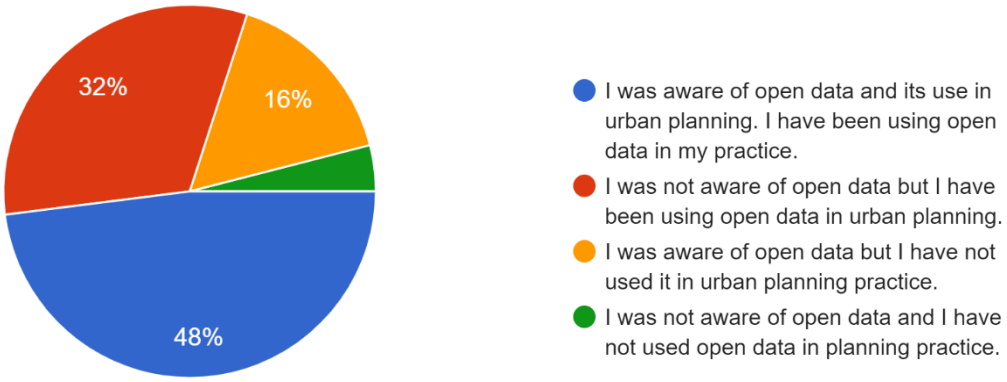


Figure 5-10 Result of Survey showing awareness of Open Data among the survey participants

Nevertheless, Urban Planners in Kathmandu Valley, when made aware about definition of Open Data, are clear that Open Data is important in urban planning (Figure 5-11).

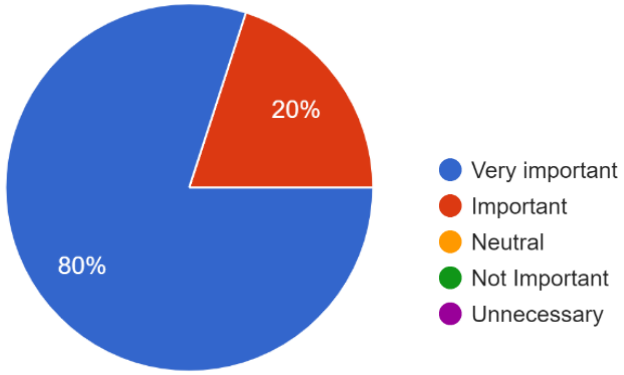


Figure 5-11 Result of Survey Question- How important is Open Data in Planning?

From the literatures (Section 3.6, 3.7), it is clear that Open Data has a vast potential of use in the field of Urban Planning- ranging from geolocating data, enabling cross-sector collaboration, and monitoring impact to disaster response, increasing government efficiency, and corruption prevention. Use of Open Data ultimately culminates in the outputs of any planning process- reports, maps, charts, projections, action plans, etc. Use of Open Data adds value by increasing the efficiency and accessibility of the project. The main types of results that are produced by the survey participants using Open Data are as follows:

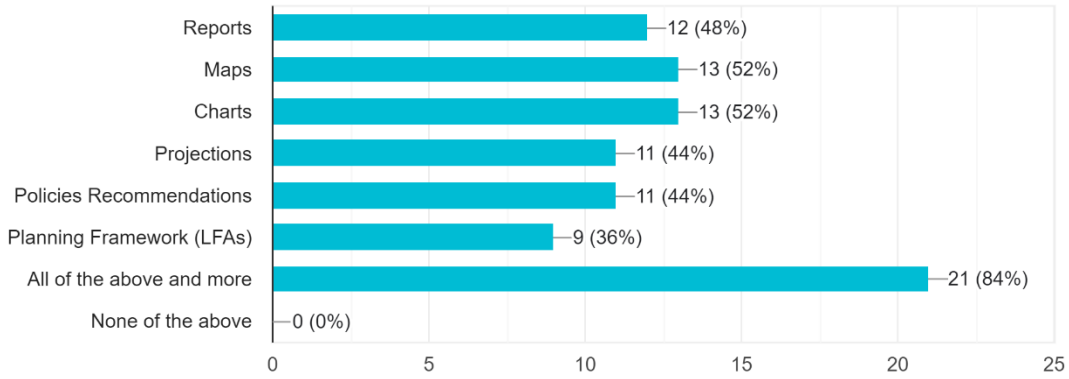


Figure 5-12 Types of Results or Outputs produced by using Open Data

From the survey, it was clear that Open Data of various sectors may be used to produce various results, including, but not limited to the following: Maps, Charts, Service Availability, Change Matrix, SWOT, Project Banks, Inventory, Management Plans, Need Assessment, Pattern Analysis, Policies, Capacity Assessment, Strategic Action Plans

The results or outputs for different sectors of planning may be different. The top four results generated using Open Data in different sectors, as per the survey are shown in Table 5-4. The details of the results are available in the Annex.

Table 5-5 Top 4 Results generated using Open Data in different Planning Sectors

Sector	Top 4 Results Generated using Open Data
Physical	Maps, Charts, Strategic Action Plans, SWOT
Social	Charts, Maps, Need Assessment, Policies
Economic	Charts, SWOT, Policies, Maps
Environment and Disaster	Maps, Charts, Strategic Action Plans, Need Assessment
Finance	Strategic Action Plans, Policies, Charts, Need Assessment

Example of application of Open Data in Republic of Korea (Fernz, 2022) for e-procurement system showed that open data can help decrease the bidding time and save billions of dollars. In Nepal, although there was an initiative to make the procurement process open via the "ppip.gov.np" website, a lot more is still required to be done. Procurement at district and local levels also needs to be made open and transparent. At present, DUDBC has a digital procurement system in place that has already made the system much more efficient than paper-based systems. Upgrading this into an open data initiative would add more value to the system and engage more stakeholders while helping prevent corruption and multiple inefficiencies at implementation of projects.

> District Rates for tendering purposes are made available by the District Administration Office. Most of the notices are not paperless and posted online. The system of online monitoring of projects is available to the administrators. Monitoring has helped to increase project efficiencies. (N. Bhandari, personal communication, September, 2023)

A good example of use of Open Data in planning is the use of a real-time open data portal in the aftermath of the 2015 Nepal earthquake. The national planning commission, with the technical support of the KLL, made an open data portal to explore real time data for severely affected areas. This initiative helped save many lives as well as make a remarkable documentation of earthquake effects on lives and property of people. KLL has also actively been involved in the OSM project that has been feeding open data attributes to the OSM. Use of OSM data has been a revolutionary step in the field of spatial planning in Nepal.

Another similar example is that of BIPADportal. BIPADportal under the Ministry of Home Affairs provides real time as well as historical inventory of disasters occurring throughout the country. This inventory can be used as an important asset to assess the situation of and build a roadmap for urban resilience of cities in Kathmandu Valley.

5.4. Benefits of using Open Data in Planning of Cities in Kathmandu Valley

> Compared to traditional methods, the use of open data (or data in general) has helped to make the planning process easier. The use of open data from various sources like NSO, google maps has made the task of past data analysis easier- this has helped in analysis and development of settlements easier. Searching for data, processing of data, and publishing of data has been made easy. (N. Bhandari, personal communication, September, 2023)

A World Bank webpage (n.d.) highlights the benefits of using Open Data that includes use of open data in tracking of government actions like budget spending, improving transparency of government activities, improving participation of citizens in public planning, creating new data driven solutions, and making it efficiently less expensive to locate and access government data by reducing acquisition costs, redundancy, and overhead. These benefits are not limited to one field or the other- which means that Urban Planners can also reap them. The result of survey of planners (Figure 5-13) reveals that urban planners do appreciate the idea that Open Data makes the planning process easier.

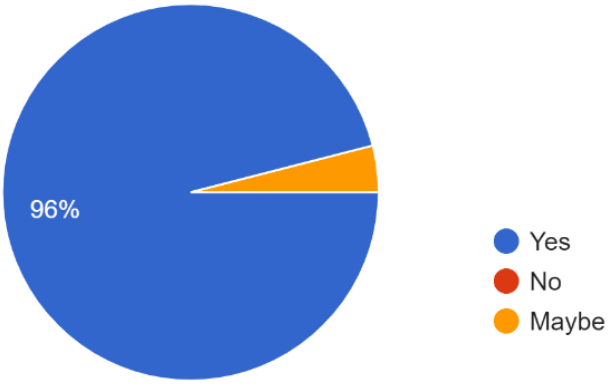


Figure 5-13 Survey response to the question - Does Open Data making planning easier?

A key informant, with over a decade of experience in the field of Open Data, revealed that Open Data promotes evidence-based, and data-driven planning while preventing duplication of work that wastes a lot of resources. Another key informant, with many years of experience in urban planning, shared that different duplication of data by undertaking different unnecessary surveys could be avoided if there was a good system of Open Data. The informant added “Development work at local levels is not guided by data. A Fact/Data driven approach needs to be developed from local levels.”

Clearly, the field of data for urban planners has many duplicated data and the process of creating datasets is expensive. Practice of sharing data via open data portals could help to save a lot of time and resources – manpower as well as financial capital - that could be utilized elsewhere.

> Open Data ecosystem invites crowd-based support and sourcing – which can be very useful to drive innovation and make better accuracy data available. (S. Basnet, personal communication, July, 2023)

> In urban planning, everything is connected to data – whether its infrastructure data, or population data. Even the plans made under the influence of political will and aspirations can be substantiated by using data. (O. Rajopadhyaya, personal communication, July, 2023)

The collaboration of the open data ecosystem and crowd-sourced support in urban planning is a powerful driver of innovation and accuracy. This approach not only develops innovative ideas but also enhances data precision through collaborative validation by using the collective intelligence of citizens, researchers, and professionals. This integration enables data-driven decision-making, substantiating plans with evidence, and fostering civic engagement – making an ecosystem where data supports everything from infrastructure to policy. A result of the survey (Figure 5-14) also suggests that use of open data helps to make informed decisions – validating the claims of key informants.

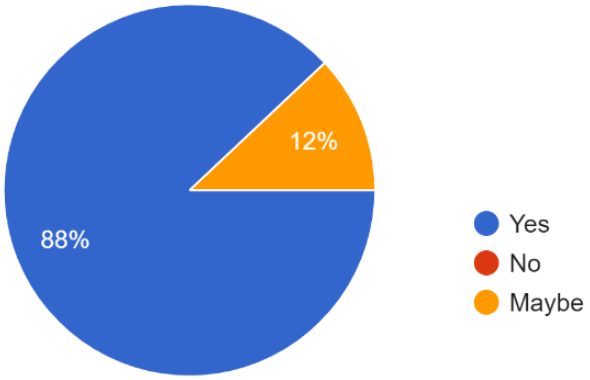


Figure 5-14 Result of survey for the question- Do the use of Open Data help make informed decisions?

In a municipality, requests for datasets may be repeatedly made by an array of people and institutions. A key informant informed that municipal officials lose a lot of time and effort in repetitive sharing of same resources and a one portal- one platform solution for sharing Open Data helps to utilize time of municipal officers in other meaningful engagements. The

informant, who has successfully launched an open data portal for a municipality in Kathmandu Valley, added that sharing the data in open data platforms in an organized way helps to make data meaningful and improves usability of datasets.

The result of the survey (Figure 5-15) supports the claims and information provided by the key informants about benefits of using Open Data in urban planning.

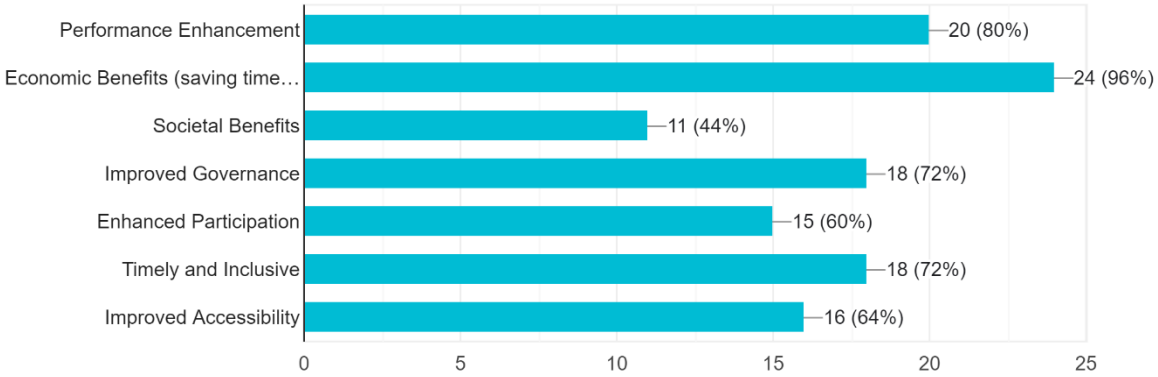


Figure 5-15 Benefits of Open Data as per survey respondents

The survey participants also added that Open Data initiatives can help in maintaining data consistency- making it easier to conduct desk study for any planning project. One of the participants added that Open Data adds credibility and authority to planning proposals and helps attain measurable goals by improvement in strategies based on data-analysis. Another believed that the use of Open Data can provide a quick overview of the situation. This can help the planners in aligning themselves with the actual needs of the planning process. A participant mentioned that Open Data helps to provide a proper direction for socio-economic development and contributes towards policy reform.

Comments from the survey participants shed light on the varied benefits of Open Data initiatives in the context of urban planning. Respondents agreed on the importance of Open Data in ensuring data consistency, which simplifies the process of performing desk studies for various planning efforts. This uniformity not only speeds up the research phase, but it also provides a more credible platform for subsequent decision-making.

Participants' perspectives and informants' views converge on the idea that integrating Open Data improves the credibility and authority of planning proposals significantly. By basing these suggestions on solid data sets, urban planners are better able to develop strategies and interventions that are not only well-informed but also capable of achieving measurable

outcomes. This aligns with the ethos of evidence-based decision-making, as Open Data enables planners to move beyond guesswork and develop projects that are more likely to produce desired outcomes.

The concept of Open Data providing a fast overview of conditions is an exciting finding from the study. This skill is vital in the field of urban planning, where a thorough awareness of the current context is required. Open Data serves as a compass, directing planners to quickly connect their strategies with the actual demands and challenges of a given planning process. This alignment eliminates the possibility of misdirected efforts and ensures that resources are focused where they will have the most impact.

5.5. Challenges in using Open Data in Planning of Cities in Kathmandu Valley

There are many challenges facing the Open Data ecosystem for planning of cities in Kathmandu Valley. The survey of planners revealed that scientific data, public safety data, mobility related data, geo-spatial data, and environmental data are the most challenging to get online.

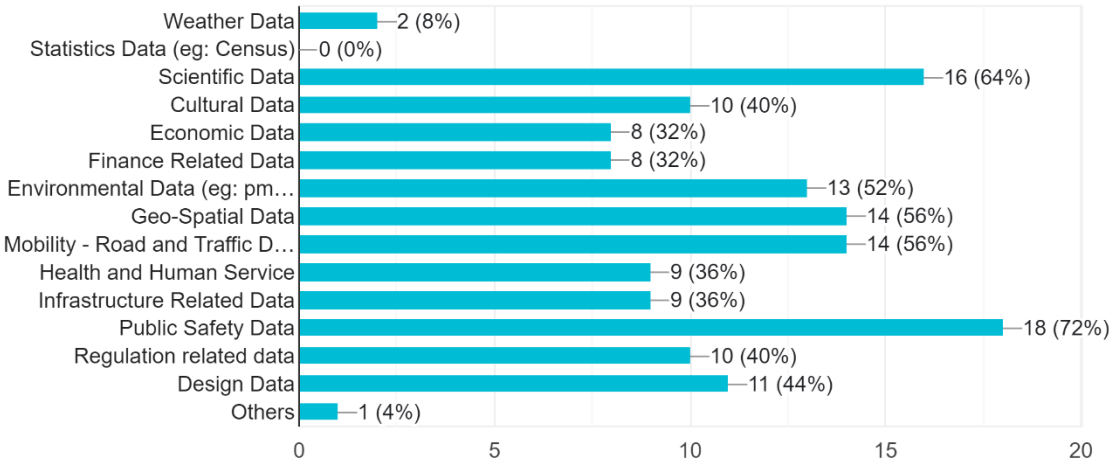


Figure 5-16 Data that are most challenging to get online according to survey participants

The KIIs as well as the survey both reveal that the institutions that should be sharing data are not enthusiastic about sharing data to public. The concept of data sharing is not well developed in the mindset of concerned stakeholders. One of the KIIs mentions that even in the age of data and information, there is no realization among the concerned stakeholders that data should be integrated into one platform and shared for effective planning. Oftentimes, the data producers are not aware about why data is required, and for what purpose.

> There is still traditional thinking among various government officials. The government officials are hesitant to make registration numbers (darta chalani) available to people. (R. Mainali, personal communication, September 2023)

KIIs also reveal that when it comes to data sharing, the consultants as well as government bodies are focused on getting monetary gain out of it. Data has been taken as assets, and even the public institutions that are supposed to share data freely take fee for data sharing – an example of this is the fee levied on spatial data provided by the survey department. Another concerning issue is the prominence of the concept of "Data/Information as power". This has challenged the ecosystem of sharing data openly, for there is no tendency to devolve the power.

Sometimes the private sectors tend to be more conservative while sharing data – there should be a systemic change in the practice and culture of data sharing. One KII pointed out that the consultants in the country are not inclined to share their data with other consultants over the concerns of others finding errors and faults in their practice. In addition to this, most consultants only provide reports of projects to the government body- not the dataset. Even the data produced by various doner funded agencies do not get shared with the government. The agencies only provide reports to the government after investing a lot of resources in data (including spatial data) preparation and analysis.

All these result in difficulty in obtaining data and information for planning purposes, evident by the result of survey (Figure 5-17). 40% of the participants had to rely on their network with the people in power to get the data they needed, while 64% had to go through a long and tedious process to obtain data that could have been made freely available on the internet.

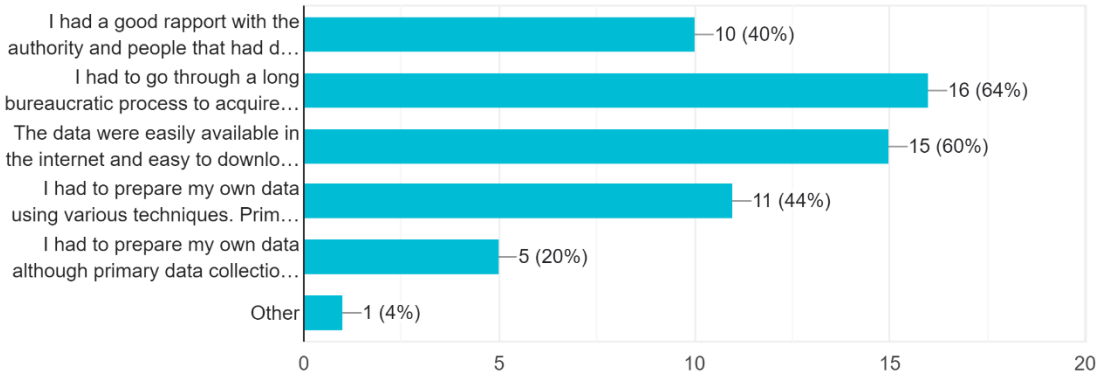


Figure 5-17 Survey participant's response to process of data collection for planning purposes

The result in Figure 5-17 is a clear indication of issues that are present in the data management system of institutions. An officer at the NSO said that historical data is not in format that can

be shared online. While the institution is working towards digitizing them, this is an example of lack of government initiatives in digitizing past archives which hold a lot of learning opportunities. Another issue, as mentioned by one of the KIIs, is that the technical staff of municipality or other government offices are not aware about open data ecosystem. Another KII added that it is difficult to get the government officials on-board to digitize data – they are willing to perform repetitive actions but do not want to engage in entering data into data portal. KII of IT officers of municipalities suggest that there is difficulty in uploading large files into government server. Limited server and lack of dedicated server to host data are other challenges IT officers face while trying to upload data into municipal websites.

One of the biggest threats when it comes to data sharing is the presence of data silos and system silos- meaning that the access and use of data and systems are limited to certain groups of people or systems. At the same time, there is a practice of "upward reporting" system which leads to the local system not being able to access their own data – this negatively impacts decision making. The Management Information System (MIS) in Nepal does not support interoperability of data. Example can help to clarify this:

> The government has produced many planning documents like IUDPs, but they are not easily available for reuse. There is no database that could be shared. The work done by one department/section of the government is limited to that department/section. Other departments are unaware or oblivious of it. (M. Joshi, personal communication, July, 2023)

There are also instances of loss of institutional memory when the person in charge is changed or the term ends. There is no transfer of knowledge/information/data from one leadership to another.

Even the data that can be considered Open are not truly open. The data shared by government institutions, development partners, or private entities are rarely within the global definition of open data. The data shared for planning does not follow the principles of open data (Section 3.6). The data/datasets are:

- Not Open by Default
- Neither Timely, nor Comprehensible
- Not Fully Accessible and Usable
- Not Comparable and Interoperable

- Devoid of proper Feedback Mechanism

Not Open by Default

In the absence of an Open Data policy, and lack of willingness or enthusiasm to open data, as suggested by the KIIs, most of the data related to planning of cities in Kathmandu are closed. The notion that open-data could violate privacy is cited by bodies like the Survey Department, preventing them from sharing data openly. It should be well established that private or personal or sensitive information can be anonymized.

Neither Timely, nor Comprehensible

KIIs and survey result (Figure 5-18) reveal that there is lack of reliability and timely update of data produced by various institutions. At the same time, the data that the institutions share lack metadata – data about data. It is essential to share metadata along with open data because metadata provides information about completeness, accuracy, and history of data. The datasets shared do not follow any standard (example ISO standard for open data).

The completeness of Open Data is highly dependent on the technical dimension and requires technical expertise/capacity/knowledge. In the case of municipalities in Kathmandu Valley, they may not be technically capable yet (or may not be priority of IT officers who are overwhelmed by administrative tasks). As a result, planners are not confident about the completeness of Open Data available for planning (Figure 5-19).

A KII also revealed that there is a lack of guidelines to maintain government websites/data portals.

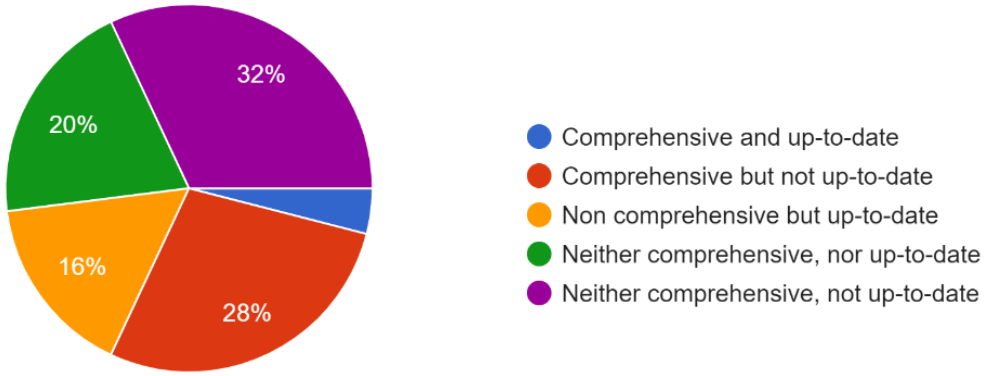


Figure 5-18 Result of State of Open Data in Planning

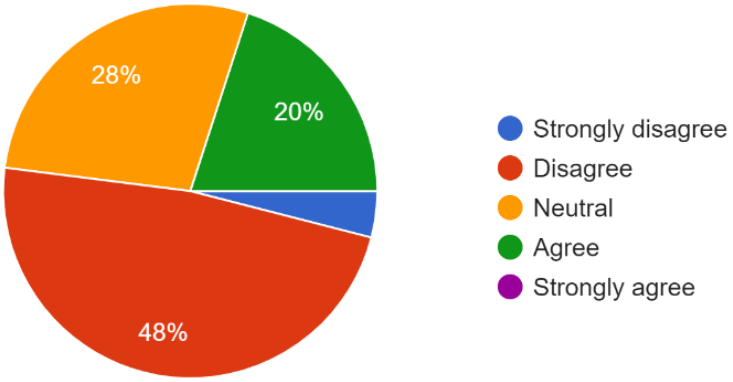


Figure 5-19 Survey Result of question - How confident are you about the completeness of Open Data in Planning

Not fully Accessible and Usable

There is availability of open data, but their accessibility is questionable. There is a lack of awareness about the concept of Search Engine Optimization- which leads to users or researchers not being able to find data easily from government websites. We can take an example of municipal profile of municipalities in Kathmandu Valley – profiles in pdf form are deep into the website of municipality. This is reflected in the survey result (Figure 5-20).

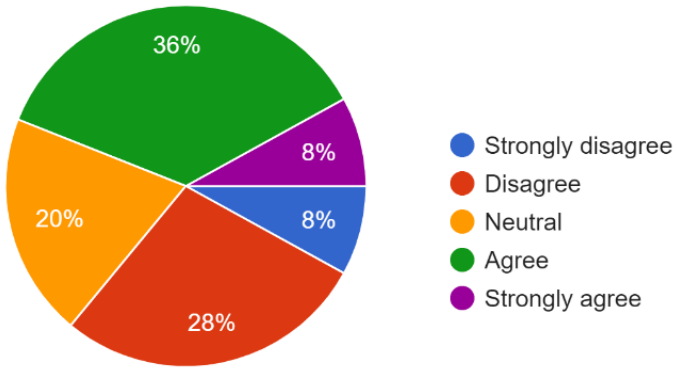


Figure 5-20 Survey response to question - Open Data available are easy to access and process

There is also a lack of clarity of licensing in data shared by government bodies. The concept of licensing for reuse and redistribution is largely ignored in sharing data. Open Data are typically shared in creative commons licenses as suggested by the literature (Section 3.11). KII with NSO officers revealed that while there are no clear written licensing related rules in the NSO, the data can be used by anyone, free of cost, by providing attribution to the NSO. However, the user is responsible for any output produced by manipulating the data provided by NSO. A national open data policy can solve this issue of confusion in licensing.

Not Comparable and Interoperable

One of the important and challenging parts of open data is that the data collected by one project should be usable by another project – data needs to be interoperable – then the actual use of data is achieved. Inter-operability of data helps to create 4-star Open Data.

The issue with the data sets available for planning is that good quality and quantity of datasets are not received from concerned departments for uploading into websites. An informant claimed that issues of negligence and reliability are prevalent in data which necessitates crosschecking of data before use. This is also substantiated by the result of the survey (Figure 5-21) question regarding the quality of data in planning where over 75% participants confirm confronting data quality issues.

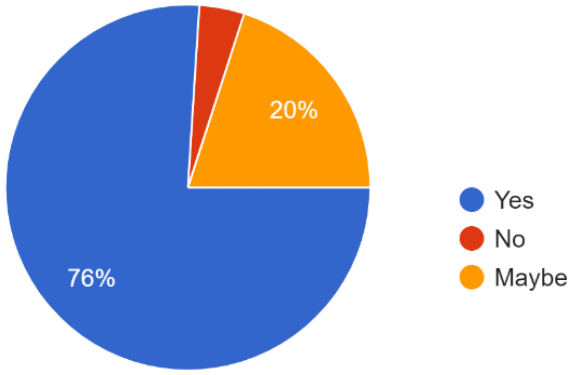


Figure 5-21 Survey result for question - Do the issues of Data quality come up in your planning practice

Another KII revealed that there are discrepancies in data produced by different institutions. For instance, the data provided by the census and data collected by municipalities do not match. Different development partners like the World Bank, ADB, UN Habitat prepare different data that do not match with one another. Even the data produced by different government agencies do not match. At times, there is even a non-overlap of data provided by the same institution. For example, the spatial data on boundaries – wards, municipal boundaries, district, province, and nation - provided by the survey department, do not overlap. One key informant even claimed that the cadastral map prepared in the 1970s using plane table survey does not overlay correctly with new surveys done using total station or drones. Around 20% discrepancies occur between these two types of survey data. This indicates a clear need for timely update of land data by the government institution.

> Data is not interoperable. Data linkages are difficult to achieve because data coding done by different institutions is not the same. For example, voters list from National Election

> Commission may have code of district set as A, B,C, while Ministry of Home Affairs may recognize districts with code 1, 2,3. This creates issues with data mapping. There is a need for standard coding mechanisms to help make data sharing and interoperability easier. Example of eBPS: For one type of work, different municipalities use different servers. Works are being done in isolation and integration is missing. (A. Dutta, personal communication, September, 2023)

Devoid of proper Feedback Mechanisms

The government websites that share data for planning do not have an easy feedback mechanism (Figure 5-22). Feedback or contact option are generally available towards the bottom of webpage. Distinct feedback button can be seen in some open data portals hosted by civil societies. Even the new data portal of NSO lacks a feedback button. However, an NSO official mentioned that anyone can provide feedback or suggestions to the NSO via the main website or in person.

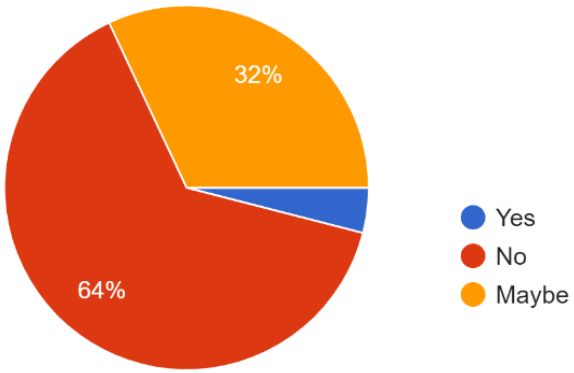


Figure 5-22 Result for - Is there a feedback mechanism in institutions that share planning data?

A lot of these challenges exist because of lack of technical manpower, financial constraints, and insufficient hardware and software infrastructures. It is also important to consider the users of the data and therefore make data that can be actually used by the end users. The capacity of users should also be developed to enhance open data ecosystem.

5.5.1. A Case of Challenge in maintaining a National Open Data Portal

From the KII with NSO officials, it was discovered that there is a national open data portal: Nationaldata.gov.np. This was started by a team in the national statistics office to decentralize data. A standard was set by the office (when it was under the National Planning Commission as Central Bureau of Statistics). Around 753 personnels were trained to use the portal and feed

data into it. IT Officers and IT Consultants of local levels took part in the training. This was verified by KIIs with IT Officers of Budhanilkantha and Changunarayan municipalities. However, all the trained manpower were not retained by the local bodies – creating inadequate human resources to feed data into the portal. There has also been no regular monitoring and evaluation of the system.

The council of ministers has been very positive and enthusiastic about the use and updating of the portal but there seems to be a general lack of coordination between MoFAGA, MoCIT, and local bodies to update the portal.

Due to various reasons like pressures from development partners, several local bodies have started to create their own portals- leading to duplication of work and inconsistency in delivery of database system in the country – which is likely to lead to a financial burden for the country.

5.6. Gaps in Policies for Open Data for Planning in Kathmandu

The Constitution of Nepal (2015), under article 27, provides right to information. Every citizen has the right to request and get information on any topic that is relevant to them or the general public with the limitation that no one may be forced to provide information about any subject about which legal secrecy is required. The constitution provides a strong foundation for sharing data Openly.

KII with a Joint Secretary of the Ministry of Communication and Information Technology revealed that there is an "Electronic Transaction Act- 2063" that contains the act for digital signature. An IT Bill was presented to parliament in 2075 but still has not been passed. Redrafting is going on to include more aspects of digital data. ICT policy-2072, Cyber Security Policy – 2080 are present that contain issues about data. An Integrated ICT Policy is being drafted. It is important to draft Acts and Regulations after the policies have been made. Data protection law talks about the owner of data as well as dissemination of data. Dissemination of data is best done in Open Data format so that interoperability of data is achieved. The ICT Policy 2015 (2075 BS) has the strategy to use ICT for government services innovation and better governance. Under this, promotion of e-governance initiatives under open governance and opening up of government data has been prioritized. It is important to explicitly use the term "Open Data" and acknowledge the importance of Open Data concept and initiatives in the policy.

The Right to Information Act (2007) provides the citizen of Nepal with access to the information held in the public bodies. The act also makes public bodies responsible for timely classification, publishing, and update of information. The act also makes it necessary for public bodies to arrange for an information officer whose responsibility is to disseminate the information held in the office. In order to safeguard, advance, and implement the right to information, the act also makes provision for an independent National Information Commission. The Right to Information Act helps to promote sharing of data and information. However, the act needs to be updated to include digital data and information. This will cause the public bodies to share their data and information online without any confusion. If any public institution does not provide data as per "right to information", they are made aware about it and if they do not comply, they are penalized as per the law (*dafa* 32).

The topic of Open Data has been limited mostly to conceptual talks. There is an unwritten assumption that the data and statistics available in government bodies are secure and correct. And, if data is kept in government bodies, the public can easily access data. This is not always the reality.

The National Information Commission has submitted the Government of Nepal with the National Action Plan (2017) on Open Government Data (OGD). The plan emphasizes the international significance of Open Government Data and advocates for its incorporation into Nepal's policies and practices. The plan underlines the importance of translating laws, implementing OGD into national policies, and coordinating among many stakeholders such as government agencies, professionals, researchers, and civil society leaders. There is a clear need to draft a National Open Data Policy to support Open Data Ecosystem in the country- that can greatly help the planning practices. According to the KII with the information commissioner of the National Information Commission, there has been no development in the policy of Open Data ever since.

Digital Data Distribution, Use, and Regulation Guidelines 2069 and the Geo Information Infrastructure Policy (still in draft form) both do not talk about open data. There are some points in the Digital Data Distribution, Use, and Regulation Guidelines 2069 about providing some data for free via the official website but does not include the concept of Open Data. The policy that is being drafted also does not consider the concept of Open Data as per the KII with the director of Survey Department.

The National Strategy for the Development of Statistical System (2019) has a strategic objective to manage regular supply of statistics by providing reliable and quality data for evidence-based policy formulation, development management, and addressing the demands of users. Under this objective, it has strategies to produce and supply quality statistics, utilize statistical sources in production and supply of data, and to apply quality assurance tools. To produce and supply quality statistics, the concept of Open Data has been adopted for easy access to statistics. Other government bodies that produce data for planning also need to adopt the concept and principles of Open Data to sustain a healthy Open Data Ecosystem for planning in cities of Kathmandu Valley.

The National Urban Development Strategy (2017) recognizes that there is a poor urban database and monitoring of urban developments. The strategy also notes the shortcomings of the municipal database and the lack of an institutionalized structure for routine data updating and monitoring. The basic information on urban infrastructure, environment, economics, governance, finance, and investment that is now accessible reflects the state of urban circumstances. The strategy also identifies the need for Data availability as one of the indicators of Urban Safety and Resilience, and establishment of Data Centre as an indicator of Urban Finance and Governance. While the strategy is clear about the need for and importance of good database management systems and accessibility to data, the strategy fails to consider the concept of Open Data. The strategy needs to be revised by including the use of open data in planning cities. A key informant mentioned that Planning norms and standards need to be different for mountains, hills and terai – this needs to be guided by informed data. Use of Open Data can become instrumental in such a case.

Concept of Smart Cities have been discussed and gaining momentum in the field of planning. In many cities of Nepal, documents related to making cities smart have been prepared. In these documents, ICT components have been discussed but the concept of Open Data is not well defined. There is a need to become aware of the possibilities and advantages of Open Data in creating smart cities. A truly smart city that is equitable provides unbiased data openly to its citizens.

The National Information Commission has closely collaborated with the United Nations to align with the global trend of Open Government Data adoption. This is a good step towards developing Open Data Ecosystem in Nepal. But this is not enough. A thorough review of international best practices and recognition of national literatures in Open Data like the Open

Data Handbook needs to be practiced to pave ways for the formulation and implementation of Open Data Policy of Nepal.

In absence of an Open Data Policy, there have been no significant efforts to build capacity of planners in Kathmandu Valley to utilize Open Data (Figure 5-23).

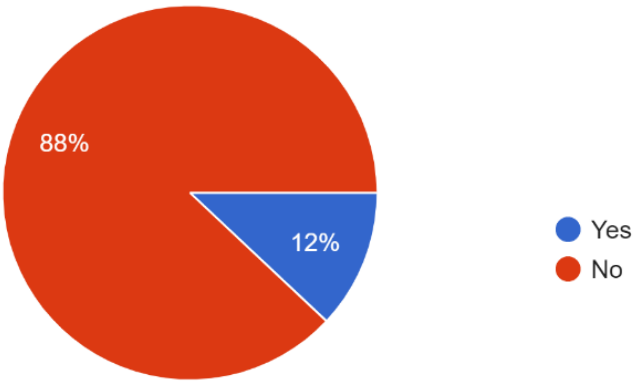


Figure 5-23 Response to Question - Are you aware of or taken part in Capacity Building Trainings for Open Data utilization

6. Recommendations

Based on the literature reviews, case studies, findings, and analysis, following recommendations are made to improve the Open Data Ecosystem to aid planning of cities in Kathmandu Valley:

6.1. Promotion of Open Data Ecosystem for Urban Planning

i. Encourage urban planners and stakeholders to adopt an open data culture. Provide trainings and capacity building opportunities to urban planners. For this, institutions like RUPSON, DUDBC, MoUD, MoFAGA, MoCIT, and development partners could be instrumental. Encourage groups like RUPSON to advocate for data sharing in order to promote the open data movement.

ii. Ensure that urban planning data is not isolated but geographically integrated for full insights. Establish proper coordination between NSO and Survey Department. Integrate National Statistics Office data with survey department spatial data.

iii. Create a set of open data indicators that will be used to determine budget allocation for local governments based on successful implementation. It could be embedded into scoring systems like LISA.

iv. Address the financial losses caused by municipalities' fragmented data collection activities. To improve data efficiency, cultivate a resource optimization attitude among urban planners. The municipalities should understand that open data ecosystems add value to their workflow and support budget allocation processes.

v. Explore the political challenges connected with promoting the transparency and accountability of open data.

vi. In urban planning, emphasize understanding of how different data variables are interrelated. This is important to make data interoperable between projects.

vii. Encourage public-private partnership to advance open data activities while protecting data privacy.

viii. Making sharing of data in usable form mandatory in terms of references of the project of government bodies and timely following up with the concerned teams.

6.2. Interventions on Existing Policies, Acts, and Guidelines

i) The ICT Policy 2015 should be amended to clearly state concept of Open Data in its strategies to promote ICT for government services delivery and innovation. The National Strategy for the Development of Statistical System (2019) strategized to open the data produced by the National Statistics Office which paved ways for the current Open Data Portal of the office for census data.

ii) The Right to Information Act (2007) should be updated to include concepts of digital data and information. There will be less confusion or hesitation for government bodies to share non-hard copy data when concepts of digital data are present in the act.

iii) The National Action Plan (2017) on Open Government Data (OGD) submitted by the National Information Commission to the council of ministers should be brought into attention of the concerned stakeholders including the council of ministers to facilitate development of an Open Data Policy.

iv) Digital Data Distribution, Use, and Regulation Guidelines 2069 of Survey Department should adopt concept of Open Data. The National Geo Information Infrastructure Policy, which is still being drafted should also incorporate concept of sharing data via Open Data Initiatives. This is not to be mean all data should be given off freely. For data that can be shared, nominal charges (at subsidized rate) could be levied on some data while many datasets could be distributed online freely. For data that are private and linked with national security, data anonymization could be used wherever possible to make data as open as possible.

v) Concept of Open Data should be made explicit in major urban development documents like the National Urban Development Strategies that are to pave ways for cities of the future where data becomes an inseparable part of cities development.

6.3. Open Data Policy

6.3.1. Need

To promote a healthy Open Data ecosystem and pave ways for legal basis to share data openly, a National Open Data Policy is of utmost importance. The Ministry of Urban Development should draft a National Open Data Policy specifically for Urban Planning. Municipality level Open Data Policies could be tailored as per the need of the municipalities. For planning of cities in Kathmandu Valley, institutions like KVDA could have an overarching Open Data Policy that includes the unique challenges and other aspects of cities in Kathmandu Valley.

6.3.2. Recommended Contents

i. Background, Need and Rationale
ii. International Standards
iii. Goals and Objectives
iv. Scope and Limitations
v. Policies
vi. Implementation Strategies
vii. Data Formats
viii. Licensing
ix. Data Privacy and Security
x. Data Quality ad Updates
xi. Accessibility
xii. Monitoring and Evaluation
xiii. Stakeholders Engagement
xiv. Stakeholders Capacity Building
xv. Promotion and Awareness
xvi. Implementation Timeline

6.3.3. Associated Institutional and Organizational Provisions

MoCIT and National Information Commission will be the parent organizations for the national open data policy. MoUD should tailor a separate policy for urban planning based on the national open data policy. There will be a need for trained and dedicated Open Data Officers at Federal, Provincial, and Local Levels. After the open data policy is made, associated guidelines, acts, and regulations should be made.

6.3.4. Suggested Process for Policy Development and Implementation

Following flowchart shows a recommended process that could be useful for promoting Open Data Ecosystem for Urban Planning of cities in Nepal.

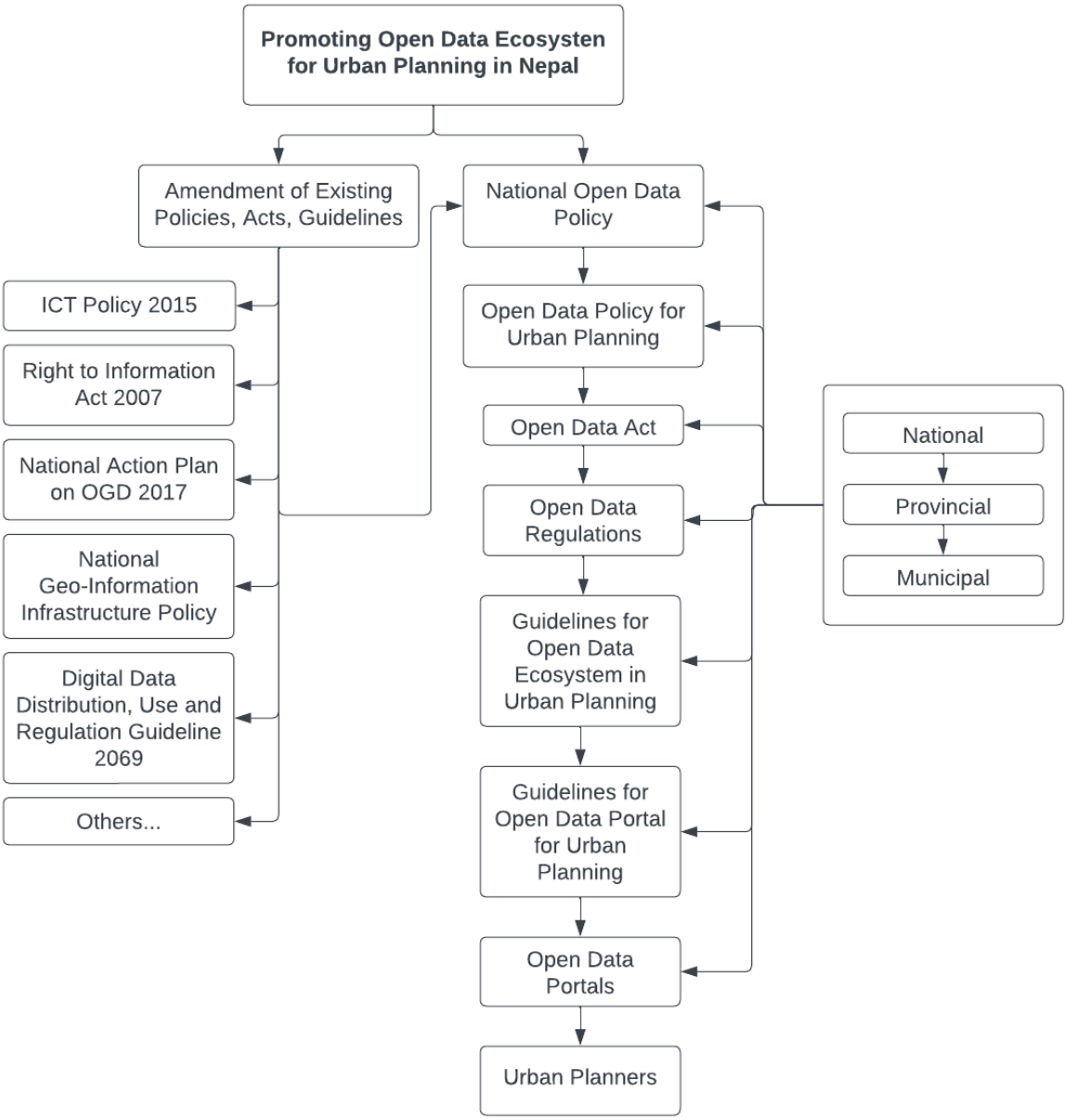


Figure 6-1 Promoting Open Data Ecosystem for Urban Planning in Nepal - a recommended process

6.4. Open Data Portals

6.4.1. Need

Open Data Portals are an important initiative to operationalize the Open Data Policy. Open Data Portals provide users with datasets that are easily accessible and reusable. It is important to see how the open data is being used in various developed countries of the world for urban planning and learn how it can be used in the context of Nepal.

Ministry of Communications and Information Technology (MoCIT) and Ministry of Federal Affairs and General Administration (MoFAGA) should jointly supervise and guide the MIS system and IDMS systems and promote interoperability of data- this can save huge sum of money in data related expenditures. Ministry of Urban Development (MoUD) should help MoCIT and MoFAGA with any collaborations or technical assistance required to make Open Data portals for cities a reality.

6.4.2. Type

National Level, Provincial Level and Local Level Open Data Portals should be made with linkages between them – their data should be interoperable. The National Open Data Policy as well as Open Data Portal Operational Guidelines should be drafted to maintain homogeneity of data type and structures. Organizations like KVDA could also have their own Open Data Portals to link the cities under their jurisdiction and provide datasets for planning purposes.

6.4.3. Contents

i. Availability of Open Data can be tallied with Planning Norms
ii. Mapping of Data sources is important to understand the open data ecosystem.
iii. Following data should be prioritized for making available online:
    - Housing (including house conditions), land use and byelaws.
    - Data related to solid waste management.
    - Data related to physical infrastructure and services.
    - Social Data
    - Trend analysis (population – trends and future projections)
    - Road network (transport and land use)
    - City Form changes
    - Disaster related data
    - Energy related data
    - Data on rivers (location, number, etc)

iv. In urban planning, data required can be listed in terms of everyday activities from morning to evening:
    - Early Morning: Open Spaces (cultural, religious)
    - Morning: School, children attending schools, vegetable markets, office goers, traffic
    - Late Morning: Industries and commerce, services
    - Day time: Energy, Communications, Sewage, status of water supply and wastewater
    - Evening: Market, recreation, entertainment
    - Night: Security, Light, Street furniture, Street design

v. For urban planning, data required can also be listed in terms of activities from Womb to Tomb:
    - Hospitals, Day Care, Schooling, Marriage, Community Halls, Yoga, Meditation, Crematorium, Cemetery

vi. Data could be categorized into 5-6 categories. More than this should be avoided.

vii. Datasets should be shared in machine readable formats, should contain metadata and clear licensing policy.

viii. Datasets should have Geolocation as far as possible.

ix. A clear feedback mechanism should be provided.

6.4.4. Making Open Data Portals

i. Municipal data can be shared mainly in two platforms: Via Mobile App or Via Website (portal)

ii. There should be one system backend which is the admin portal which has connection to the database via networking.

iii. There is then a front-end website of the municipality where users access or mobile app used by users. The users use these platforms to view or request data/information.

iv. There is an API (Application Programming Interface) that helps to create an interface or communication between the frontend and the backend.

v. The domain for frontend and the backend could be same or different depending on the context and necessity.

vi. Crash and Backup
    a. When it comes to creating open data portals, one key element that should not be missed is "crash and backups." The dependability and availability of open data are critical in a data-driven environment. It is critical to design effective crash

recovery methods and backup strategies to assure service continuity and data integrity. Open data portals, which serve as vital information repositories, must be built with fail-safe procedures in place. This includes developing redundant data storage options and automatic backup processes (solar power, UPS, batteries, etc.) to protect against data loss in the event of system failures or other unforeseen events.

vii. A sample method of making open data portal possible:

- Make a list of documents and datasets required for Urban planning: IUDP, KVDA masterplan, New Town Documents, Municipal plans, MTMPs. Listing should be done using a participatory approach- to assign value and weightage to the data.
- Create a data storage plan.
- Create data in machine readable Formats
- Make as many data geolocated and geotagged as possible
- Have collaborations with IT institutions to get interns to help with data generation, upload, and management– ICT Scholarships (Internship to IT college students at the municipality)
- Train the municipality staff
- Allocate certain hours per week for online data creation/exercise (eg: Friday after 1 pm – 2 hours dedicated to data creation by municipal staff)

6.5. Projects and Activities to Promote Open Data Ecosystem

Following is a set of projects and activities that helps to promote open data ecosystem for urban planning in the context of Kathmandu Valley that can be generalized for Nepal. The projects and activities are aimed at implementing the flowchart of Figure 7-1. The importance of public and private cooperation needs to be realized if an open data ecosystem is to flourish in Nepal. The list of projects and activities towards the end are targeted towards promoting the open data ecosystem at local levels.

Table 6-1 Projects and Activities to Promote Open Data Ecosystem for Urban Planning in Nepal

P.N.	Project	Activities	Stakeholders/ Institutions
1	Preparation of National Open Data Policy	Experts Identification, Consultant/Expert Hiring, Discussions, Consultations, Trainings, Dissemination Workshops	MoCIT, MoFAGA, council of ministers, National Information Commission
2	Preparation of Open Data Policy for Urban Planning	Experts Identification, Consultant/Expert Hiring, Discussions, Consultations, Trainings, Dissemination Workshops	MoUD
3	Preparation of Acts and Regulations for Open Data for Urban Planning	Experts Identification, Consultant/Expert Hiring, Discussions, Consultations, Trainings, Dissemination Workshops	MoUD, MoCIT, MoFAGA, Survey Department, National Information Commission
4	Guidelines for Open Data Portal for Urban Planning	Experts Identification, Consultant/Expert Hiring, Discussions, Consultations, Trainings, Dissemination Workshops	MoUD, MoCIT, Survey Department, MoFAGA
5	Adopting Policies, Acts, Regulations and Guidelines at Provincial and Local Level	Experts Identification, Consultant/Expert Hiring, Discussions, Consultations, Trainings, Dissemination Workshops at Provincial and Local Level	Municipalities, Development Partners, MoUD
6	Making Open Data Portals (for Urban Planning)	Frontend Development Backend Development Web Portal Mobile App Servers Backups Management Team Trainings	Municipalities, Development Partners, MoUD, IT experts or consultants

6.6. Others Recommendations

i. Recognize the importance of information technology (IT) in urban planning and prioritize IT training and skill development.

ii. Integrate several data streams, such as Geographic Information Systems (GIS) and taxation systems (IPT), to enable holistic decision-making that takes into account numerous aspects of urban planning.

iii. Simplify the data purchase process by recognizing the requirement for specific paid data sources, such as high-resolution photographs. However, lower-resolution photos can be available for free.

iv. Create effective coordination systems for data exchange among government agencies. To support seamless collaboration, ensure that G2G data sharing is smooth and free of financial restraints.

v. Conduct extensive study to identify and assess available data sources for urban planning requirements. This research will aid in the identification of gaps and the improvement of overall data collection tactics for effective planning.

7. Conclusion

Open Data, in simple terms, is any data produced by public agencies, and shared digitally under a freely usable license, along with information about its content and history. Open Data plays a significant role in planning practice. Literatures reveal that Open Data has various benefits in the planning realm, with potential to save costs, minimize project time, and control corrupt practices. In the Nepalese context, the practice of Open Data is a crucial way in which democracy can be practiced.

In the context of planning of cities in Kathmandu Valley, the Open Data Ecosystem is still in an infant stage. Most of the data available is in Pdf form via the government websites are not interoperable between datasets and systems. Most of the data, therefore, are in one-star stages. Aid related data have developed well and there have been some excellent examples of Open Data initiatives like post-earthquake data portal and OSM project. The NSO has upgraded its website to include an interactive data portal which is a good practice of Open Data, made possible by explicit inclusion of the open data concept in strategy followed by the NSO. BIPAD portal is another example of good practice where disaster related data are integrated into one platform from various stakeholders to provide information that is useful for evidence-based planning. An analysis of availability of sectoral data revealed that around 50% data are openly available (in one form or the other) – with availability percentages of physical, social, economic, environmental and disaster, and financial revealed to be ~30%, ~45%, ~35%, ~35% and ~65% respectively. It was also discovered that many planners do not make the data they produce openly available.

A cross case analysis of open data portals from Barcelona, Pune and Nepal revealed the need for a city level portal. It also clarified the need for timely update and standardization of datasets, inclusion of licensing and metadata, and feedback mechanism. The research showed that Open Data may have been used by planners, but they may not be aware that the data they are using is Open Data. Nevertheless, planners agree that Open Data is useful and beneficial for planning.

Open Data, like any other planning related data, is used to prepare maps, reports, analysis schemes, policy recommendations, and so on. Easily accessible data in machine readable formats that are geolocated can have various added benefits in planning – including efficient result generation, data-driven informed policy recommendations, informed decision making, and enhanced participation. One important use or benefit of open data is its ability to guide the

planners towards the right direction by providing an early insight into the existing conditions of a planning project. With crowd-based support and sourcing opportunity provided by open data ecosystem, there is higher opportunity for innovation in the planning practice.

The research also highlighted various challenges in using Open Data in planning of cities in Kathmandu Valley. The issues of mindset of planners and stakeholders not open to sharing data, inclination of consultants to use public data for monetary gain, and presence of data silos and system silos were brought forth by the research. KIIs and surveys conducted showed that the data used in planning in Kathmandu Valley are not open by default, neither timely, nor comprehensive; they are not fully accessible and reusable, non-comparable and non-interoperable.

The lack of an Open Data Policy has been clearly highlighted in the research. With the help of an Open Data policy, the planning field can harness the real power of truly open, standard, and interoperable datasets that follow open data principles and are aligned with international open data practices. It is important to explicitly mention the idea of sharing (sharable) data via open data concept in policies of governments at all levels.

Research on the state of use of open data in planning of cities in Kathmandu Valley is limited to study of few municipalities and interactions with planning practitioners, expert consultations, and surveys of planners. Because this research was conducted in a limited time frame, it could not carry out the study of all the municipalities within Kathmandu Valley and interact with stakeholders of all the municipalities.

This research could add to the advocacy for an Open Data Policy, as well as provide a good reference for any further research in the field of open data in planning. A potential way forward could be assessing the availability of Open Data for cities in Kathmandu Valley by improving on the methodology used for Madhyapur Thimi Municipality in this research.

The world is undergoing a digital revolution, and the field of data is far too important to be left only to data scientists. Urban Planners need to rightfully own research and practice in the field of urban data to enhance informed decisions.

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ANNEX I

List of Open Data Portals in Nepal

(List from DSET for Data Portals in Nepal from World Bank Report on Assessing the Effectiveness of Data Sites in Nepal and some rows added by the researcher)

Name	URL	Types of data	Creator
NepalMap	https://nepalmap.org/	Nepal government data	Code for Nepal
2015 Nepal Earthquake: Open Data Portal	http://eq2015.npc.gov.np/	Download, explore and visualize data for the eleven severely affected districts of the 2015 Nepal Earthquake.	Kathmandu Living Labs
National Data Portal-Nepal	http://nationaldata.gov.np/	Data and information related to geography, natural resources, environment, demographics, social, economic, and governance etc.	National Planning Commission, Central Bureau of Statistics
Nepal Human Development Indicators by District	https://www.npc.gov.np/human_development_indicators_by_district/	Visualization Dashboard based on Nepal Human Development Report 2014	Kathmandu Living Labs
Hydropower Projects in Nepal	https://www.npc.gov.np/nationwide_distribution_of_hydro_projects/	Time series visualization of nationwide distribution of hydro projects	Government of Nepal
Open Data Nepal	http://opendatanepal.com/	Data related to Nepal in open format and fulfills the increasing public demand to make government transparent and accountable	Open Knowledge Nepal
Nepal in Data:: A Gateway to Development Data & Statistics in Nepal	https://nepalindata.com/	Data indicators on agriculture and land; civil society and foreign aid; economy, market and finance; infrastructure, communication and technology; state and politics; the sustainable development goals; etc.	Bikas Udhyami
EMapping System	https://emap.nrb.org.np/	Financial Inclusion Dashboard	Nepal Rastra Bank
NepStat Database Portal	https://nepstat.iids.org.np/	Time series data of Nepal on Economics, Banking and Finance, Agriculture, Environment etc.	Institute for Integrated Development Studies
National Geospatial Portal	http://nationalgeoportal.gov.np/	Geospatial data and associated information services	Survey Department, Geographic Information Infrastructure Division (NGIID), Government of Nepal.

CensusInfo Nepal 2011	http://dataforall.org/dashboard/nepalcensus/	Dashboard on Economy, Household, Occupation, Education, Social factors etc.	Central Bureau Of Statistics
Public Procurement Transparency Initiative in Nepal	http://ppip.gov.np/downloads	Procurement data	Government of Nepal
Infrastructure Management System Dhangadi	https://ims.susasan.org/dhangadhi	Dashboard that tracks progresses of infrastructure projects in Dhangadi	Dhangadhi Sub-Metropolitan City
Sustainable use of Technology for Public Sector Accountability in Nepal	https://susasan.org/	Links to tools and apps	Centre for International Studies and Cooperation (CECI)
Kathmandu valley utility mapping initiative	http://naxa.com.np/light/	Data on where street lights are and what their conditions are	Youth Innovation Lab and NAXA
Hydro Map project	http://hydro.naxa.com.np/	Interactive web mapping, datasets and statistics on Hydropower Projects in Nepal	Niti Foundation
Province Information	http://103.69.124.141/gis	Portal on distribution of metropolitan, VDC, etc. of the seven provinces	Government of Nepal
Nepal GeoNode	https://geonepal.info/	public platform for curated GIS data of Nepal	GeoNode
Housing Recovery and Reconstruction Platform	http://www.hrrpnepal.org/	Dashboards, Data and Charts on Post earthquake housing recovery and reconstruction	HRRP Nepal
Regional Database System	http://rds.icimod.org/	Central data repository for different thematic areas in the Hindu Kush Himalayan (HKH) region	ICIMOD
Nepal Disability Portal	http://nepaldisabilityportal.org/	The Disability Portal is a centralized repository of data and information about disability in Nepal.	D4D
National Census Portal	https://censusnepal.cbs.gov.np/	Official data and infographics portal for national population and housing census of Nepal	National Statistics Office
BIPADportal	https://bipadportal.gov.np/	Official disaster information management website of Nepal	NDRRMA

IDMS Tulsipur Sub-Metropolitan City	https://data.tulsipurmun.gov.np/	Official IDMS system of Tulsipur Sub-Metro	Tulsipur Sub-Metropolitan City
National Spatial Data Centre : Geoportal	https://nationalgeoportal.gov.np/	Consolidated and centralized web-based digital platform that provides an online geo information management system and consists of spatial data sharing tools to access and view different data and maps.	Survey Department
Soil Map - NARC	https://soil.narc.gov.np/soil/soilmap/	Soil Data collected from detailed soil survey from pits at 10000 scales. Soil morphological characteristics and properties	National Soil Science Research Centre
SDG Sub-national indicators	https://dataviz.worldbank.org/views/ProvincialSDGDashboardv8/Province?iframeSizedToWindow=true&:embed=y&:showAppBanner=false&:display_count=no&:showVizHome=no	SDG	World Bank Nepal

ANNEX II

Summary of Key Informant Interviews and Surveys

Open Data in Urban Planning | PUL078MSURP012 | Prabal Dahal | 2023				
KIIs Conducted				
S.N.	Name	Institution	Post	Discussions
NON-PLANNERS				
1	Shanta Poudyal	Budhanilkantha Municipality (BM)	IT Officer	Discussion about open data availablity, infrastructures and challenges in the municipality and general practice related to data.
2	Sulav Dangol	Service Towards Technology Nepal	IT Consultant for BM	Discussion about creating data portals
3	Namo Raj Budhathoki	Kathmandu Living Labs	Founder	OSM in Nepal, How to understand availability of open data in context of planning in Nepal
4	Nikesh Balami	Open Knowledge Nepal	Co-Founder	Open data history in Nepal, policies for open data and licensing, resources of Open data
5	Deenanath Lamsal	National Statistics Office (NSO)	Officer	Discussion about open data policy at NSO, data portal of census, future plans for making data openly available, nationaldata.gov.np- vision and challenges, formatting of data, data licensing
6	Manohar Ghimire	National Statistics Office (NSO)	Information Officer	
7	Kapil Dev Joshi	National Statistics Office (NSO)	Officer	
8	Kritika Sharma	International Centre for Integrated Mountain Development	Web Content Management Assistant	Discussion about data produced by ICIMOD, data sharing format and data portal
9	Siddhantha Neupane	Changunagarayan Municipality	former IT Officer	Discussion about the success story of open data portal in Changunarayan and how it was achieved
10	Anil Dutta	Ministry of Communication and Information Technology	Joint Secretary	Discussion about data trends in the national ecosystem, recommendations for open data ecosystem.
11	Shashish Maharjan	Kathmandu Living Labs	Chief Operating Officer	Discussion about Open Data Ecosystem in Nepal, requirements for an open data portal, challenges and potential solutions for open data environment in Kathmandu
12	Ratna Prasad Mainali	National Information Commission	Information Commissioner	Discussion about situation of Open Data ecosystem in Nepal, development, and practice of Open Data and Right to Information in the context of development in Nepal. Discussion on challenges faced in Open data implementation and things to do.

13	Damodar Dhakal	Survey Department	Director / Information Officer	Nationalgeoportal, online availability of data, privacy issues, data sharing policies
PLANNERS				
1	Nava Raj Pyakurel	Kathmandu Valley Development Authority	Deputy Development Director	Prospects of Open Data in planning and what could be recommendations for open data ecosystem
2	Saroj Basnet	ICF Nepal/City Planning Commission of Kathmandu Metro	Deputy Director / Former Vice-Chairperson	Discussion about open data ecosystem in Nepal , challenges and way forward
3	Om Dharananda Rajopadhyaya	Nepal Institute for Urban and Regional Studies	Urban Planner	Discussion about challenges of using data in planning, use of data in planning
4	Ekraj Adhikari	New Town Project Coordination Office, DUDBC	Project Director	Discussion about issues with data in urban planning, need of policies in making open data ecosystem
5	Tej Karki	Lovely Professional University	Professor	Importance of data in planning, challenges in open data infrastructure in context of Nepal
6	Yogesh Purna Shrestha	Picasso Consultants	Director	Use of data in planning, prospects of making data open, policy of open data and private groups, issues of making data open
7	Manish Raj Joshi	Urban Planning and Design Consultants Nepal	Director	Experience of using open data for planning in international context, data sharing mindset in Nepal, issues and challenges in making data open
8	Narayan Prashad Bhandari	Department of Urban Development and Building Construction	Deputy Director General	Discussion on open data culture, challenges, and IUDP datasets.
SURVEYs conducted				
1	Manisha Karki	NURP	Architect/Urban Planning Student	
2	Yuvaraj Timalsina	Freelance	Engineer/Urban Planning Student	
3	Bipin Bhusal	Panchkhal Municipality	Urban Planner	
4	Sugan Gautam	Picasso Consultants	Urban Planner	
5	Kiran Joshi	Maze Consultants	Urban Planner	
6	Padma Aryal	Civil Link Engineering Consultant	Urban Planner	
7	Rojina Shrestha	Anaha Associates Pvt. Ltd	Urban Planner	

8	Shreya Shrestha	Freelance	Architect/Urban Planning Student	
9	Sarik Awale	Freelance/Former Lalitput Mun	Engineer/Urban Planning Student	
10	Neha Rathi	Freelance	Engineer/Urban Planning Student	
11	Hisila Manandhar	ICF Nepal	Urban Planner	
12	Barsha Chitrakar	UNDP Nepal	Urban Planner	
13	Apil KC	Urban Park Pvt Ltd	Urban Planner	
14	Ashim Bajracharya	IOE Pulchowk Campus	Urban Planner/Asso. Professor	
15	Astha Acharya	Ministry of Urban Development	Urban Planner	
16	Navaraj Pyakurel	Ministry of Urban Development	Urban Planner	
17	Milan Bagale	UN Habitat Nepal	Architect/Urban Planner	
18	Sagar Humagain	Picasso Consultants	Urban Planner	
19	Manish Raj Joshi	Urban Planning & Design Consultants	Urban Planner	
20	Yek Raj Adhikari	DUDBC- New Town	Architect/Project Director	
21	Srijana Koirala	Freelance	Urban Planner	
22	Moti Ram Giri	Freelance	Urban Planner	
23	Achyut Bikram Thapa	Ripple Training and Consulting	Urban Planner	
24	Ananta Gautam	Pokhara Metropolitan City	Urban Planner	
25	Gaurav Nepal	Urban Park	Urban Planner	

ANNEX III

Notes from Key Informant Interviews

Key Informant Interview I

Informant : **Shanta Poudyal**, IT Officer
Institution : Budhanilkantha Municipality
Date: June 30, 2023 and July 02, 2023

Key Notes

1. Most data are shared in pdf form by the municipality via its website. Pdf is portable and easy to access in any platform. There is no rule that dictates that data be shared in pdf form, but it is the general practice.
2. Around 60% of the data produced by the municipality has been made online.
3. The development related data in the municipality are available in the IT section. The Municipal Development Department also coordinates with the IT section to make data available to the website.
4. Statistical and Geospatial Data availability:
    a. The municipal profile of the municipality was made by a consultant who is not responding to the municipality now. The household surveys done by the consultant has not been made available to the municipality in digitally reusable form.
    b. The MTMP report of the municipality is available on the web, but the spatial data files are not available.
    c. The main problem lies in negligence of the municipality as well as incompetency and/or irresponsibility of the consultants in transfer of data ownership. This can be easily solved by making sharing of data in usable form mandatory in the terms of references.
5. Data portal
    a. A data portal is planned to be launched this year with emphasis on household data. The file format will include excel formats.
    b. The portal will link the users to various useful sites for data
    c. For data collection and preparation of data portal, a tendering will be announced, and terms of reference will be provided
    d. There will be 80+ questions including household information, building information, etc
6. The municipality website has been accessed by 6 lacs, 6 thousand people till June 30, 2023.
7. Training related to data and database are provided sometimes but not regularly. The general recommendation provided to the IT officer by the central government is to tie-up data with data from national statistics office (formerly CBS)
8. Problems related to making data open:
    a. No provision of dedicated server to host data
    b. Bandwidth provided by the government is limited.
    c. Difficult to upload file of large size
    d. Good quality and quantity of data is not received from concerned departments
9. Data Quality
    a. Departments, in general, provide poor quality data that needs to be processed before uploading them
10. Complaints from people/users
    a. People from the academia as well as news agencies complain of inadequate data in the website from time to time
11. The general system of data sharing
    a. The current practice is pasting any notice or data on the notice board (which is compulsory) and making it available on the web via website and sharing on facebook page of the municipality. People mostly show engagement and comment on facebook posts.
12. Issues of privacy/security:
    a. The issues of privacy/security in data have not been raised yet
    b. There is an issue of transfer of email addresses and password from previous section officers to new officers which may have caused some internal data loss

13. Source of data for municipality
    a. The planning department received data from various sources
    b. The survey data from department of survey is free for municipality to access and use

Key Informant Interview II
Informant : **Sulav Dangol**, IT Consultant for Budhanilkantha Municipality
Institution : Service Towards Technology Nepal (STTN)
Date: June 30, 2023

Key Notes:

1. The municipality hires IT Consultant to help with IT related issues or to solve certain IT related problems in the municipality.
2. Most of the data shared by Budhanilkantha municipality is in pdf form.
3. The website is updated regularly as per need.
4. Municipal data can be shared mainly in two platforms:
    a. Via Mobile App
    b. Via Website
5. There should be one system backend which is the admin portal which has connection to the database via networking.
6. There is then a front-end website of the municipality where users access or mobile app used by users. The users use these platforms to view or request data/information.
7. There is an API (Application Programming Interface) that helps to create an interface or communication between the frontend and the backend.
8. The domain for frontend and the backend could be same or different depending on the context and necessity.

Key Informant Interview III and notes from Talk Program on OSM at IOE
Informant : **Nama Raj Budhathoki** Founder/Chairperson, Regional Director
Institution : Kathmandu Living Labs (KLL), Open Mapping Hub- Asia Pacific at Humanitarian OpenStreepMap Team (HOT)
KII Dates: June 30, 2023 July 17, 2023
Talk Program Date : July 06, 2023

Key Notes:

1. It is important first to list the types of data required to be used in various planning practices to know about their availability.
2. KLL has been working in the field of geospatial open data for a long time.
3. Websites like Wikipedia, facebook, youtube, twitter, google maps and Open-Source Map (OSM) require user generated contents. The innovation of these types of websites or platforms in that they require user inputs to thrive.
4. OSM with the tag line “free ware map” is driven by the philosophy that user produced contents should be openly/freely available for reuse and redistribution.
5. With the help of location attributes in geospatial data, that was made publicly available, a lot of lives were saved in the earthquake of 2015. Nepal Army has reported this.
6. Nepal was the leading country in OSM in South Asia when it was first introduced. There are more data in OSM than in google maps for many places of Nepal. India has dominated the OSM movement in the region now.
7. Sources of Open Data in Nepal:
    a. Many data are open in pdf form
    b. NSO data, Survey Department data (with minimum fee)
    c. OSM data (truly open data)
    d. Nepalindata website and others as such
8. Metadata:
    a. It is essential to share metadata along with open data
    b. Metadata tells about completeness, accuracy, of data

    c. Concerns with fitness of use of data (including legal issues)
9. ISO Standard
    a. A high-quality open data should have ISO standard and meta data should be supplied
10. Completeness
    a. Highly dependent on the technical dimension – requires technical expertise/capacity/knowledge
    b. Municipalities in Nepal may not be technically capable yet (or may not be priority of IT officers who are overwhelmed by administrative tasks)
11. Promotion of Open Data
    a. Change in mindset/culture
        i. The current trend is recollection of data by municipality- that is creating a lot of financial loss
        ii. The mindset for resource optimization needs to be developed
        iii. Incentivize : create a list of indicators pertaining to open data for local government to work on – if they are able to successfully address the requirements, they will get some amount of budget for various programs or extra grants
        iv. Educate and aware people about usefulness, effectiveness, and importance of Open Data
    b. Politics/Power
        i. Open Data promotes transparency- which may not be everyone's cup of tea
        ii. It is important to understand interconnectedness of different dimensions
        iii. Address this issue
    c. Legislation / Coercion by the government
        i. Expect data pertaining to government/national security, well-being, personal information of citizens- data for public benefit should be mandated to be shared openly
12. About 80% of data in urban planning are geo-referenced. It is important to have open data in spatial form in urban planning
13. During the tenure of Swarnim Wagle as the VC of National Planning Commission, a portal to share open data related to disaster was made
14. Open data promotes evidence-based, and data-driven planning and prevent duplication of work that wastes a lot of resources

Key Informant Interview IV
Informant : **Nikesh Balami ,** Co-Founder/CEO
Institution : Open Knowledge Nepal
Date : July 05, 2023

Key Notes

1. The awareness about open data has been in Nepal for more than a decade now. Open Knowledge Nepal was conceptualized around the year 2013 ad was formally registered in 2017. Open data has gained global momentum in the recent years and Open Data Day is celebrated in March 03 in Nepal.
2. The data shared in Nepal by government institutions, development partners, or private entities are rarely within the global definition of open data. The concept of licensing for reuse and redistribution is largely ignored in sharing data.
3. There is availability of open data, but their accessibility is questionable.
4. With the constitution of Nepal guaranteeing right to information and launch of government websites at all three tiers of government, data are starting to be open (mostly in pdf form)
5. One of the important and challenging parts of open data is that the data collected by one project should be usable by another project – data needs to be interoperable – then the actual use of data is achieved. Inter-operability of data helps to create 4* data.

6. There is lack of clarity of licensing in data shared by government bodies. There is no Open Data policy and no open licensing policy. It is likely that the Open Data policy will be launched in 3-4 years.
7. Aid Management Platform / Aid Data of Nepal has been made open, which has been serving various government bodies and development partners.
8. There was an initiative to make government contract related data and data from office of company registrar open- the practice was not sustainable because of various reasons
9. Integrated Data Management System (IDMS) – with government domain and funded by development partners is being developed in some municipalities like Tulsipur and Birgung. These systems contain open data in formats that could be easily accessible.
10. One of the biggest challenges in the field of data in our country is that we have data silos and system silos. Data and systems are limited to certain groups of people or systems. Also, there is practice of "upward reporting" system which leads to the local system not being able to access their own data – this negatively impacts decision making. The Management Information System (MIS) in Nepal does not support interoperability of data.
11. Ministry of Communications and Information Technology (MoCIT) and Ministry of Federal Affairs and General Administration (MoFAGA) should jointly supervise and guide the MIS system and IDMS systems and promote interoperability of data- this can save huge sum of money in data related expenditures.
12. The National Statistics Office, funded by the UNFPA, was able to create a good open data portal to provide demographic data to the people. Young Innovation Pvt Ltd, a pioneer company advocating for Open Data in Nepal and are aware of the technicalities associated with Open Data made the data portal successful and open.
13. The current procurement act of Nepal for building government apps and websites is not good for innovation and a lot of financial resources is being invested in unfruitful endeavors.
14. To make data open available,
    a. A portal or website is required
    b. Open Data Policy / Open Licensing Policy is required
    c. A good server is required (the current server is limited)
15. The technology hub of the country is already good. The government needs to tap into that correctly.
16. Infrastructures for real time open data (like air pollution, hydrology, and river watch) will follow the development in policies, acts, and regulations.
17. Resources for open data knowledge
    a. Open Data – Open Data Definition
    b. License – Open Data Commons (for data) , Creative Commons (for contents)
    c. Open Data Charter, Open Data Handbook
18. It is easier to make people understand the term "Fair Policy" than Open Data
19. The European countries are now moving beyond open data and are now moving towards the use of open data for AI.
20. There are good examples of Open Data Practices in India

Key Informant Interview V, VI, VII
Informant : **Deenanath Lamsal** Statistics Officer, **Manohar Ghimire** Director/Information Officer, **Kapil Dev Joshi** Statistics Officer
Institution : Nepal Statistics Office (NSO) – under the council of ministers (formerly Central Bureau of Statistics CBS as a wing of the National Planning Commission NPC)
Date : July 13, 2023

Key Notes

1. Types of data produced by NSO (as per Statistics Act 2015) :
    a. Population and Housing Census
    b. Agriculture (including price index)
    c. Industry, Labor
    d. GDP related

    e. According to the requirement of the government
2. NSO produces aggregate data and microdata by managing outliers. Microdata is available after paying a certain fee. These data are anonymized to protect privacy. No one - except a few officials at NSO, has access to non-anonymized data.
3. Almost 100% data shared online in one form or the other
    a. Softcopies are preferred in the recent years (paperless concept- around 50% reduction in use of paper in the recent years)
    b. Data will be shared via data portals in the coming days (following example of census data portal)
4. Factors affecting making data online
    a. Historical data are not in format that can be shared online
    b. Non-anonymized microdata cannot be shared online
5. Nationaldata.gov.np
    a. Started by a team in the national statistics office to decentralize
    b. A standard was set by the CBS
    c. Around 753 personnels were trained (mostly IT Officers or IT Consultants of local levels) to use the portal
    d. All the trained manpower were not retained by the local bodies – creating inadequate human resources to feed data into the portal
    e. The council of ministers has been very positive and enthusiastic about the use and updating of the portal
    f. There has been a general lack of coordination between MoFAGA, MoCIT, and local bodies to update the portal
    g. Due to various reasons like pressures from development partners, several local bodies have started to create their own portals- leading to duplication of work and inconsistency in delivery of database system in the country – which is likely to lead to a financial burden for the country
6. The data sets in NSO are mostly up to date as per the law and as per the requirements of the funding agencies.
7. There is a lack of awareness about the concept of Search Engine Optimization- which leads to users or researchers not being able to find data easily from NSO and other government websites
8. Licensing:
    a. While there are no clear written licensing related rules in the NSO, the data can be used by anyone, free of cost, by providing attribution to the NSO. However, the user is responsible for any output produced by manipulating the data provided by NSO.
9. Feedback mechanisms:
    a. Anyone can provide feedback or suggestions to the NSO via the website or in person
10. The concept of open data has been discussed in the government sphere in the recent days
    a. Internally discussed within the NSO as well
    b. National Statistics Development Strategy policy document also touches on some aspects of open data
    c. Nepal is adopting the global trends
11. The server has been sufficient for now. There was some problem of over-traffic during the initial days of launch of the census portal, but the flow of traffic is smooth now.

Key Informant Interview VIII
Informant : **Navaraj Pyakurel** Deputy Development Commissioner
Institution : Kathmandu Valley Development Authority (KVDA)
Date : July 16, 2023
Key Notes

1. It should be made mandatory to put public data online. Data can be subjective and objective : Quality of data can be verified by municipality itself.
2. If most data is openly available, a lot of resources can be saved in primary data collection
3. Following data should be prioritized for making available online:

   a. Housing (including house conditions), land use and byelaws
   b. Data related to solid waste management
   c. Data related to physical infrastructure and services
   d. Social Data
   e. Trend analysis (population – trends and future projections)
   f. Road network (transport and land use)
   g. City Form changes
   h. Disaster related data
   i. Energy related data
   j. Data on rivers (location, number, etc)
4. In urban planning, data required can be listed in terms of everyday activities from morning to evening:
   a. Early Morning : Open Spaces (cultural, religious)
   b. Morning : School, children attending schools, vegetable markets, office goers, traffic
   c. Late Morning : Industries and commerce, services
   d. Day time : Energy, Communications, Sewage, status of water supply and wastewater
   e. Evening : Market, recreation, entertainment
   f. Night : Security, Light, Street furniture, Street design
5. Triangle of SERVICE – MARKET – RESIDENCE needs to be considered in urban planning
6. In urban planning, data required can also be listed in terms of activities from Womb to Tomb: Hospitals, Day Care, Schooling, Marriage, Community Halls, Yoga, Meditation, Crematorium, Cemetery
7. There are challenges in getting spatial data and land use data in our context and Availability of Open Data can be tallied with Planning Norms
8. Mapping of Data sources is important to understand the open data ecosystem

Key Informant Interview IX
Informant : **Saroj Basnet** Deputy Leader
Institution : ICF Nepal (former Vice-Chairperson of City Planning Commission at Kathmandu Metropolitan City)
Date : July 18, 2023

Key Notes

1. Truly open data are rarely available in Nepal.
2. When Mr. Basnet was VC at CPC of KMC, there was allocation of budget for making data openly available but could not be completed – need to follow up present status
3. Problems in open data ecosystem :
   a. Data taken as asset
      i. Nobody wants to share – even the public institutions who are supposed to share data freely are taking fee for data – example – the survey department takes fees for spatial data
      ii. Gaining monetary benefits from data that should be made freely available – because the data were made from public money
   b. The notion that open-data could violate privacy – which is not true – data can be anonymized – sensitive data , personal data need not be shared
   c. Concerns about forging
4. Land use information should be made open
   a. At least land use classification data
   b. So that people can be aware about the land they're purchasing (under which category does the land belong to)
5. An Open Data policy is necessary – supporting guidelines are also important – consultation with the private sector is required while drafting policy
6. Open Data ecosystem invites crowd-based support and sourcing – which can be very useful – drives innovation
7. Topo Data should also be made openly available

    a. At present, 5 m interval data is available
    b. With the help of open data ecosystem, and crowd sourcing, better accuracy data can be made available
8. ICF Nepal is currently working on Municipal Asset Management System that is like an inventory of various services and infrastructure of municipality. It contains information on the location, condition, number, and other attributes of following and more:
    a. Roads
    b. Drains
    c. Water Supply
    d. Open Space
    e. School
    f. Healthcare institutions
    g. Educational institutions
    h. Community Buildings
9. Orientation and training program for this is happening soon.
10. After the site is in operation, everyone can access the site. A similar site should be made available for land use and topography related spatial data.
11. Data in urban planning
    a. Should not be in isolation
    b. Spatially linked
12. It is important that the public and private sectors work together to improve open data ecosystem in Nepal (as well as protect data)
13. Data Centre needs to be active in making data openly available to people
14. Sometimes the private sectors tend to be more conservative while sharing data – there should be a systemic change in the practice and culture of data sharing.

Key Informant Interview X
Informant : **Om Dharananda Rajopadhyaya** Urban Planner
Institution : NIURS (Nepal Institute for Urban and Regional Studies)
Date : July 19, 2023

Key Notes

1. Urban Planning and Data are closely interrelated
    a. Data is very important in Urban Planning
    b. In urban planning, everything is connected to data (infrastructure, population)
    c. Even the plans made under political wills and aspirations can be substantiated by using data
2. 15-20% data are available online (which is quite low)
    a. These data are not timely updated
    b. Taking an example of municipal profile of municipality
        i. One has to look deep into the website of municipality to find municipal profile in pdf form
        ii. Municipal profile contains many data unrelated to urban planning
        iii. May contain non-authentic data – concerns of data reliability
3. Issues with data
    a. Land information not shared by survey department easily
        i. Need to pay fees to acquire data
    b. Cadastral map prepared in 2021/22 B.S. using plane table survey does not overlay correctly with new surveys done using total station or drones. Around 20% discrepancies between these two types of survey data
    c. Planning norms and standards need to be different for mountains, hills and terai – this needs to be guided by informed data
    d. Data and its link with current definition of urban areas
4. Citing the right to privacy, the department of land management is not providing land related data- private or personal or sensitive information can be anonymized.

5. Open Data availability
    a. Mostly government websites
    b. Private institutions rarely share data online
    c. Service providers should share their data with the public
        i. Water supply
        ii. Solid waste management companies (eg: they could install a sensor in their waste collection bins that helps to automate the waste collection process to some degree – the waste truck need to visit everyday)
    d. Need of a good system of data collection, and sharing
6. Centralized vs Decentralized Open Data portals
    a. The local bodies should be able to independently create open portals, but they should be interoperable with the provincial and federal open data portals
    b. Institutions like MoFAGA, MoCIT should play a crucial role in coordination
7. Challenges in Open Data
    a. Misinformation leads to misguidance
    b. Professionally, consultants share everything with the client (reports and data), after that the consultant cannot share data to the public (professional ethics) – it is the responsibility of the client (government or private bodies) to make data accessible to people

Key Informant Interview XI
Informant : **Kritika Sharma** Web Content Management Assistant
Institution : ICIMOD (International Centre for Integrated Mountain Development)
Date : July 20, 2023

Key Notes

1. Data produced by ICIMOD
    a. Geospatial
    b. Data related to development
    c. Air pollution data
    d. Shared via regional database system
2. There are urban municipalities in the mountain regions of Nepal. ICIMOD works in those areas as well.
3. Data sharing format
    a. Data is shared in various formats via various websites:
        i. http://rds.icimod.org/
        ii. https://lib.icimod.org/
        iii. http://smog.icimod.org/apps/airquality/
        iv. https://servir.icimod.org/
    b. Most reports are share in pdf formats
    c. Some data are shared in machine readable formats as well
4. Data sharing policy
    a.
    b. Data Policy : http://rds.icimod.org/Content/files/ICIMOD%20Data%20Policy.pdf
    6.5. Increasingly, scientific journals are also demanding the publication of research data alongside published articles to allow for more transparent and critical analysis in the peer review process. Unless restricted by confidentiality or third-party rights, ICIMOD will make available the research data used in its publications through its institutional repository or a suitable external repository.

Key Informant Interview XII
Informant : **Ekraj Adhikari** Project Director

Institution : New Town Project Coordination Office, DUDBC, MoUD
Date : July 21, 2023

Key Notes

1. There is gap in data production and gap in identification of stakeholders in the context of urban data
2. There are issues related with reliability and integration of data
3. There is data discrepancy – different development partners like the World Bank, ADB, UN Habitat prepare different data that do not match with one another. Even the data produced by different government agencies do not match (eg: data produced by Planning commission vs DUDBC)
4. If there was a good system of open data- different duplication of data by undertaking different unnecessary surveys could have been avoided
5. There should be a policy for National Database to guide an integrated database system
6. Projects involving UICI (Urban Infrastructure Condition Index) under NUDS and Carbon Competitive Index require a lot of data. The experience has been that the data output produced by different consultants for different study areas have non-uniform. The data have not been able to translate into good set of stories required for development. This leads towards making decisions such as handing over 100 projects to one consultant to maintain uniformity and easing the data analysis.
7. Development work at local levels is not guided by data. A Fact/Data driven approach needs to be developed from local levels.
8. Even the database at NTPCO is not integrated at present. Some ideas are being discussed and implemented for an integrated database management system.

Key Informant Interview XIII
Informant : **Tej Karki** Professor
Institution : Lovely Professional University
Date : July 21, 2023

Key Notes

1. Data is useful in deriving meanings. When data is public, people can provide feedback and data can make meaningful impact.
2. The state of use of open data in Nepal : there is less freely open data in Nepal. The issues of negligence and reliability are prevalent. There is a need of crosschecking of data.
3. It is important to see how the open data is being used in various developed countries of the world for urban planning and learn how it can be used in the context of Nepal.
4. It is important to make a list of sources of open data for urban planning in Nepal.
5. When talking about open data, the concepts of big data and crowd sourcing are also linked.
6. The understanding about open data in planning can be derived from the study of international practices to develop insights for Nepal.
7. Most of the government data and project data in Nepal are not truly open.
8. There is lack of scientific data that is reliable in Nepal.
9. The concerns about rights to information, sensitivity and inclusivity need to be well studied in the context of open data.
10. There is no feedback mechanism for open data platforms in Nepal.
11. The data in media can itself be sources of open data.

Key Informant Interview XIV
Informant : **Yogesh Purna Shrestha** Director
Institution : Picasso Consultants
Date : July 23, 2023

Key Notes

1. Planning is supposed to be a fact-based practice that involves projection using existing archives and similar case studies. Data is, therefore, an important aspect of planning.
2. In the context of Nepal, spatial data is acquired from Department of Survey (one has to buy high resolution data). Non-spatial data is acquired from NSO or through surveys (primary source) in local levels.
3. Primary data is generally gathered using KIIs and FGDs , whereas for secondary data – published and unpublished materials are used. Government invests resources in preparing secondary data- so as a recovery plan certain fee for data is required.
4. DUDBC also sells images for planning purposes.
5. The formats of data available online are excel, pdf and csv. Pdf is a good format because it provides information and conversion is possible from pdf to other formats.
6. There is online database available in Nepal – government should play a good role in database creation and management.
7. It should also be easier to buy data without any hassle. In the context where we need to buy required data even from google, we cannot expect everything to be free. Certain charge may be applied for 5 cm resolution images but 10m or 30m resolution images could be made freely available.
8. There is a general problem of not understanding the necessity of planning processes. In the case where a satellite image is enough, many other unnecessary data are acquired- which increases the cost of project
9. The data required for research needs to be easily available.
10. It is also important for the planners to have the knowledge about availability of the data- where and how they are available.
11. It should not be necessary to put all plans of the municipality in the municipality website.
12. Data portals should provide information about availability of data for free. Not all data can be free.
13. There should be a record keeping system to have an idea about who is accessing open data and using the data. It should also be discussed how the municipality will benefit from making data openly available.
14. In the case of government to government (G2G) information and data sharing, everything should be well coordinated and free.
15. There is an issue of data authenticity. There are discrepancies between data provided by the census and data collected by municipalities.
16. Issues of data privacy also comes up in planning. During social surveys, people are hesitant to provide answers/share their information.
17. Open Data Policy: It should be led by the government (MoCIT). In the case of data, it is not useful if private institutions lead it. The economic and policy related things should be handled by the government. Public agencies should review the data system.
18. Google earth and OSM Data are used for planning in Picasso. There are issues concerning reliability but at least some data is available. There is requirement of field verification of data.
19. Thematic data and information for planning should be well managed by the federal government. The federal government should think about homogeneity of data. The portals should be uniform. It should be easy to search for required data.
20. The data of NSO should be linked with spatial data of survey department.
21. The data prepared by government bodies are currently not in correct path. It is difficult to search them. They are not optimized for search engines.
22. There is issue of non-overlap of data provided by same institution. For example, the data provided by the survey department – wards, municipal boundaries, district, province, and national boundaries do not overlap. It is important that these different scales of data overlap.
23. The data produced by various doner funded agencies do not get shared with the government. The agencies only provide reports to the government after investing a lot of resources in data preparation and analysis (including spatial data)
24. Following stakeholders need to be consulted for open data in urban planning:
    a. Colleges – colleges should make their thesis readily available online
    b. DUDBC – DUDBC should provide information to planners

c. IT Officers of Municipality – Data sharing policy of the municipality and associated workplan
d. ADB, WorldBank, ICIMOD, UNDP, GIZ, TDF – policy of data sharing
e. Survey Department – condition of LIDAR mapping and data sharing policy
f. MoUD, MoFAGA, MoCIT (National Information Commission)
g. Municipalities – power of IT can be used and harnessed even in low resource setting

Key Informant Interview XV
Informant : **Manish Raj Joshi** Director
Institution : Urban Planning and Design Consultants Nepal (UPDCN) Pvt. Ltd.
Date : July 23, 2023

Key Notes

1. Experience from Hong Kong
    a. There is a planning department website which contains data and information from any planning study completed or going on. There is a good report and information sharing platform (included overall planning, transport department, and online zoning plans)
    b. Data up to plot level is available. It is easier to see the change use and apply and/or make decisions.
2. Experience from Hawaii
    a. There is data related to disaster
        i. HLF - Flood level data
        ii. GIS data of Tsunami
3. Data sharing concept in Nepal is not well developed in the mindset of concerned stakeholders. There is no coordination and communication between departments. Departments work in isolation.
4. In the age of data and information, there is no realization that data should be integrated into one platform and shared for effective planning.
5. The data producers are not aware about why data is required, for what purpose.
6. The concept of "Data/Information as power" is prominent and there is no tendency to devolve the power. This has challenged the ecosystem of sharing data openly.
7. Even urban planners in Nepal are not aware of data portals.
8. DUDBC produced many IUDPs, but they are not easily available for use. There is no database that could be shared. The work done by one department/section is limited to that department/section. Other departments are unaware or oblivious of it.
9. There are instances where institutional memory is lost when the person in charge is changed or the term ends. There is transfer of knowledge/information/data from one leadership to another. Example: ADB RUDP study – a series of public consultations was conducted. Several meeting minutes were misplaced when the UPDC leadership changed.
10. The technical staff of municipality or other government offices are not aware about open data ecosystem.
11. Data in Planning
    a. Statistical data – data produced by NSO gets old and household level data are not easily available- difficulty to verify, costly, and huge manpower required for household data creation
    b. Land use data – needs to be bought from survey department
    c. GIS data
    d. Data from department of hydrology and mines – restricted access
12. There is no archiving of reports and drawings. Even educational institutions do not archive their theses properly.
13. The consultants in the country are not inclined to share their data with other consultants. They are concerned about others finding errors and faults in their practice.
14. Most consultants only provide reports to the government body- not the data.
15. Urban planning can become a very good tool only if data and GIS are effectively used.

16. At the government level, it is important to recognize IT as an important field. There should be training and capacity building for IT development. Additional staff may be required.
17. IPT – taxation, GIS should be combined
18. For open data, data portals should be made by the clients and consultants should also be accountable for the data.
19. There are challenges of data bandwidth when it comes to open data ecosystem.
20. The concept of knowledge sharing and knowledge building online has not developed well in the context of urban planning practices in Nepal. Consultants are insecure about their own data.
21. There is no concept of regular update of data.
22. Just like the Delhi Development Committee that does centralized data keeping, KVDA could independently keep data and create portals to aid urban planning.
23. Organizations like RUPSON should also advocate for data sharing.
24. There should be an integrated system of data creation, utilization mechanisms, including citation, attribution, and authentication.
25. There is need of upgrading of technology in government agencies. There is a need of exposure and knowledge generation in the field of open data.
26. Refer to Prashant Malla – Pioneer in the field of DBMS and data sharing.

Key Informant Interview XVI
Informant : **Siddhanta Neupane** Former IT Officer
Institution : Changu Narayan Municipality
Date : July 23, 2023

Key Notes

1. Why was open data platform initiated in the municipality?
    a. The data present were not meaningful
    b. Time and other resources were being wasted in duplication of work
    c. Repetitive asking by people for same data
    d. One portal- one platform solution was required
2. GIS based open data -smart city network was established
    a. Municipal GIS based open data portal was initiated
    b. NAKSA private limited – standard framework was set to help governance in problem solving
3. It was difficult to get the officials on board
    a. They were okay with doing repetitive work but did not want to spend any time on entering data into the portal
4. Open data in Urban Planning
    a. Open data portal
        i. Urbanization and Urban Context
        ii. Shape files
        iii. DPRs and other plans
        iv. Road network
        v. River Network
        vi. Land use policy
    b. Interactive GIS Model
    c. Paper based approach to digitized approach required
5. Making Open Data Ecosystem
    a. Listing
        i. IUDP, KVDA masterplan, New Town Documents, Municipal plans, MTMPs
        ii. Listing using participatory approach- to assign value and weightage to the data
    b. Storing
        i. Format
        ii. GIS vs MIS forms

   c. Infrastructure
      i. Web Based portal
      ii. Server- depends on the type of portal
      iii. Specialized person may be required
      iv. Drone videos may be 800-900 GB for one municipality
   d. Issues
      i. Government policies on cloud storage are not very open data friendly
      ii. Mathematics of data size calculations required (NPS server required for Open Data – Traditional Latin Server will be obsolete)
      iii. Mobile apps become very heavy
   e. Opportunities
      i. Small offices or institutions can easily make non-GIS based open data portals
      ii. Data can be easy and non-heavy for non-spatial data. Starting can be done with non-spatial data and further infrastructure may be developed
   f. Process of making data available online
      i. IT collaboration – ICT Scholarships
         1. Internship to IT college students at the municipality
         2. Train the staff and at least create PDFs of paper records
      ii. Allocate certain hours per week for online data creation/exercise (eg: Friday after 1 pm – 2 hours dedicated to data creation by municipal staff)
6. A National Level portal would be a better choice
   a. But there is no proper initiation
   b. There is no sustainable solution to it yet- projects ends when initial budget ends

Key Informant Interview XVII
Informant : **Narayan Prashad Bhandari** Deputy Director General
Institution : Department of Urban Development and Building Construction
Date : September 04, 2023

Key Notes

1. What kind of data is openly available on the website/shared openly by the department?
   a. Many types of data are shared openly by the department
      i. Budget and Programs
      ii. Policy and Directives
      iii. Guidelines, Codes, and Byelaws
      iv. Progress Reports
2. What are the sources of Open Data for the department?
   a. NSO, Satellite Images (sometimes purchase), Survey Department, Self-creation
3. How has open data benefitted urban planning compared to traditional methods?
   a. The use of open data (or data in general) has helped to make the planning process easier.
   b. The use of open data from various sources like NSO, google maps has made the task of past data analysis easier- this has helped in analysis and development of settlements easier.
4. Have district rates for tendering purposes been made openly available? Has openness helped to prevent issues of project incompletion and project time extension?
   a. District Rates for tendering purposes are made available by the District Administration Office. Most of the notices are not paperless and posted online.
   b. The system of online monitoring of projects is available to the administrators. Monitoring has helped to increase project efficiencies.
5. DUDBC has prepared many IUDPs. Have the consultants provided only reports or shared datasets as well? Are these datasets made open?

   a. Consultants mostly share reports only but there are also datasets available for projects. Spatial data like satellite maps and base maps are available in the department. These datasets are going to be shared online by creating an online data portal that is linked to the main website.
   b. The mindset of the department is moving towards sharing data to make work efficient for planners. The datasets are currently available in the GIS Section of the department.
6. What are challenges in Open Spatial Data?
   a. Spatial data used by the department are either created by consultants, bought from the survey department or are available in the department itself.
   b. Data linked with personal information and property information are made available only by imposing a certain fee. This has been done to ensure that data misuse does not occur.
   c. There ae various challenges in making spatial data openly available, including but not limited to:
      i. Lack of technical manpower
      ii. Financial constraints
      iii. Insufficient hardware and software
   d. It is important to make sure that the data shared are user friendly and the users should also have the capacity to use the data effectively
7. What should be included in the Open Data Policy that could benefit the realm of urban planning?
   a. Issues of data authenticity
   b. Issues about context and interpretation of data

Key Informant Interview XVIII
Informant : **Anil Dutta** Joint Secretary
Institution : Ministry of Communications and Information Technology
Date : September 05, 2023

Key Notes

1. Relevance of Data Protection Law in Open Data
   a. There is an "Electronic Transaction Act- 2063" that contains the act for digital signature. An IT Bill was presented to parliament in 2075 but still has not been passed. Redrafting is going on to include more aspects of digital data.
   b. ICT policy-2072, Cyber Security Policy – 2080 are present that contain issues about data.
   c. An Integrated ICT Policy is being drafted. It is important to draft Acts and Regulations after the policies have been made.
   d. Data protection law talks about the owner of data as well as dissemination of data. Dissemination of data is best done in Open Data format so that interoperability of data is achieved.
2. An important issue in Data ecosystem in Nepal
   a. Data is not interoperable. Data linkages are difficult to achieve because data coding done by different institutions is not the same. For example, voters list from National Election Commission may have code of district set as A, B,C, while Ministry of Home Affairs may recognize districts with code 1, 2,3. This creates issues with data mapping.
   b. There is a need for standard coding mechanisms to help make data sharing and interoperability easier.
   c. Example of eBPS:

        i. For one type of work, different municipalities use different servers. Works are being done in isolation and integration is missing.
3. Data sharing within MoCIT
    a. There is an intranet system.
    b. Mostly paperless.
4. MoCIT's thinking about work ahead
    a. Integrated database of office management system (GIOMS – Government Integrated Office Management System) being prioritized
    b. Data Standardization is being discussed.
5. Whatever data is sharable, should be sharable by any government organization. Citizens can exercise the right to information if the agencies and/or organizations are not sharing data.

Key Informant Interview XIX
Informant : **Shashish Maharjan** Chief Operating Officer
Institution : Kathmandu Living Labs
Date : September 05, 2023

Key Notes
1. There has been some development in the field of Open Data, but a lot more needs to be done.
2. KMC has a GIS unit.
    a. Study of flash floods was done using GIS
    b. Public bus route optimization analysis has been carried out
        i. The data was brought from paper records from the transportation department. Digitized open data could have saved a lot of time and resources.
3. In lack of Open Data, a lot of work have been done repeatedly in the context of development work in Nepal. Time and resources are being wasted by repetition of work.
4. Many government departments, as well as private companies collect data in a non-integrated manner.
5. Because data is not open, government data needs to be bought.
6. Looking back 10 years in the field of data in Nepal
    a. Local bodies have shown interest in maps
        i. Some municipalities decide based on mapping (example: Nepalgunj)
        ii. Local bodies are preparing maps (which requires data)
        iii. Lot of visualization exercises are being done but their implementation for decision making is quite low.
7. What is preventing Open Data Ecosystem
    a. Lack of data quality assurance
    b. Inadequate data authorization mechanism
    c. No system of metadata creation
    d. No standardization mechanism
    e. Lack of maintenance guidelines for government websites/data portals
    f. Not being able to use low bandwidth/mobile friendly apps that use non-costly servers
8. Some examples of Open Data Portals developed in Nepal
    a. Soil.narc.gov.np
    b. Preparpokhara.org (developed by KLL team)
9. Major Requirements for an Open Data Ecosystem
    a. Human resources/technical manpower (data modeling, updating)
    b. Maintenance schedule/ mechanism
    c. Hardware
    d. Servers
    e. Open-Source Software
    f. Users (well informed)

Key Informant Interview XX
Informant : **Ratna Prasad Mainali** Information Commissioner
Institution : National Information Commission Nepal
Date : September 07, 2023

Key Notes

1. National Information Commission is an independent government commission
2. On August 13, 2017, a National Action Plan on Open Government Data was submitted to the prime minister's office. There has been no development in the policy of Open Data ever since.
3. To make data transparent and open, the information commission has been advocating for an open data ecosystem. Based on the prevalent laws, the commission advocates for collection, storage, and publish/dissemination of data openly.
4. There is a general lack of technical manpower in the commission itself.
5. The institutional memory of the commission itself is poor. A copy of the National Action Plan on Open Government Data is not easily available to the current officials of the commission.
6. The topic of Open Data has been limited mostly to conceptual talks
7. There is an unwritten assumption that the data and statistics available in government bodies are secure and correct. And, if data is kept in government bodies, the public can easily access data. This is not always the reality. The concept didn't materialize. Most data are still present in government paper records.
8. Various programs have been organized by the commission with the help of various other partners to advocate open data and open government. Last year, 4 programs were organized in Gandaki, Lumbini, Koshi, and Bagmati province to advocate for open governance ecosystem. Relevant experts and stakeholders were also present in the programs.
9. To implement open governance, the indicators in our context are quite good. There is need of interest and efforts from all three tiers of the government (vertical as well as horizontal coordination)
10. Open Governance requires public participation (civil societies), in addition to political and bureaucratic interests.
11. Some challenges:
    a. Traditional thinking
        i. Privacy issues are brought time and again
        ii. The government officials are afraid to open even registration numbers
12. If any public institution does not provide data as per "right to information", they are made aware about it and if they do not comply, they are penalized as per the law (*dafa* 32)
13. It is important to consider the local language while providing information to the local bodies. Local people should be able to understand what is being provided as information.
14. Government institutions should compulsorily publish a "*swota prakashan*" meaning self-published document to provide information about the institution, as well as works done by institutions.
15. *Satarkata Kendra* (National Vigilance Centre) and *Sushasan Ain* (Good Governance Act 2008) are good references for Open Governance in the context of our country.

Key Informant Interview XXI
Informant : **Damodar Dhakal** Director / Information Officer
Institution : Survey Department
Date : October 18, 2023

Key Notes

1. The Survey Department has been generating various spatial data.
    a. The department is the main point of contact for any spatial data in the country.
2. The spatial data provided by the department is provided officially in an unprojected format.
3. To acquire data from the department, the applicant must pay a certain fee and provide an identity card for verification.
4. The nationalgeoportal is the official online portal of the department.
    a. It has some data freely available
        i. A few years ago, even the administrative boundaries data was not freely available. After the earthquake, some data have been made freely available. In fact, during earthquake, many data were made freely available in high-resolution.
    b. Not all data can be made freely available because of the cost incurred in preparation of data
    c. More data is being gathered online.
        i. Online payment partners are reached to help with the necessary transactions.
    d. The department aims to be the hub of all spatial data by coordinating with various government and private institutions engaged in spatial data preparation.
        i. For this a portal could be a good solution. The department is working towards achieving this by evaluating and drafting necessary policies, acts, regulations, and guidelines. 25-30 organizations that are directly or indirectly linked to the department for spatial data will be included in this. Base data will be incorporated and a proper standard and guideline will be developed.
    e. Attribution is required when someone uses the department's data
5. Policies related with data and payment
    a. The online payment is guided by the Ministry of Finance
    b. There is a digital data distribution guideline available to share digital data
    c. A Geological Information Infrastructure related policy is being developed and is in the draft stage. This policy also talks about metadata. However, it does not mention open data.
6. Some spatial data cannot be made available like the plot related data. The country's law does not allow sharing data that could be used against individuals. Only limited stakeholders can access these kinds of data.
7. Promoting Open Data Ecosystem
    a. It is important to cater to the needs of the users. Also, understand the expertise and level of awareness of users. Both the service providers and service seekers should be on the same page about data distribution.
    b. Collaborations with the National Statistics Office for preparing the Census Map Atlas are likely to happen soon.
    c. Literacy among the various fields about use of spatial data is increasing. This is likely to push more towards open data technologies.

ANNEX IV

Madhyapur Thimi Municipality Open Data Availability Analysis

S. N.	Section	Component	Required Data Type	Data Sources	Availability	Remarks
1	Physical Development Plan	Base Map	Shape Files	Survey Department	Partially Open	Free to government agencies only, public need to pay
2	Physical Development Plan	Satellite Map	Satellite Map (DEM)	Google or purchase	Partially Open	Some Open, mostly closed
3	Physical Development Plan	Elevation Range Map	Spot heights, contour elevation (shp, csv)	Survey Department	Partially Open	Open to government agencies only, public need to pay
4	Physical Development Plan	Land Use	Shape Files	Survey Department	Partially Open	Open to government agencies only, public need to pay
5	Physical Development Plan	Population Density	Excel/xml/csv	NSO, Municipality	Open	Mostly Open, Survey by Municipality not available
6	Physical Development Plan	Road Network	Images, shape files	OSM, DoR, Survey	Partially Open	Mostly Open from OSM, attributes from DoR and Survey partially open
7	Physical Development Plan	Water Supply Network	Location point and pipelines shape files	Municipality, DWSS	Unavailable	Generally not available and limited to word of mouth
8	Physical Development Plan	Electricity and Telecom Network	Location Points and wires shape files	NEA/NTC	Unavailable	Not open to public
9	Physical Development Plan	Cadastral Information Map	Shape Files	Survey Department	Unavailable	Open to government agencies only, public need to pay
10	Physical Development Plan	Slope/Aspect Map	DEM	Google or purchase	Partially Open	Some Open, mostly closed
11	Physical Development Plan	Natural Drainage and Watershed Map	Satellite Map and shape files	Satellite Map	Unavailable	
12	Physical Development Plan	Resources Map	Shape files	Municipality, Survey	Unavailable	Rarely made available to public
13	Physical Development Plan	Waste Management / Sewerage System	Satellite,Shape files	Municipality	Unavailable	Mapping generally not done, Data available in unusable format
14	Physical Development Plan	Cultural and Tourism Map	Digitization in satellite map	Municipality, OSM	Partially Open	Some data available in OSM, Municipalities publish pdf or hard copies
15	Physical Development Plan	Suitability Map	Land use, topo, countour map	Various Agencies	Unavailable	Rarely made available to public in reusable form
16	Physical Development Plan	Existing Land Use	Shape Files	Survey Department, Municipality	Partially Open	Free to government agencies only, public need to pay

17	Physical Development Plan	Urban Growth	Satellite Images	Google or purchase	Partially Open	Some open, some closed
18	Physical Development Plan	Area for future growth	Excel/xml/csv and shape files	NSO, Municipality	Partially Open	Some open, some partially open
19	Physical Development Plan	Total building permit	Excel/xml	Municipality	Unavailable	
20	Physical Development Plan	Total houses in the municipality	Excel/xml	Municipality	Unavailable	
21	Physical Development Plan	Byelaws and codes compliance	Excel/xml	Municipality	Unavailable	
22	Physical Development Plan	Proposed Future Urban Expansion	Land use, risk sensitive map	Municipal Profile	Unavailable	Mostly limited to word of mouth
23	Physical Development Plan	Road Network	Excel, shape files	MTMP, Statistics (DoR)	Partially Open	Mostly Open from OSM, attributes from DoR and Survey partially open
24	Physical Development Plan	Public Passenger and freight transport	Excel, shape files	MTMP, Transport Association	Unavailable	rarely available
25	Physical Development Plan	Traffic Management	Counting data in excel, links junction shape files	MTMP, Traffic Police	Unavailable	Not open to public
26	Physical Development Plan	Parking Management	List of parking spaces, parking quantity and location data	MTMP	Unavailable	Data not prepared
27	Physical Development Plan	Situation of water supply	Water Supply Network - Shape files and excel	DWSS	Partially Open	Pdfs available
28	Physical Development Plan	Situation of waste water/sewarage	Sewarage Network with manhole- shape files and excel	DWSS	Unavailable	Mostly unavailable
29	Physical Development Plan	Solid Waste Collection	Solid waste collection reports and points	Municipality or private company	Unavailable	No data available
30	Social Development Plan	Basic demography	Excel, xml	NSO	Open	NSO data available openly
31	Social Development Plan	Demographic indicators birth, death, migration etc)	Excel, xml	NSO	Open	NSO data available openly
32	Social Development Plan	Population projection	Excel, xml	Municipality	Unavailable	Not available
33	Social Development Plan	List of Cultural and Traditional Monuments	Excel, xml	Municipality, OSM	Partially Open	OSM data available

34	Social Development Plan	List of Rituals and Festivals	Excel, xml	Municipality	Unavailable	
35	Social Development Plan	List of ethnic and marginalized communities	Excel, xml	NSO	Open	NSO data available openly
36	Social Development Plan	Data of accidents and types	Excel, xml	Traffic police	Unavailable	Not available
37	Social Development Plan	Number of schools, students and educational institutions	Excel, xml	Municipality	Partially Open	Available in list in the website
38	Social Development Plan	Location of educational institutions	Shape Files	OSM	Open	Mapped institutions are available
39	Social Development Plan	Literacy Rate (male, female, general)	Excel, xml	NSO	Open	NSO data available openly
40	Social Development Plan	Total student enrollment by level disadvantaged group student school student ratio SSR	Excel, xml	Municipality	Unavailable	Not available openly to public, some do not even have record
41	Social Development Plan	Life expectancy	Excel, xml	NSO, Municipality	Unavailable	No data available
42	Social Development Plan	Maternal Health Case Infrastructure	Excel, xml	Municipality	Partially Open	Available in list in the website
43	Social Development Plan	Nutrition of children	Excel, xml	Municipality	Unavailable	Not available
44	Social Development Plan	Number of health facilities	Excel, xml	Municipality, OSM	Partially Open	Available in list in the website, OSM data
45	Social Development Plan	Location of health facilities	Shape Files	OSM	Open	Mapped facilities are openly available
46	Social Development Plan	Number of medical professionals	Excel, xml	Municipality	Unavailable	No data available (availble only of government facilities)
47	Economic Development Plan	Agricultural output	Excel, xml	Municipaliy	Unavailable	
48	Economic Development Plan	Major Agricultural product	Excel, xml	Municipaliy	Unavailable	
49	Economic Development Plan	Cash and food crop production	Excel, xml	Municipaliy	Unavailable	
50	Economic Development Plan	Employment in Agriculture sector	Excel, xml	NSO, Municipality	Partially Open	Some data from NSO

51	Economic Development Plan	Trend in agriculture	Excel, xml	Municipaliy	Unavailable	
52	Economic Development Plan	Status of Animal Products	Excel, xml	Municipaliy	Unavailable	
53	Economic Development Plan	Location of agriculture land and farm	Shape Files	OSM, Municipality	Partially Open	OSM data available but not fully correct
54	Economic Development Plan	Number of farm animals	Excel, xml	Municipality	Partially Open	Pdf form
55	Economic Development Plan	Types of Industries	Excel, xml	Municipality, CCI	Partially Open	Available in pdf formats
56	Economic Development Plan	Location of Industries	Shape Files	OSM	Open	Mapped industries are available
57	Economic Development Plan	Production by industries (type and quantity)	Excel, xml	Municipality, CCI	Unavailable	
58	Economic Development Plan	Employment in Industries	Excel, xml	Municipality, CCI, NSO	Open	Number available in NSO
59	Economic Development Plan	Employment by type	Excel, xml	Municipality, CCI, NSO	Open	Number available in NSO
60	Economic Development Plan	Employment of Marginalized communities	Excel, xml	Municipality, CCI	Unavailable	
61	Economic Development Plan	Export area of products	Excel, xml	Municipality, CCI	Partially Open	Available in pdf formats
62	Economic Development Plan	Trend and status of imports	Excel, xml	Municipality, CCI	Unavailable	
63	Economic Development Plan	Trend and status of exports	Excel, xml	Municipality, CCI	Unavailable	
64	Economic Development Plan	Types and number of trading	Excel, xml	Municipality, CCI	Unavailable	Not available openly to public
65	Economic Development Plan	Volume of traders	Excel, xml	Municipality, CCI	Unavailable	Not available openly to public
66	Economic Development Plan	Number of banks	Excel, xml	Municipality, CCI	Partially Open	Available in pdf formats
67	Economic Development Plan	Location of banks	Shape Files	OSM	Open	Mapped facilities are openly available

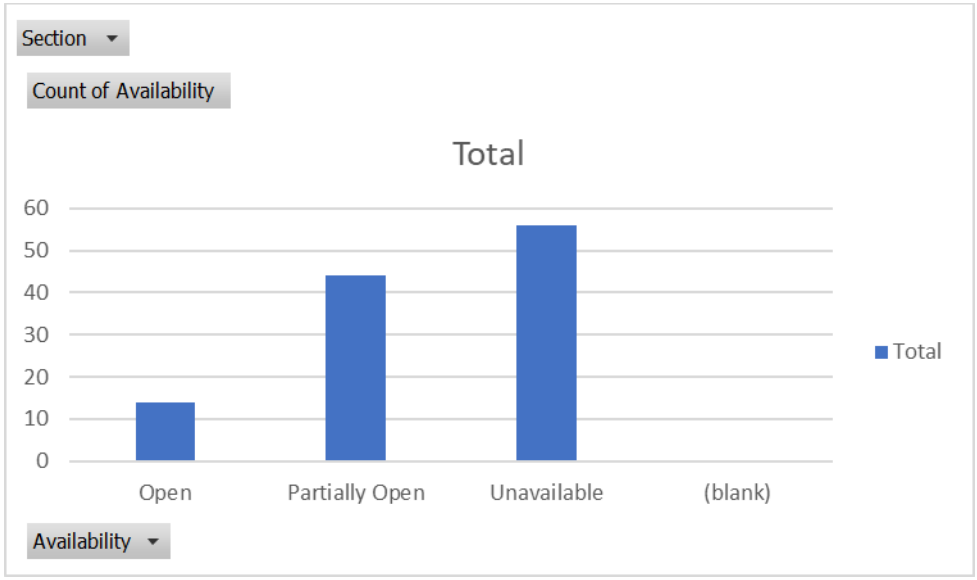
68	Economic Development Plan	Number and status of other financial institutions (eg cooperatives)	Excel, xml	Municipality, CCI	Partially Open	Available in pdf formats
69	Economic Development Plan	Location of financial institutions	Shape Files	OSM	Open	Mapped facilities are openly available
70	Economic Development Plan	Number of people below poverty line	Excel, xml	Municipality, NSO	Unavailable	
71	Economic Development Plan	Numer of people in foreign employment	Excel, xml	Municipality, NSO	Partially Open	Available in pdf formats
72	Economic Development Plan	Data on remittance sent to the municipality	Excel, xml	Municipality, NSO	Unavailable	Not made open to public
73	Economic Development Plan	Number and type of tourists arrivals	Excel, xml	Municipality	Unavailable	No record in most municipalities
74	Economic Development Plan	Number of hotels, tour operators	Excel, xml	Municipality, Tour Operators	Unavailable	Not made open to public
75	Economic Development Plan	Location of hotels and tour operators	Shape Files	OSM	Open	Mapped facilities are openly available
76	Economic Development Plan	Average stay of tourists	Excel, xml	Municipality, Tour Operators	Unavailable	Not made open to public
77	Economic Development Plan	Average expenditure by tourists	Excel, xml	Municipality, Tour Operators	Unavailable	Not made open to public
78	Environment Management Plan	Temperature Data	Excel, xml	DHM, International Websites	Partially Open	Images of tentative data available in international websites
79	Environment Management Plan	Rainfall Data	Excel, xml	DHM, International Websites	Partially Open	Images of tentative data available in international websites
80	Environment Management Plan	Wind Speed Data	Excel, xml	DHM, International Websites	Partially Open	Images of tentative data available in international websites
81	Environment Management Plan	Geomorphology	Shape Files, excel, xml	DHM, Google Earth	Partially Open	Some data available in google earth
82	Environment Management Plan	Hydrology	Shape Files, excel, xml	DHM, Google Earth	Partially Open	Some data available in google earth
83	Environment Management Plan	Siesmology	Shape Files, excel, xml	DHM	Unavailable	
84	Environment Management Plan	Mineral Resources	Shape Files, excel, xml	DHM	Unavailable	

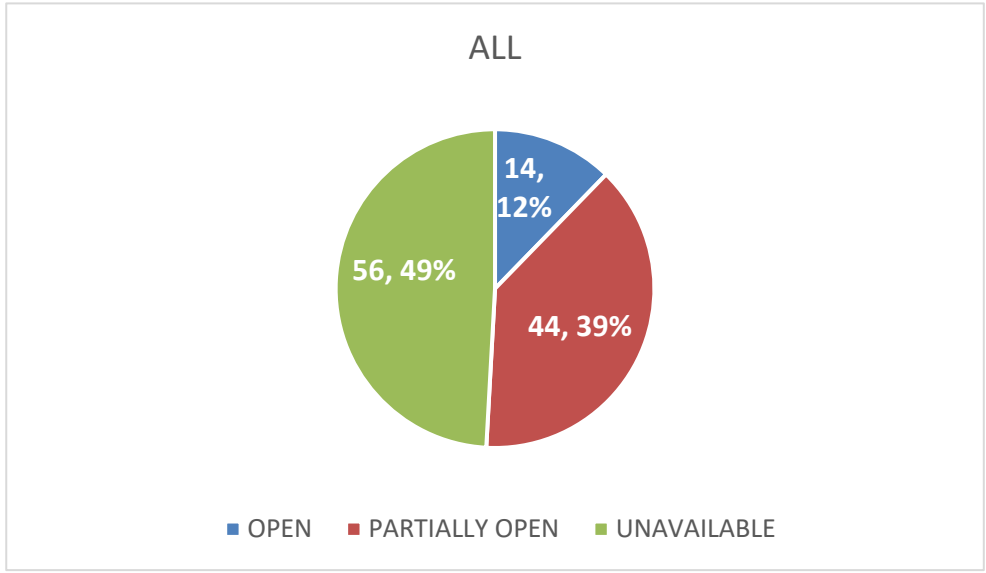
85	Environment Management Plan	Forest Cover	Shape Files, excel, xml	Municipality, Forest Division, OSM	Partially Open	OSM data available but not fully correct
86	Environment Management Plan	Number and type of forests	Excel, xml	Municipality, Forest Division	Unavailable	May be available in printed form
87	Environment Management Plan	Location of Forests	Shape Files, excel, xml	Municipality, Forest Division, OSM	Partially Open	OSM data available but not fully correct
88	Environment Management Plan	Flora and Fauna data	Excel, xml	Municipality, Forest Division	Unavailable	
89	Environment Management Plan	Quantity of water supply	Excel, xml	Municipality, DWSS	Unavailable	
90	Environment Management Plan	Water supply source locations	Shape Files, excel, xml	Municipality, DWSS	Unavailable	
91	Environment Management Plan	Sanitation related records (number of houses with septic tanks)	Excel, xml	Municipality, DWSS	Unavailable	
92	Environment Management Plan	Ground water table records	Excel, xml	Municipality, DWSS	Unavailable	
93	Environment Management Plan	Ground Water mapping	Shape Files	Municipality, DWSS	Unavailable	
94	Environment Management Plan	Drinking water taps locations	Shape Files	Municipality, DWSS	Unavailable	
95	Environment Management Plan	Quantity of waste water	Excel, xml	Municipality, DWSS	Unavailable	
96	Environment Management Plan	Quantity of sewarage	Excel, xml	Municipality, DWSS	Unavailable	
97	Environment Management Plan	Quantity of solid waste	Excel, xml	Municipality, Companies	Unavailable	
98	Environment Management Plan	Managed quantity of solid wastes	Excel, xml	Municipality, Companies	Unavailable	
99	Environment Management Plan	Location of solid waste management	Shape Files, excel, xml	Municipality, Companies	Partially Open	Located in google maps
100	Environment Management Plan	Air quality index	Excel, xml	Municipality, Environment Division	Partially Open	Some data of some places available
101	Environment Management Plan	Noise level mapping	Shape files	Municipality, Environment Division	Unavailable	

102	Disaster Risk Management Plan	Hazard Mapping	Shape files	Municipality, DRRM Centre, DRR/bipad portal	Partially Open	Images available in bipad portal
103	Disaster Risk Management Plan	Disaster History	Shape Files, excel, xml	Municipality, DRRM Centre, DRR portal	Open	
104	Disaster Risk Management Plan	Satellite Map	Shape Files	Municipality, DRRM Centre	Partially Open	Google earth satellite map available
105	Disaster Risk Management Plan	Disaster Inventory Map	Shape Files, excel, xml	Municipality, DRRM Centre, DRR/Bipad portal	Partially Open	Images and xml available in bipad portal
106	Disaster Risk Management Plan	Disaster Incident, Loss Data and Map	Shape Files, excel, xml	Municipality, DRRM Centre, DRR/Bipad portal	Partially Open	Images and xml available in bipad portal
107	Disaster Risk Management Plan	Calculations related to flooding and landslides	Excel, xml	Municipality, DRRM Centre	Unavailable	
108	Financial Development Plan	Revenue and Taxes Data	Excel, xml	Municipality	Partially Open	Available in pdf formats
109	Financial Development Plan	Fees, Charges Data	Excel, xml	Municipality	Partially Open	Available in pdf formats
110	Financial Development Plan	Grants Data	Excel, xml	Municipality, Province, Federal	Partially Open	Available in pdf formats
111	Financial Development Plan	List of planned development activities	Excel, xml	Municipality	Partially Open	Available in pdf formats
112	Financial Development Plan	Cost Estimates of projects	Excel, xml	Municipality	Partially Open	Available in pdf formats
113	Financial Development Plan	Feasibilty Reports	Excel, xml	Municipality, Province, Federal	Partially Open	Available in pdf formats
114	Financial Development Plan	Municipal Budget	Excel, xml	Municipality, Province, Federal	Partially Open	Available in pdf formats

SUMMARY

DATA TYPE	OPEN	PARTIALLY OPEN	UNAVAILABLE	TOTAL
PHYSICAL	1	12	16	29
SOCIAL	6	4	7	17
ECONOMIC	6	8	17	31
ENVIRONMENTAL	0	9	15	24
DISASTER	1	4	1	6
FINANCIAL	0	7	0	7
ALL	14	44	56	114
TOTAL	**114**			





ANNEX V

Mid-Term Jury Comments and Resolution

MID-TERM JURY COMMENTS AND RESOLUTION			
N.	**Jury**	**Comment**	**Resolution**
1	Nava Raj Pyakurel	Need to clarify the Policy, Act and Regulations required for Open Data	Mentioned recommendation chapters (Open Data Policy and the Act, Regulations, and Open Data Portals to operationalize Open Data Policy)
2		The recommendations should cover budget allocation, system development guidelines, and management of portals	Reflected in the recommendation chapter (7.3.4. Making Open Data Portals)
3		The recommendation should include how to change attitude of people through education and trainings, and how this can be integrated into local bodies	Reflected in 7.3.4. and 7.4.
4		Issues of system crashing and need for backups should also be mentioned	Reflected in Chapter 7 - Making Open Data Portals
5	Kishore Kumar Jha	It is important to link Right to information with Open Data and make data available to all. Need to clarify: What needs to be improved? How open data can help "right to information" and vice-versa? What are the budget requirements?	Reflected in 5.6. Gaps in policies and in chapter 7.2. Open Data Policy
6	Dr. Jiba Raj Pokharel	Problems in tender documentation can be solved with the help of Open Data (could help solve non-completion and time-extension issues)	Section 5.3 – Addition of a paragraph and a quote on use of Open Data for procurement system, citing examples of South Korea and DUDBC.
7		The Benefits/Contributions need to include how using open data is better than classical method of planning	Section 5.4 – first paragraph (quote by a KII about better efficiency of Open Data compared to traditional paper-based system)
8	Dr. Ajay Chandra Lal	What could be the incentives for Open Data (creating and sharing?)	Mentioned in chapter 7 (recommendations-linking open data milestones with budget)
9		How to promote Right to Information	Mentioned in 7.1 – Promotion of Open Data Ecosystem
10		Why do we need to visit the survey department for spatial data? Can't there be online payment options?	Mentioned in 5.1 – The department is working towards and testing the online payment system.

ANNEX VI

IOE GC Acceptance Letter and Paper

त्रिभुवन विश्वविद्यालय
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Date: November 26, 2023

To Whom It May Concern:

This is to certify that the paper titled "***Open Data in Urban Planning : Unveiling Perspectives from Planners and Stakeholders in Kathmandu Valley***" (Submission# **343**) submitted by **Prabal Dahal** as the first author has been accepted after the peer-review process for presentation in the 14th IOE Graduate Conference being held during Nov 29 to Dec 1, 2023. Kindly note that the publication of the conference proceedings is still underway and hence inclusion of the accepted manuscript in the conference proceedings is contingent upon the author's presence for presentation during the conference and timely response to further edits during the publication process.

Bhim Kumar Dahal, PhD
Convener,
14th IOE Graduate Conference

IOE Graduate Conference
[Placeholder for Publication Information]

Open Data in Urban Planning : Unveiling Perspectives from Planners and Stakeholders in Kathmandu Valley

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Abstract
With the majority of the world living in urban areas, there is a necessity to deliver services to cater to their needs, which requires urban planners to become aware of, adopt, and harness data literacy. Open Data is a form of data that is publicly available for re-use and redistribution, and it has various economic, performance, and societal benefits. Kathmandu Valley, being the hub of urban development in Nepal is a good place to review the state of use of open data in planning in Nepal. To understand the state of use of open data in planning cities in Kathmandu Valley and how the planning fraternity is using open data, a mix of qualitative and quantitative methods has been adopted. Engagement of stakeholders through key informant interviews, expert consultations, online data/documents search, and planners' survey has been carried out in addition to review of relevant literature. It has been found that planners are using open data mostly available in PDF form and derive many benefits including saving time and resources in primary data collection. Challenges of lack of a guiding open data policy, lack of coordination between stakeholders and government authorities, and lack of awareness about importance and use of open data are revealed. With the help of existing national efforts as well as international examples, an open data policy and city level open data portals could help develop and promote the open data ecosystem for urban planners in Nepal.

Keywords
Open Data, Data, Open Data Portal, Governance, Transparency, Urban Planning, Informed Decision-Making

1. Introduction

By the year 2050, it is expected that 68.4% world population will be living in urban areas [1]. With a greater proportion of people living in urban areas, the demand for improved living standards and urban services has increased significantly. In order to properly understand the needs of increasing population and deliver services to cater their needs, traditional systems of data keeping, and analysis are becoming obsolete. In the wake of the digital revolution, the field of data has become far too important to leave only to data scientists. Urban Planners need to become aware of the data they use, their sources and how they are generated. While there are various types of data available in the world, Open Data is an important type of data in the field of urban planning. Open Data or Open Government Data is information gathered, produced, or paid for by public agencies and made freely available for re-use for any purpose, and the terms of use is included in the license [2].

The meaning and scope of open data may vary in different countries and different sectors. In the context of urban planning in Nepal, open data is available and used in form of data from National Statistics Office (formerly CBS), Open-source mapping, PDFs of various reports in various government websites, freely available survey department data, etc. The use of google earth and google maps data has been instrumental in various urban planning projects in recent years. There are high expectations for Nepal, which is currently decentralizing to a new federal system, to advance an open government agenda and create a culture of more accountability and transparency [3]. There is a famous sloka in Sanskrit "Vidya dhanam sarba dhanam pradanam" equivalent to Nepali saying "Jñāna jati baḍyō tyatī baḍhcha" which translates to "The more knowledge we share, the more it grows.". This philosophy helps to validate the need and support for open data ecosystem in the Nepalese context.

There are limitations in the field of open data in Nepal, including a lack of empirical research and systematic analysis that specifically focuses on the use of open data in urban planning. Limited research on setting up infrastructure for open data and caution against misuse of open data makes discussion on open data difficult in the Nepalese context. In such a context, this research intends to answer the question "What is the state of use of open data in the planning of cities in Kathmandu Valley and how is the planning fraternity using open data?" with objectives to define and explore the availability, use, benefits, and challenges of open data in the context of city planning in Kathmandu Valley, to investigate how the planning fraternity is using open data, and to review relevant policies to provide recommendations for effective implementation of open data ecosystem.

Because of its high population density, urban development issues, availability of open data projects, technological improvements, and policy importance, Kathmandu Valley is an appropriate research location for evaluating the use of open data in Nepal. The research has been carried out in the context of Kathmandu Valley- meaning the key stakeholders that are interviewed and/or surveyed are linked to planning of Kathmandu Valley in one way or the other. It is expected that the learnings and recommendations from this research can be used for cases of use of Open Data in Planning of cities outside of Kathmandu Valley as well. The research is expected to

encourage more research and discussion about open data in urban planning.

2. Methodology

The conceptual framework of the study incorporates gathering knowledge about open data, use of open data in urban planning and benefits of use of open data in the realm of urban planning. While examining these, the right to information and privacy of the citizens are also to be considered.

Figure 1: Conceptual Framework of the study

This research belongs to the pragmatist's paradigm which Uprety [4] describes as being a paradigm where the researchers believe that the reality needs to be constantly negotiated, debated, and interpreted.

The ontological claim of this study is Open data integration in urban planning of cities in Kathmandu Valley encompasses a variety of sources, stakeholders, and challenges, with potential benefits for informed, participative, and geospatially informed urban development.

Epistemologically, the valid source of knowledge for this study is the study of social process and direct interaction with the experts which requires adoption of various methods and strategies for the generation of the knowledge out of the literature study, case study, cross case analysis, and survey.

This research utilizes mixed methodology as a research strategy. Descriptive strategy within the post positivist paradigm, inductive logic system within the interpretivist paradigm, as well as abductive logic within the interpretivist and pragmatic paradigm is utilized to address the objectives of the research. It is important to note that this is not an intermix of paradigm but use of two different paradigms for different objectives. The overview of the research strategy for the research can be summarized with the help of following diagram:

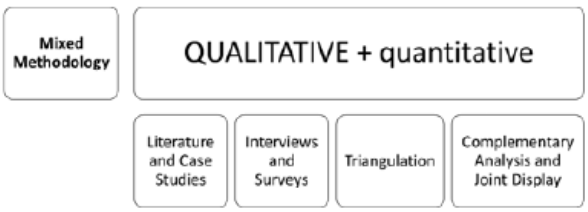


Figure 2: Overview of the Research Strategy

A data collection plan was made to collect data by addressing the key objectives of the research. The summary of data collection methods is as follows:

Table 1: Data Collection Methods

Method	Purpose	Remarks
Literature and Policy Review [S]	Definition and decoding Open Data, Gaps in policies [Convenience Sampling]	National and International documents reviewed
Key Informant Interview (KII) and Expert Consultation [P]	Open Data Availability, Use, Benefits, and Challenges, Gaps in Policies [Expert Sampling and Snowballing]	8 Senior Planners in Kathmandu Valley from Government and Private Institutions. 13 other Expert/Key Informants in the field of data, statistics, survey, information, and IT
Survey [P]	Use, Benefits, and Challenges [Expert Sampling and Snowballing]	Online Survey of 25 Urban Planners practicing in Kathmandu Valley
Case Study (National, International) [P+S]	Availability, Use, Benefits, and Challenges [Convenience Sampling]	National: Madhyapur Thimi, Budhanilkantha, Changunarayan International : Barcelona, Pune
[P]- Primary [S] - Secondary		

The planners for the Key Informant Interviews were Deputy Development Director at Kathmandu Valley Development Authority, Deputy Director General of Department of Urban Development and Building Construction, Project Director at New Town Project Coordination Office of Department of Urban Development and Building Construction, Deputy Director of ICF Nepal, Urban Planner and Board member of National Institute for Urban and Regional Studies, Director of Picasso Consultants, Director of Urban Planning and Design Consultants, Professor of Lovely Professional University. 13 other Key Informants or Experts for consultation included Founder and CFO of Kathmandu Living Labs, IT Officers of Budhanilkantha and Changunarayan Municipality, CEO of Open Knowledge Nepal, Offiers of National Statistics Office, Joint Sectretaty of Ministry of Communication and Information Technology, National Information Commissioner of National Information Commission, and Director of Survey Department.

The study interviews and surveys were conducted in a convivial environment, without any intimidation or discrimination based on race, ethnicity, sexuality, gender, religion, disability, age, or any other base. In this research, the focus has been on the process rather than the ultimate result.

3. Literature Review

According to the International Open Data Charter [5] "Open data is digital data that is made available with the technical and legal characteristics necessary for it to be freely used, reused, and redistributed by anyone, anytime, anywhere". Open data empowers governments, citizens, civil society organizations, and private companies to make more informed decisions. For data to be open, the data itself should be publicly accessible over the internet, such as through websites, or data portals; the provided data should be useful and reusable without regard to legal constraints, using and conducting actions on data to create value through analysis, visualization, application development, and other means should be free; and the information must be freely and publicly given [6].

Open data is still a relatively new concept in Nepal, and it has only been a few years since momentum for open data has grown. Initiatives such as the large-scale mobile data collection to determine the extent of the earthquake's damage, the National Planning Commission's self-assessment of data gaps in measuring progress toward the Sustainable Development Goals (SDGs), the Public Procurement Monitoring Office's launch of the Public Procurement Transparency Initiative in Nepal (PPTIN), the sharing of registered business data by the Office of Company Registrar, and the submission of the Open Government Data show the presence of Nepal government in open data – mostly aided by civic space [6].

The use of Open Data in the public sector increases transparency and integrity by allowing for the tracking of public finances and throwing light on market trends that intersect with social, political, and environmental contexts [7]. For urban planning and development, urban data provides environmental (geographical, architectural) and societal (economic, social) information. Furthermore, urban data improves city intelligence by providing applications for healthcare, transportation, housing, and social life. It contributes to the creation of a sustainable and resilient urban environment, as well as the design of efficient public services for the well-being of inhabitants [8].

According to the Open Data Charter [5], following are the six principles of open data: Open by default, Timely and comprehensible, Accessible and usable, Comparable and interoperable, For improved governance and citizen engagement, and For inclusive development and innovation.

As open data evolves, the quality and breadth of datasets increase, and cities generate more insightful knowledge about open data performance assessment and impact. As a result, the quality of open data offered and its use are the most important success elements for open data efforts [9].

The open-platform geospatial information could be crucial during emergency situations, and could also greatly enhance disaster preparedness, quick responses, and early recovery [10].

In 2010, Sir Tim Berners-Lee suggested a 5-star deployment scheme for Linked Open Data, starting at one star with data getting more stars when proprietary formats are removed, and links are added [11].

An Open Data Portal is a collection of systems set up to make Open Data used and useful [12]. To make data usable, it must be adequately documented and tools for re-users must be available. The data must be of high quality for others to translate it into knowledge and make it valuable.

An open license permits others to do things like republish the contents or data on their own website, derive new content or data, make money by selling products that use one's content or data, republish the content or data while charging a price for access, and so on [13].

Metadata is essentially structured information that facilitates the retrieval, usage, or management of an information resource [14]. In practice, metadata explains a dataset and its structure while also assisting users in discovering it . The data often contains the following basic elements: title, who published the dataset, when it was published, how frequently it is updated, and what license is linked with the dataset.

The ten building blocks of Open Data Initiative as proposed by Davies [15] helps to understand what are the items that need to be considered while thinking about an open data ecosystem:

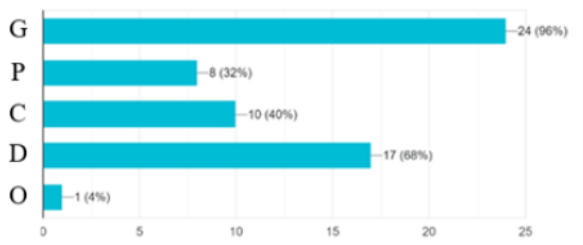
Block 1: Leadership and Bureaucratic Support
Block 2: Datasets
Block 3: Licenses
Block 4: Data Standards
Block 5: Data Portals
Block 6: Interpretations, Interfaces, and Applications
Block 7: Outreach and Engagement
Block 8: Capacity Building
Block 9: Feedback Loops
Block 10: Policy and Legislative Lock-in

4. Findings and Analysis

4.1 Open Data Availability in Planning of Cities in Kathmandu Valley

4.1.1 Sources of Open Data

The awareness about open data has been in Nepal for more than a decade now with engagement of civil societies and data enthusiasts actively promoting an open data ecosystem. The key informants consulted during the research as well as the survey conducted reveal that various government, as well as non-government agencies produce a plethora of data in Nepal, but they are shared mostly in PDF form, and mostly via government websites.



G - Government websites, P – Private companies, C – Civil societies, D – Development partners, O - Others

Figure 3: Sources of online data in Nepal according to survey respondents

4.1.2 Open Data Initiatives

Several efforts have been made to make various kinds of data open. The survey revealed that urban planning practitioners confidently believe statistical data related to the census is openly available. The National Statistics Office (NSO) was able to create an interactive open data portal to provide demographic data to the people. Efforts of Open Data enthusiasts and open data activists advocating for Open Data in Nepal and raising awareness among the key stakeholders at the NSO of the technicalities associated with Open Data made the data portal successful and open. An interview with the officials revealed that the office plans to publish any future data via an open data initiative as supported by their National Strategy for Development of Statistical System [16].

Another good example of open data initiative in the field of planning is BIPADportal [17] managed by NDRRMA under the Ministry of Home Affairs. The portal brings together digital and spatial data from various governmental, non-governmental, academic and research institutions on one platform and help in evidence-based planning by providing data in machine readable formats.

Similarly, open geo-spatial data is available for use in planning in cities of Kathmandu Valley in the Open Street Mapping (OSM) repository. OSM is a mapping system that is built by a community of mappers that emphasizes local knowledge and use of aerial imagery, GPS devices, and low-tech field maps to verify data. OSM data includes at least 29 primary features that could be helpful in geospatial analysis. Research reveals that about 80% of data used for urban planning are geo-referenced. It is important to have open data in spatial form in urban planning. Nepal was the leading country in OSM in South Asia when it was first introduced. There are more data in OSM than in google maps for many places of Nepal. India has dominated the OSM movement in the region now.

Other initiatives have also come up, but most of them became unrealized due to various issues like loss of institutional memory as someone leaves the institution or hurdles in bureaucratic processes.

Looking back a decade in the field of data in Nepal, local bodies have shown interest in maps and are preparing maps (which requires data). A lot of visualization exercises are being done but their implementation for decision is still not explored/utilized.

4.1.3 Open Data Availability for preparing an IUDP

Preparation of Integrated Urban Development Plan (IUDP) is a popular planning practice amongst the survey participants which includes an integrated planning of all various developmental sectors like physical, social, economic, environmental, disaster risk reduction, financial, and institutional.

A study of availability of online data was carried out for a municipality in Kathmandu Valley. The search of online datasets for preparing an IUDP of Madhyapur Thimi Municipality revealed that the percentage of data available openly for planners is around 51 %. The survey of planners revealed 29% of data to be available online. On average, 40% of data for planning is openly available- considering the average (mean) of values from search for datasets and survey of planners.

Table 2: Online Availability of Datasets for preparation of IUDP of Madhyapur Thimi Municipality

DT	O/PO	U	T
Physical	13 (45%)	16 (55%)	29
Social	10 (59%)	7 (41%)	17
Economic	14 (45%)	17 (55%)	31
Environment and Disaster	14 (47%)	16 (53%)	30
Financial	7 (100%)	0 (0%)	7
All	**58 (51%)**	**56 (49%)**	**114**
DT – Data Type, O- Open, PO- Partially Open (pdf form) U- Unavailable, T- Total			

Table 3: Percentage (averaged) Availability of Open Data of various sectors as per Survey Respondents (Urban Planners in Kathmandu Valley)

DT	O/PO (mean)	O/PO (mode)
Any	32.7%	37.5%
Physical	20.6%	5%
Social	34.1%	17.5%
Economic	28.3%	17.5%
Environment and Disaster	25.4%	5% and 17.5%
Financial	36.6%	37.5%
Mean	**29%**	-
DT – Data Type, O- Open, PO- Partially Open (pdf form)		

4.1.4 Type or Format of Available Data

It is also important to consider what kind of availability is present and to assess if the data shared is truly accessible. A report [18] on assessment of effectiveness of data sites in Nepal revealed that 85% of the sites have the most basic machine-readable formats. This is a good percentage considering Nepal is a developing country and most of the work is still carried out in pen and paper. However, when it comes to urban planning open data, the story is different. Experiences from the survey participants indicate that most data for planning purposes are still available in pdf form, or non-machine-readable formats.

The survey also revealed that most of the planners are either unaware about whether the data they produce have been shared online, or do not share the data online at all. Because planners are hired as consultants and do not have access to data portals and follow up regarding the upload of data online is not practiced, this scenario has been created. Even the planners who have shared their data online are primarily sharing data in PDF or scanned report forms, resulting in most data available in the same formats.

Two KIIs informed that there is a mindset of considering PDF as an easy to upload, download, and use format. This is a probable reason for most data being shared in PDF format. This indicated that most data are present in one star data format.

On a positive note, this scenario is likely to improve in the coming years. Local and federal level institutions are engaging in conversations about data portals. KII with officers at Budhanilkantha Municipality, Changunarayan Municipality and the NSO reveal that they have been working actively to promote culture of open data and providing data in machine readable

format- moving towards a paperless era.

4.1.5 Making all Data Open

It is important to note that not all data can be made openly available. Some data that contain sensitive information related to certain individuals and organization, issues related to national security, and information that can be used to harm someone or some institution cannot be made openly available by the government bodies.

4.2 Cross Case Comparison and Analysis of Availability of Open Data for Planning

The cross-case comparison and analysis of Open Data portals of Barcelona, Pune and Nepal shows that some attributes of Nepal's data portal are quite better than Pune's. The analysis reveals that the open data portal in Barcelona is quite mature. Both India and Nepal can learn a great deal from the quality and standard of open data portal of Barcelona. Nepal has an advantage of contribution from civil societies in the field of open data.

4.2.1 Open Data Portal of Barcelona

Open Data BCN [19], a data portal under the Barcelona city council, was launched in 2011. There are 571 data sets in the portal shared with the help of open data policy. The data in the portal are categorized into 5 major themes – territory, population, city and services, administration, and economy and business. The data are timely updated as per the need of data types. The most prominent data formats are csv, json, and xml. A total of 22 shapefiles were present in the portal. The datasets are shared under creative commons attribution 4.0 license. Metadata are provided for all datasets and a clear "contact us" button is present at the bottom of the portal for easy feedback. The datasets available in the portal are also categorized according to the Sustainable Development Goals (SDGs).

4.2.2 Open Data Portal of Pune

PMC Open Data, a data portal under the Pune metropolitan city, was launched in 2016. An open data policy for the city of Pune [20] was developed in the year 2019. The policy discusses the lifecycle management of data, identified key stakeholders and collaborators, and implementation plan including components of initiation, planning, execution, and continuous improvement. There are 559 datasets in the portal. The data are categorized according to the departments like traffic, water supply, bhavan rachana, and social development. A total of 29 departments have been listed. Xls, xlsx, and xml are the most popular formats available on the site. There are no shapefiles present, and the licensing of datasets is not clear. Clarity about the metadata about datasets is also missing. There is a small "feedback" link at the bottom of the portal and no datasets have been linked with the SDGs.

4.2.3 Open Data Portal of Nepal

Open Data Nepal, a data portal under Open Knowledge Nepal, was launched in 2019. There are 629 datasets available in the portal for Nepalese context. The datasets are categorized into 12 themes like agriculture, census, education, finance, health, and geodata. Most datasets are timely updated. The most prominent data formats in the portal are csv, xlsx and xml. There is 1 shapefile available on the site. The portal shares data via creative commons attribution 4.0 licensing but the information about metadata is not very clear. A "suggest data" links are present at the top and at the bottom of the site for feedback. No data has been linked with SDGs in the portal.

4.2.4 Key Learning

It can be learnt that city level portals for needed to share data openly. For urban planning, it is essential to have geospatially linked data that are provided under reusable licensing. It is imperative to share the data under open data licensing and provide metadata to improve authenticity of data. It is a high time cites in Kathmandu Valley started to establish data portals and catch up with the international trend. For that, a national open data policy is required. A national open data portal already exists (although it is not updated). The data portals of cities could be linked to this national portal operated by the National Planning Commission. In the context of SDGs, it is important to link data categorization with SDG targets.

4.3 Use of Open Data in Planning of Cities in Kathmandu Valley

Data, in general, is an important asset in the field of urban planning. From the KIIs conducted, it was established that planning relies heavily on the use of data. A KII mentioned that planning is supposed to be a fact-based practice that involves projection using existing archives and similar case studies. Data is, therefore, an important aspect of planning. It is also important for the planners to have knowledge about availability of the data- where and how they are available. Another KII mentioned that Urban planning can become a very good tool only if data and GIS are effectively used.

From the literatures [5, 8, 9, 10, 21, 22, 23], it is clear that Open Data has a vast potential of use in the field of Urban Planning- ranging from geolocating data, enabling cross-sector collaboration, and monitoring impact to disaster response, increasing government efficiency, and corruption prevention. Use of Open Data ultimately culminates in the outputs of any planning process- reports, maps, charts, projections, action plans, etc. Use of Open Data adds value by increasing the efficiency and accessibility of the project.

4.3.1 Post-Earthquake Humanitarian Data Collection

A good example of use of Open Data in planning in Nepal is the use of a real-time open data portal in the aftermath of the 2015 Nepal earthquake. The national planning commission, with the technical support of the Kathmandu Living Labs [24], made an open data portal to explore real time data for severely affected areas. This initiative helped save many lives as well as make a remarkable documentation of earthquake effects on lives and property of people.

4.3.2 Awareness about Use of Open Data amongst Planners

Open Data is an important type of data in the field of Urban Planning. Almost every urban planner in Kathmandu Valley accesses open data (maybe in PDF form) from at least one of the following sources: the NSO (formerly CBS), municipal websites,

and OSM via GIS applications. However, the awareness about them being Open Data is not 100%, as shown by the result of the survey. 48% of respondents said they were aware of open data and its use in urban planning, while 32% responded that they were not aware of open data but have been using it in their planning practice. A KII also indicated that some planners in Nepal are not even aware about Open Data Portals. Nevertheless, Urban Planners in Kathmandu Valley, when made aware about definition of Open Data, are clear that Open Data is important in urban planning. This means that there is a need for planners to be made aware that they are using open data and realize that open data and open data portals are important for planning. This way, they may be encouraged to start producing and sharing open data via open data portals.

4.3.3 Results Generated using Open Data

The results or outputs for different sectors of planning may be different. The top four results generated using Open Data in different sectors, as per the survey are shown in the following table:

Table 4: Top 4 Results generated using Open Data in different Planning Sectors

Sector	Top 4 Results Generated
Physical	Maps, Charts, Strategic Action Plans, SWOT
Social	Charts, Maps, Need Assessment, Policies
Economic	Charts, SWOT, Policies, Maps
Environment and Disaster	Maps, Charts, Strategic Action Plans, Need Assessment
Financial	Strategic Action Plans, Policies, Charts, Need Assessment

4.4 Benefits of using Open Data in Planning of Cities in Kathmandu Valley

A World Bank webpage [25] highlights the benefits of using Open Data that includes use of open data in tracking of government actions like budget spending, improving transparency of government activities, improving participation of citizens in public planning, creating new data driven solutions, and making it efficiently less expensive to locate and access government data by reducing acquisition costs, redundancy, and overhead. These benefits are not limited to one field or the other- which means that Urban Planners can also reap them. The result of the survey of planners reveals that urban planners do appreciate the idea that Open Data makes the planning process easier. 96% respondents agreed that Open Data makes planning process easier.

4.4.1 Increased Efficiency of the Planning Process

A key informant, with over a decade of experience in the field of Open Data, revealed that Open Data promotes evidence-based, and data-driven planning while preventing duplication of work that wastes a lot of resources. Another key informant, with many years of experience in urban planning, shared that different duplication of data by undertaking different unnecessary surveys could be avoided if there was a good system of Open Data. The informant added "Development work at local levels is not guided by data. A Fact/Data driven approach needs to be developed from local levels."

4.4.2 Informed Decision and Innovation

The collaboration of the open data ecosystem and crowd-sourced support in urban planning is a powerful driver of innovation and accuracy. This approach not only develops innovative ideas but also enhances data precision through collaborative validation by using the collective intelligence of citizens, researchers, and professionals. This integration enables data-driven decision-making, substantiating plans with evidence, and fostering civic engagement – making an ecosystem where data supports everything from infrastructure to policy. The result of the survey also suggests that use of open data helps to make informed decisions – validating the claims of key informants. 88% respondents answered "Yes" to "Do the use of Open Data help make informed decisions?"

4.4.3 Saving Time and Resources

In any municipality, requests for data-sets may be repeatedly made by an array of people and institutions. A key informant informed that municipal officials lose a lot of time and effort in repetitive sharing of same resources and a one portal- one platform solution for sharing Open Data helps to utilize time of municipal officers in other meaningful engagements.

4.4.4 Other Benefits

The survey participants also added that Open Data initiatives can help in maintaining data consistency- making it easier to conduct desk study for any planning project. One of the participants added that Open Data adds credibility and authority to planning proposals and helps attain measurable goals by improvement in strategies based on data-analysis. Another believed that the use of Open Data can provide a quick overview of the situation. This can help the planners in aligning themselves with the actual needs of the planning process. A participant mentioned that Open Data helps to provide a proper direction for socio-economic development and contributes towards policy reform.

4.5 Challenges in using Open Data in Planning of Cities in Kathmandu Valley

There are many challenges facing the Open Data ecosystem for planning of cities in Kathmandu Valley. The survey of planners revealed that scientific data, public safety data, mobility related data, geo-spatial data, and environmental data are the most challenging to get online.

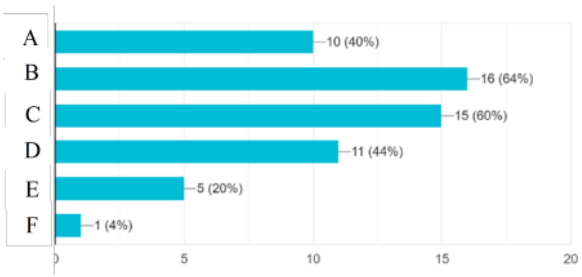
4.5.1 Lack of Data Sharing Mindset

The KIIs as well as the survey both reveal that the institutions that should be sharing data are not enthusiastic about sharing data to public. The concept of data sharing is not well developed in the mindset of concerned stakeholders. One of the KIIs mentions that even in the age of data and information, there is no realization among the concerned stakeholders that data should be integrated into one platform and shared for effective planning. Oftentimes, the data producers are not aware about why data is required, and for what purpose.

KIIs also reveal that when it comes to data sharing, the consultants as well as government bodies are focused on getting monetary gain out of it. Data has been taken as assets, and even the public institutions that are supposed to share data freely take fee for data sharing – an example of this is the fee levied on spatial data provided by the survey department. Another concerning issue is the prominence of the concept of "Data/Information as power". This has challenged the ecosystem of sharing data openly, for there is no tendency to devolve the power.

4.5.2 Reliance on Personal Networking and Rapport to Obtain Data

Due to the reasons discussed above, there is difficulty in obtaining data and information for planning purposes. This is supported by the result of survey as well. 40% of the participants had to rely on their network with the people in power to get the data they needed, while 64% had to go through a long and tedious process to obtain data that could have been made freely available on the internet.



A – Good rapport with the authorities, B – Bureaucratic hassle, C- Easily available on the internet, D- Self Preparation, E- Primary Data, F- Others

Figure 4: Survey Respondents' response to process of data collection for planning purposes

The result is a clear indication of issues that are present in the data management system of institutions.

4.5.3 Lack of Technical Resources and Manpower to Digitize Data

An officer at the NSO said that historical data is not in format that can be shared online. While the institution is working towards digitizing them, this is an example of lack of government initiatives in digitizing past archives which hold a lot of learning opportunities. Another issue, as mentioned by one of the KIIs, is that the technical staff of municipality or other government offices are not aware about open data ecosystem. Another KII added that it is difficult to get the government officials on-board to digitize data – they are willing to perform repetitive actions but do not want to engage in entering data into data portal.

KII of IT officers of municipalities suggest that there is difficulty in uploading large files into government server. Limited server and lack of dedicated server to host data are other challenges IT officers face while trying to upload data into municipal websites.

4.5.4 Data Silos, System Silos and Upward Reporting

One of the biggest threats when it comes to data sharing is the presence of data silos and system silos- meaning that the access and use of data and systems are limited to certain groups of people or systems. At the same time, there is a practice of "upward reporting" system which leads to the local system not being able to access their own data – this negatively impacts decision making.

4.5.5 Insufficient Truly Open Data

It is also important to note that the data that can be considered Open are not truly open in the context of planning in Kathmandu Valley. The data shared by government institutions, development partners, or private entities are rarely within the global definition of open data. The data shared for planning does not follow the principles of open data as outlined by the International Open Data Charter [5]. The data/datasets are:

- Not Open by Default
- Neither Timely, nor Comprehensible
- Not Fully Accessible and Usable
- Not Comparable and Interoperable
- Devoid of proper Feedback Mechanism

4.5.6 Mindset of Data Producers

In the absence of an Open Data policy, and lack of willingness or enthusiasm to open data, as suggested by the KIIs, most of the data related to planning of cities in Kathmandu are closed. The notion that open-data could violate privacy is cited by bodies like the Survey Department, preventing them from sharing data openly. It should be well established that private or personal or sensitive information can be anonymous.

4.5.7 Lack of Reliability, Timely Update, Accessibility

KIIs and survey results reveal that there is lack of reliability and timely update of data produced by various institutions. At the same time, the data that the institutions share lack metadata – data about data. It is essential to share metadata along with open data because metadata provides information about completeness, accuracy, and history of data. The data-sets shared do not follow any standard (example ISO standard for open data).

There is availability of open data, but their accessibility is questionable. There is a lack of awareness about the concept of Search Engine Optimization- which leads to users or researchers not being able to find data easily from government websites. We can take an example of municipal profile of municipalities in Kathmandu Valley – profiles in PDF form are deep into the website of municipality.

4.5.8 Issues with Licensing of Shared Data

There is also a lack of clarity of licensing in data shared by government bodies. The concept of licensing for reuse and redistribution is largely ignored in sharing data. Open Data is typically shared in creative commons licenses as suggested by the literature [13, 15]. KII with NSO officers revealed that while there are no clear written licensing related rules in the NSO, the data can be used by anyone, free of cost, by providing attribution to the NSO. However, the user is responsible for any output

produced by manipulating the data provided by NSO. A national open data policy can solve this issue of confusion in licensing.

4.5.9 Issues with Inter-Operability of Data

One of the important and challenging parts of open data is that the data collected by one project should be usable by another project – data needs to be inter-operable – then the actual use of data is achieved. Inter-operability of data helps to create 4-star Open Data.

4.5.10 Issues with National Data Portal Initiative

From the KII with NSO officials, it was discovered that there is a national open data portal: Nationaldata.gov.np. This was started by a team in the national statistics office to decentralize data. A standard was set by the office (when it was under the National Planning Commission as Central Bureau of Statistics). Around 753 personnel were trained to use the portal and feed data into it. IT Officers and IT Consultants of local levels took part in the training. This was verified by KIIs with IT Officers of Budhanilkantha and Changunarayan municipalities. However, all the trained manpower were not retained by the local bodies – creating inadequate human resources to feed data into the portal. There has also been no regular monitoring and evaluation of the system. Due to various reasons like pressures from development partners, several local bodies have started to create their own portals- leading to duplication of work and inconsistency in delivery of database system in the country – which is likely to lead to a financial burden for the country.

The issue with the data sets available for planning is that good quality and quantity of data-sets are not received from concerned departments for uploading into websites. An informant claimed that issues of negligence and reliability are prevalent in data which necessitates crosschecking of data before use. This is also substantiated by the result of the survey question regarding the quality of data in planning where over 75% participants confirm confronting data quality issues.

It is worthwhile to note that in absence of true open data that follow principles of open data, primary data from sources like ground-based field surveys become highly important and necessary, even for baseline data.

4.6 Gaps in Policies for Open Data for Planning in Kathmandu

The Constitution of Nepal 2015 [26], under article 27, provides right to information. It states, "Every citizen shall have the right to demand and receive information on any matter of his or her interest or of public interest. Provided that no one shall be compelled to provide information on any matter of which confidentiality must be maintained in accordance with law". The constitution provides a strong foundation for sharing data Openly.

The Right to Information Act 2007 [27] provides the citizen of Nepal with access to the information held in the public bodies. The act also makes public bodies responsible for timely classification, publishing, and update of information. The act also provides provision for an independent National Information Commission for the protection, promotion, and practice of the right to information. However, the act needs to be updated to include digital data and information. This will cause the public bodies to share their data and information online without any confusion.

The National Information Commission has submitted the Government of Nepal with the National Action Plan 2017 on Open Government Data (OGD) [28]. The plan emphasizes the international significance of Open Government Data and advocates for its incorporation into Nepal's policies and practices. The plan underlines the importance of translating laws, implementing OGD into national policies, and coordinating among many stakeholders such as government agencies, professionals, researchers, and civil society leaders. There is a clear need to draft a National Open Data Policy to support Open Data Ecosystem in the country- that can greatly help the planning practices.

The National Strategy for the Development of Statistical System 2019 [16] has a strategic objective to manage regular supply of statistics by providing reliable and quality data for evidence-based policy formulation, development management, and addressing the demands of users. To produce and supply quality statistics, the concept of Open Data has been adopted for easy access to statistics. Other government bodies that produce data for planning also need to adopt the concept and principles of Open Data to sustain a healthy Open Data Ecosystem for planning in cities of Kathmandu Valley.

The National Urban Development Strategy 2017 [29] is clear about the need for and importance of good database management system and accessibility to data. But the strategy fails to consider the concept of Open Data. The strategy needs to be revised by including the use of open data in planning cities.

The topic of Open Data has been limited mostly to conceptual talks. There is an unwritten assumption that the data and statistics available in government bodies are secure and correct. And, if data is kept in government bodies, the public can easily access data. This is not always the reality.

In absence of an Open Data Policy, there have been no significant efforts to build capacity of planners in Kathmandu Valley to utilize Open Data.

5. Conclusion

Open Data plays a significant role in planning practice. In the context of planning of cities in Kathmandu Valley, the Open Data Ecosystem is still in an infant stage. Most of the data available is in PDF form via the government websites are not interoperable between data-sets and systems.

The issues of mindset of planners and stakeholders not open to sharing data, inclination of consultants to use public data for monetary gain, and presence of data silos and system silos were brought forth by the research. The lack of an Open Data Policy has been clearly highlighted in the research. With the help of an Open Data policy, the planning field can harness the real power of truly open, standard, and interoperable data-sets that follow open data principles and are aligned with international open data practices.

The world is undergoing a digital revolution and the field of data is far too important to be left only to data scientists. Urban

Planners need to rightfully own research and practice in the field of urban data to enhance informed decisions.

6. Recommendations

Based on the literature reviews, case studies, findings, and analysis, following recommendations are made to improve the Open Data Ecosystem to aid planning of cities in Kathmandu Valley

- Promote Open Data Ecosystem for Urban Planning
- Create a set of open data indicators that will be used to determine budget allocation for local governments based on successful implementation.
- Ensure that urban planning data is not isolated but geographically integrated for full insights. Establish proper coordination between NSO and Survey Department. Integrate National Statistics Office data with survey department spatial data.
- Draft and implement a National Open Data Policy to promote a healthy Open Data ecosystem and pave ways for legal basis to share data openly.
- Promote Open Data Portals initiative to operationalize the Open Data Policy. Open Data Portals provide users with datasets that are easily accessible and reusable.
- Conduct extensive study to identify and assess available data sources for urban planning requirements. This research will aid in the identification of gaps and the improvement of overall data collection tactics for effective planning.

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ANNEX VII

Plagiarism Check Report

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ORIGINALITY REPORT

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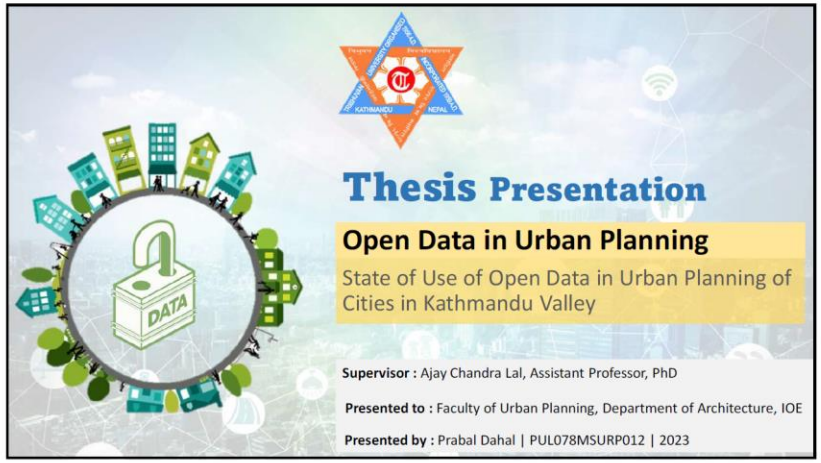
ANNEX VIII

Final Presentation Slides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Open Data in Urban Planning
State of Use of Open Data in Urban Planning of Cities in Kathmandu Valley
Supervisor : Ajay Chandra Lal, Assistant Professor, PhD
Presented to : Faculty of Urban Planning, Department of Architecture, IOE
Presented by : Prabal Dahal | PUL078MSURP012 | 2023

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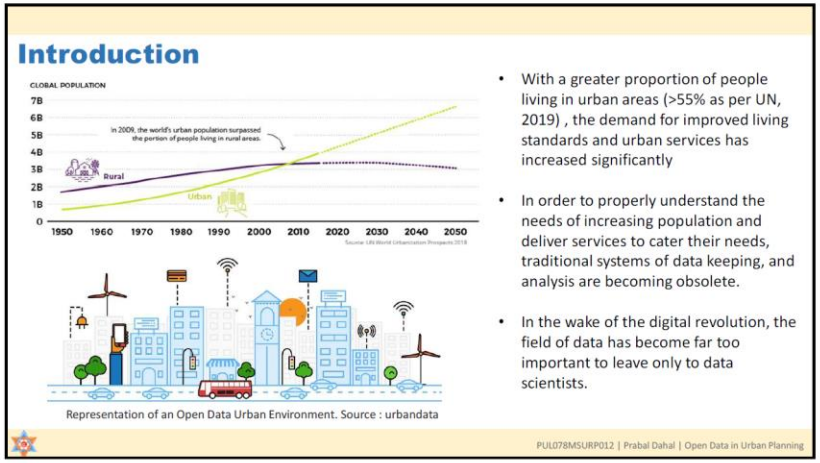
Introduction
GLOBAL POPULATION
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In 2009, the world's urban population surpassed the portion of people living in rural areas.
Rural
Urban
1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050
Representation of an Open Data Urban Environment. Source : urbandata
With a greater proportion of people living in urban areas (>55% as per UN, 2019) , the demand for improved living standards and urban services has increased significantly
In order to properly understand the needs of increasing population and deliver services to cater their needs, traditional systems of data keeping, and analysis are becoming obsolete.
In the wake of the digital revolution, the field of data has become far too important to leave only to data scientists.
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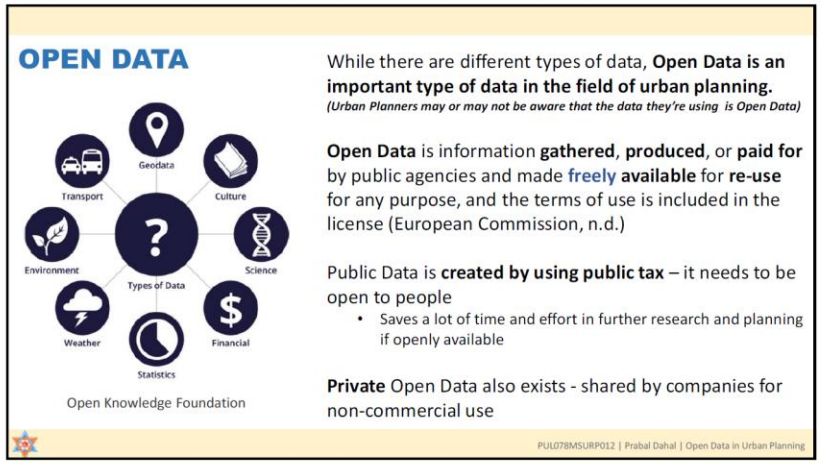
2


OPEN DATA
Geodata
Culture
Transport
Environment
Science
Types of Data
Weather
Financial
Statistics
Open Knowledge Foundation
While there are different types of data, Open Data is an important type of data in the field of urban planning.
(Urban Planners may or may not be aware that the data they're using is Open Data)
Open Data is information gathered, produced, or paid for by public agencies and made freely available for re-use for any purpose, and the terms of use is included in the license (European Commission, n.d.)
Public Data is created by using public tax – it needs to be open to people
Saves a lot of time and effort in further research and planning if openly available
Private Open Data also exists - shared by companies for non-commercial use
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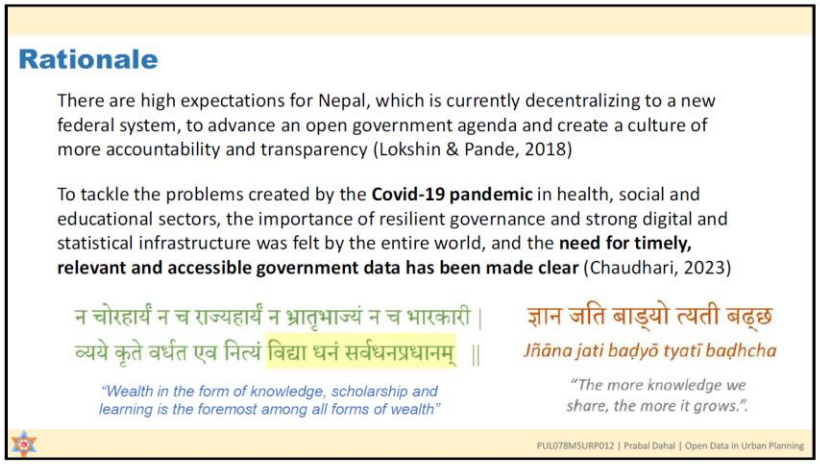
3


Rationale
There are high expectations for Nepal, which is currently decentralizing to a new federal system, to advance an open government agenda and create a culture of more accountability and transparency (Lokshin & Pande, 2018)
To tackle the problems created by the Covid-19 pandemic in health, social and educational sectors, the importance of resilient governance and strong digital and statistical infrastructure was felt by the entire world, and the need for timely, relevant and accessible government data has been made clear (Chaudhari, 2023)
न चोरहार्यं न च राज्यहार्यं न भ्रातृभाज्यं न च भारकारी |
व्यये कृते वर्धत एव नित्यं विद्या धनं सर्वधनप्रधानम् ||
"Wealth in the form of knowledge, scholarship and learning is the foremost among all forms of wealth"
ज्ञान जति बाड्यो त्यती बढ्छ
Jñāna jati baḍyō tyatī baḍhcha
"The more knowledge we share, the more it grows.".
PUL078MSURP012 | Prabal Dahal | Open Data in Urban Planning

4

Problem Statement

- There are limitations in the field of open data in Nepal, including **a lack of empirical research and systematic analysis** that specifically focuses on the use of open data in urban planning
- There is **limited technical infrastructure, data quality issues, limited awareness** and **capacity among stakeholders,** and **unclear legal and policy frameworks**

5

Purpose : Research Question

The main research question of this research is:

What is the state of use of open data in the planning of cities in Kathmandu Valley and how is the planning fraternity using open data?

The sub-questions include:

i. What is the **definition of open data** and what is **the state of availability of open data** in the context of city planning in Kathmandu Valley?
ii. What are the **uses, benefits, and challenges of using open data in urban planning** of cities in Kathmandu Valley?
iii. What are the **gaps in policies** related to open data in planning and what could be the **recommendations for the effective implementation of open data practices** in planning of cities in Kathmandu Valley?

6

Study Area

Kathmandu Valley

Kathmandu Valley, being political and administrative center, often plays a focal role in any innovative initiatives like open data

It holds offices of research institutions and organizations that generate and collect data, including data related to urban planning.

High Population Density Urban Development
Availability of Open Data Project
Technological Improvement Policy Importance

7

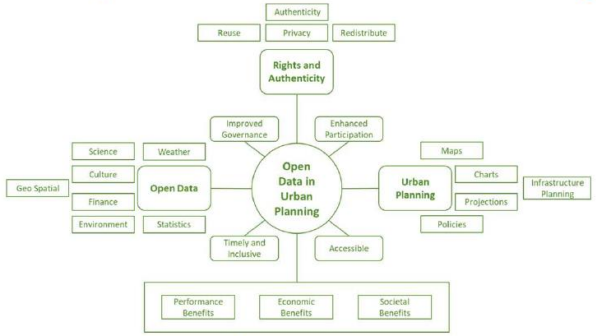
Scope and Limitations

- The research involved an in-depth examination of literature, academic papers, official reports, and relevant case studies about open data and urban planning in Kathmandu Valley
- Key stakeholders such as urban planners, government officials, researchers, and representatives from civil society organizations have been the focus of the primary data collecting techniques, which has included qualitative and quantitative research techniques including interviews, questionnaires, and survey

*The research has emphasized on **UNVEILING PERSPECTIVES FROM PLANNERS AND STAKEHOLDERS IN KATHMANDU VALLEY**. It is expected that the **learnings and recommendations** from this research can be **used for cases of use of Open Data in Planning of cities outside of Kathmandu Valley as well**. The research is expected to encourage more research and discussion about open data in urban planning.*

8

Conceptual Framework and Methodology



Conceptual Framework for the Study (Author)

The conceptual framework of the study incorporates gathering knowledge about open data, use of open data in urban planning and benefits of use of open data in the realm of urban planning.

9

Conceptual Framework and Methodology

This research belongs to the **pragmatist's paradigm** which Uprety (2022) describes as being a paradigm where the researchers believe that the reality needs to be constantly negotiated, debated, and interpreted.

Ontology

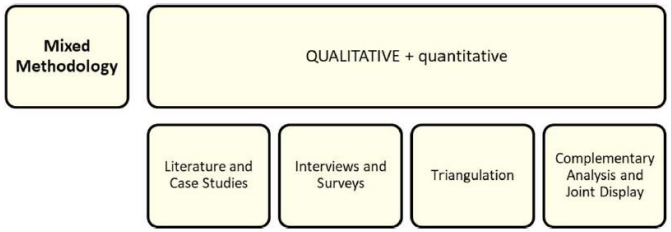
The ontological claim of this study is Open data integration in urban planning of cities in Kathmandu Valley encompasses a variety of sources, stakeholders, and challenges, with potential benefits for informed, participative, and geospatially informed urban development.

Epistemology

Epistemologically, the valid source of knowledge for this study is the study of social process and direct interaction with the experts which requires adoption of various methods and strategies for the generation of the knowledge out of the literature study, case study, cross case analysis, and survey

10

Methodology : Research Strategy - MIXED Methodology



Overview of Research Strategy

INDUCTIVE and **ABDUCTIVE** logic

11

Methods: Data Sources and Sampling

Data on...	Sources	Data Type	Data Sources
Definition and decoding Open Data	Literature Review	Secondary	Convenience Sampling : Based on availability, accessibility.
Open Data Availability	Government Data and Repositories	Secondary	Government Agency Websites
	Open Data Initiatives	Secondary	Open Data Portals –Government, Private (review licensing) Data Format/Type (open data stage) – 1* , 2*, 3*, 4*, 5* (whichever available)
	Published reports and studies	Secondary	National context – World Bank study in 2020
	Interview and Survey	Primary	Expert Sampling and Snowballing
Use, Benefits, and Challenges	Interview and Survey	Primary	Expert Sampling and Snowballing: Local Government (Municipality) ; Federal Government(DUDBC/MoUD/MoCIT) ; Private Consultants ; Academia
	International Case Study	Secondary	City of Barcelona (Spain), City of Pune (India)
	National Case Study	Primary and Secondary	Convenience Sampling : Kathmandu Valley : IT officer of Budhanilkantha Municipality, IDUP of Madhyapur Thimi Municipality, Stakeholders (IT departments)
Gaps in Policies	Policy Analysis	Secondary	Purposeful Sampling : NUDS 2017, Smart Cities in Nepal – Concepts and Indicators 2015, Data Privacy Act of Nepal, MoCIT Acts/Policies, Constitution and LGOA, Right to Information Act 2007
	Expert Consultation	Primary	Expert Sampling : Kathmandu Living Labs, Open Knowledge Nepal, Former IT Officer of Changunarayan Municipality

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Methods: Data Sources, Collection Plan, Sampling

- **Key Informant Interviews** (KII) - **8 senior planners** - Semi-Structured Interviews
- **Expert Consultations** - **13 interviews** - Semi-Structured Interviews with stakeholders (statisticians, National Information Commission, Survey Department, KLL, Open Knowledge Nepal)
- **Survey of planners** - **25 Entries** (planners, architects/engineers) – **65 questions** – Multiple Choice, Likert, Scale, Open-Ended, Demographic
- A **list of data required to prepare an IUDP** - IUDP guideline prepared by MoUD with the technical assistance of ADB - **114 data** under six different sectors - **Madhyapur Thimi Municipality**.

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Research Ethics

- The study interviews and surveys have been **conducted in a convivial environment**, **without any intimidation or discrimination** based on race, ethnicity, sexuality, gender, religion, disability, age, or any other base.
- In this research, deontological ethics is considered because the **focus is on the process rather than the ultimate result**.

14

Literature Review : Open Data Definition

Two fundamental characteristics contribute to data being "open":

- **Data must be "legally" open,**
- **Data must also be open in the "technical" sense**

(Ayre & Craner, 2017)

	Completely open	More liquid	Completely closed
Degree of access	Everyone has access		Access to data is to a subset of individuals or organizations
Machine readability	Available in formats that can be easily retrieved and processed by computers		Data in formats not easily retrieved and processed by computers
Cost	No cost to obtain		Offered only at a significant fee
Rights	Unlimited rights to reuse and redistribute data		Re-use, republishing, or distribution of data is forbidden

Characteristics of open or closed data (McKinsey Global Institute)

15

Literature Review : History and Development - World

- The term "open data" first appeared in a publication from an American scientific body in 1995- disclosure of geophysical and environmental data
- 2010- the UK government started data.gov.uk to help people find and use open government data (UK Government, n.d.)
- Likewise, in 2013, G8 member countries signed the Open Data Charter to promote open data (Chaudhari, 2023)
- In 2010, the World Bank declared that their database will be made open. OECD, in 2013 started to work in the field of Open Government Data, and in 2015 UN General Assembly released Open Data Charter which led to United Nationals Statistics Commission establishing Open Data Working Group in 2018 and approval of "Open by Default" concept in 2021 (Chaudhari, 2023)

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Literature Review : History and Development - Nepal

- Nepal's Constitution, established in 1990, guaranteed citizens' right to information as a basic right.
- Nepal was one of the first countries in South Asia to establish a Right to Information Act in 2007 and has taken considerable steps to implement the Act under the leadership of the National Information Commission – Assignment of Information Officer in government offices
- Past Open Data Initiatives (Open Knowledge Nepal, 2017):
  - large-scale mobile data collection to determine the extent of the earthquake's damage
  - National Planning Commission's self-assessment of data gaps in measuring progress toward the Sustainable Development Goals (SDGs)
  - the Public Procurement Monitoring Office's launch of the Public Procurement Transparency Initiative in Nepal (PPTIN)

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Literature Review : History and Development - Nepal

Established in 2013 to further the OpenStreetMap (OSM) movement

Climate change and resilience Civic participation

Map-based surveys Digital governance

Youth development and skill-building

After 2015 earthquake, KLL mapped 31 earthquake districts across Nepal. Over 3000 surveyors were deployed to assess damages of 1.05 million buildings. 5.08 million people were reached, and 9.34 million photographs were captured during the survey.

18

Literature Review : Principles of Open Data

1. Open by Default
2. Timely and Comprehensive
3. Accessible and Usable
4. Comparable and Interoperable
5. For Improved Governance and Citizen Engagement
6. For Inclusive Development and Innovation

Principles of Open Data (Open Data Charter, 2015)

Open data contributes significantly to the **effectiveness** of **resilience-building initiatives** by providing insights into various climates and disaster-related details, allowing communities to stay informed about pre-, during-, and post-disaster situations, revealing vulnerabilities, and providing decision-making tools (Parajuli et al., 2020)

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Literature Review : Five Star Linked Open Data, Open Data Portal

Stages of Open Data (Open Data Charter)

5 Star Open Data Portals

1 STAR : A Dataset Registry
2 STAR : A Meta-Data Provider
3 STAR : A Co-Creation Platform
4 STAR : A Data Publishing Platform
5 STAR : A Common Data Hub

Colpaert et.al. (2013)

20

Literature Review : Quality, Licensing and Metadata

One of the ways used to assess quality of Open Data by a research team in Colombia (Mahecha Moyano et al., 2017) is to use the three metrics : **traceability**, **completeness**, and **compliance**.

Standard Open Data Licences (Korn et al., 2011, as cited in Khayyat, 2014) :

- Creative Commons Attribution
- Creative Commons Zero (CC0)
- Public Domain and Dedication License (PDDL)
- Open Data Commons Attribution Licence (ODC)
- Creative Commons Attribution Share Alike (but limited interoperability)
- Open Government License (OGL)

Metadata is essentially structured information that facilitates the retrieval, usage, or management of an information resource (Lisowska, 2016)

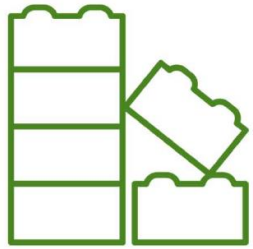
The INSPIRE Infrastructure for Spatial Information in Europe standard (INSPIRE metadata schema), for example, arose from the necessity to handle the unique metadata needs for geospatial information, which is based on the ISO 19115 standard.

21

Literature Review : 10 Building Blocks of Open Data Initiative

The ten building blocks of Open Data Initiative as proposed by Davies (2012, as cited in Khayyat, 2014) helps to understand what are the items that need to be considered while thinking about an open data ecosystem.

Block 1 : **Leadership and Bureaucratic Support**
Block 2 : **Datasets**
Block 3 : **Licenses**
Block 4 : **Data Standards**
Block 5 : **Data Portals**
Block 6 : **Interpretations, Interfaces, and Applications**
Block 7 : **Outreach and Engagement**
Block 8 : **Capacity Buildings**
Block 9 : **Feedback Loops**
Block 10 : **Policy and Legislative Lock-in**



22

Analysis and Findings

From surveys, KIIs, and relating them with one another as well as with literature and case studies

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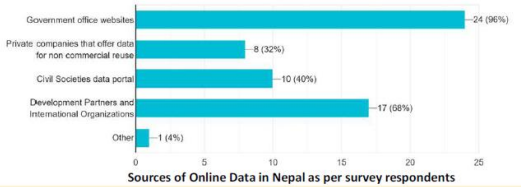
Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

The key informants consulted during the research as well as the survey conducted reveal that **various government, as well as non-government agencies produce a plethora of data in Nepal**, but they are shared **mostly in pdf form**, and mostly via **government websites**

An important development in the field of open data in Nepal has been witnessed in aid management. **Aid Management Platform / Aid Data** of Nepal has been made open, which has been serving various government bodies and development partners



Sources of Online Data in Nepal as per survey respondents

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Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

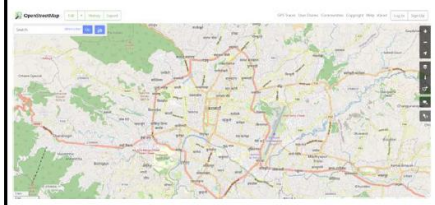
The **National Statistics Office**, funded by the UNFPA, was able to create **an interactive open data portal** to provide demographic data to the people.

Efforts of Open Data enthusiasts and open data activists advocating for Open Data in Nepal and raising awareness among the key stakeholders at the NSO of the technicalities associated with Open Data made the data portal successful and open.

An interview with the officials revealed that **the office plans to publish any future data via an open data initiative** as supported by their National Strategy for Development of Statistical System (Central Bureau of Statistics, 2019)

25

Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley



Research reveals that about 80% of data used for urban planning are geo-referenced. It is important to have open data in spatial form in urban planning. Nepal was the leading country in OSM in South Asia when it was first introduced. There are more data in OSM than in google maps for many places of Nepal. India has dominated the OSM movement in the region now.

(N. Budhathoki, personal communication, July 2023)

OSM data includes at least 29 primary features that could be helpful in geospatial analysis.

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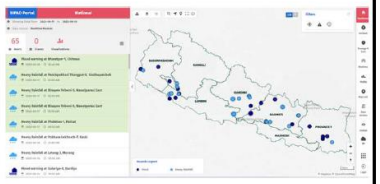
Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

BIPADportal managed by NDRRMA under the Ministry of Home Affairs.

The portal brings together digital and spatial data from various governmental, non-governmental, academic and research institutions on one platform and help in evidence-based planning by providing data in machine readable formats.



Looking back a decade in the field of data in Nepal, local bodies have shown interest in maps and are preparing maps (which requires data). A lot of visualization exercises are being done but their implementation for decision is still not explored/utilized. (S. Maharjan, personal communication, September 2023)

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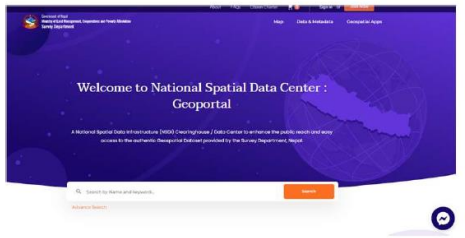
Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

National Geo Portal

Survey Department

Ministry of Land Management, Cooperatives, and Poverty Alleviation



The survey department generates various spatial data. Not all data can be made freely available because they may contain sensitive information. Fee is levied as per the "Digital Data Distribution, Use, and Regulation Guideline 2069". The department is working towards online payment systems so that people do not have to be physically present in the department to get spatial data. (D. Dhakal, personal communication, October 2023)

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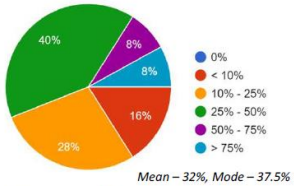
Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

The survey of urban planners as well as search of online datasets for preparing an IUDP of Madhyapur Thimi Municipality reveal that the percentage of data available openly for planners is around 40%-50%.



Mean – 32%, Mode – 37.5%

Percentage of Data Openly available as per Survey Participants' Experience

DATA TYPE/SECTOR	FULLY OPEN	PARTIALLY OPEN	UNAVAILABLE	TOTAL
PHYSICAL	1	12	16	29
SOCIAL	6	4	7	17
ECONOMIC	6	8	17	31
ENVIRONMENTAL	0	9	15	24
DISASTER	1	4	1	6
FINANCIAL	0	7	0	7
ALL	**14 (12.3%)**	**44 (38.6%)**	**56 (49.1%)**	**114**
TOTAL	**114**			
Fully Open – Machine Readable Format, Partially Open – PDFs				

Online Availability of Datasets for preparation of IUDP of Madhyapur Thimi Municipality

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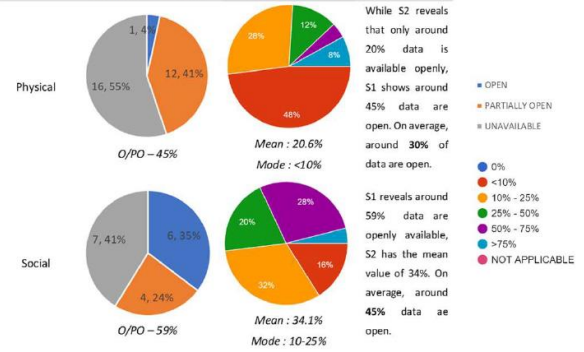
Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

SECTOR	% Openly Available in Madhyapur Thimi (S1)	% Availability per Survey Respondents (S2)	Remarks



While S2 reveals that only around 20% data is available openly, S1 shows around 45% data are open. On average, around **30%** of data are open.

S1 reveals around 59% data are openly available, S2 has the mean value of 34%. On average, around **45%** data ae open.

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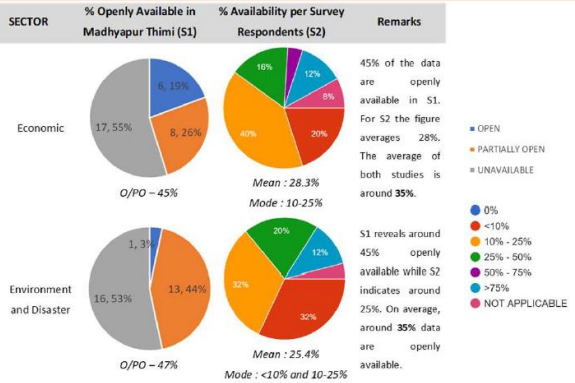
Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

SECTOR	% Openly Available in Madhyapur Thimi (S1)	% Availability per Survey Respondents (S2)	Remarks



45% of the data are openly available in S1. For S2 the figure averages 28%. The average of both studies is around **35%**.

S1 reveals around 45% openly available while S2 indicates around 25%. On average, around **35%** data are openly available.

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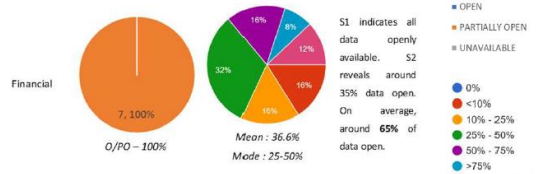
Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

SECTOR	% Openly Available in Madhyapur Thimi (S1)	% Availability per Survey Respondents (S2)	Remarks



S1 indicates all data openly available. S2 reveals around 35% data open. On average, around **65%** of data open.

Financial data are mostly available in pdf forms- which shows general tendency as well as capacity of municipality officials to share data in that format

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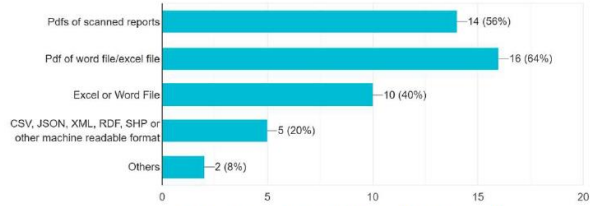
Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

A report (The World Bank, 2020) on assessment of effectiveness of data sites in Nepal revealed that 85% of the sites have the most basic machine-readable formats. This is a good percentage considering Nepal is a developing country and most of the work is still carried out in pen and paper.

However, when it comes to urban planning open data, the story is different. Experiences from the survey participants indicate that most data for planning purposes are still available in pdf form, or non-machine-readable formats.



Open Data Formats available for Planning works

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Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

Two KII conducted shows that there is a **mindset of considering Pdf as an easy to upload, download, and use format**. This is a probable reason for most data being shared in Pdf format. This indicates that most data are present in **one star data format**.

Issues about government data being shared in non-operable PDFs have been raised even in the federal parliament.

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Analysis and Findings Open Data Availability in Planning of Cities in Kathmandu Valley

KII with officers at Budhanilkantha Municipality, Changunarayan Municipality and the NSO reveal that they have been working actively to promote culture of open data and providing data in machine readable format- moving towards a paperless era.

Development organizations like ICIMOD are also sharing some of their data in accessible formats (machine readable re-usable forms) under their data policy.

ICF Nepal is currently working on Municipal Asset Management System that is like an inventory of various services and infrastructure of municipality. It contains information on the location, condition, number, and other attributes of following and more: Roads, Drains, Water Supply, Open Space, School, Healthcare Institutions, Educational Institutions, Community Buildings.

(S. Basnet, personal communication, July, 2023)

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Analysis and Findings Cross Case Analysis on Availability of Open Data for Planning

City of Barcelona, Spain

City of Pune, India

Nepal

Absence of open data portal of a city in Kathmandu Valley for comparison

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International Case of Use of Open Data : City of Barcelona

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International Case of Use of Open Data
City of Pune

The impacts and benefits of Open Data has been listed in an article (TATA Trusts, 2020) reviewing open-data platform in Pune. The list is replicated below:

- PMC has geo-mapped postal pin codes to accurately indicate the lanes and houses that come under each ward in the city.
- Insights on air pollution came from correlating the number of vehicle registrations and the rise in pollution as reflected in Pune's air quality index.
- An app that collates data on 4 million trees to shed light on areas with maximum green cover, places to find rare trees and those with medicinal properties, where to focus conservation efforts, the kind of trees that need to be planted, etc.
- A city health meter that collates ward-wise data using both positive figures (tree cover, number of hospitals, waste management services) and negative figures (air quality index, number of citizen's grievances) to give Puneites a better idea of the areas they live in.

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Analysis and Findings Cross Case Analysis on Availability of Open Data for Planning

Basis of Comparison	Open Data BCN	PMC Open Data	Open Data Nepal	Remarks/ Recommendations
Owner of the Portal	Barcelona City Council	Pune Metropolitan City	Open Knowledge Nepal	Cities/Municipality
Country and Continent	Spain, Europe	India, Asia	Nepal, Asia	-
Size (sq km) of City/Country	BCN: 101.9 sq km Spain: 505,990 sq km	PMC: 1110 sq km India : 3,287, 263 sq km	Nepal : 147, 516 sq km	-
Population of City/Country	BCN: 1.62 million Spain: 47.42 million	PMC: 4.307 million India : 1.4 billion	Nepal : 29.1 million	-
Year the Portal was started	2011	2016	2019	**City level portals need to be made**
Open Data Policy	Available	Available, 2019	No	**Need to draft and implement Open Data Policy for Nepal**
Number of Datasets	571	559	629	As many as possible that are of good quality
Major Themes/Categories of Datasets	5 - Territory, Population, City and Services, Administration, Economy and Business	29 Departments (Traffic, Water Supply, Bhavan Rachna, Social Development, etc)	12 – Agriculture, Census, Education, Finance, Health, Legislative, Geo Data	Better to have 5-6 number of themes (could be sectors of IUDP to ease communication with stakeholders)
State of Updating of Data	Very Updated	Updated - Site down	Fairly updated	Should be **regularly updated** (daily, weekly, monthly, yearly, as necessary and possible)
Popular Formats	CSV, JSON, XML	XLS, XLSX, XML	CSV, XLSX, XML	**Machine Readable formats** (avoid Pdfs and images)

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Analysis and Findings Cross Case Analysis on Availability of Open Data for Planning

Basis of Comparison	Open Data BCN	PMC Open Data	Open Data Nepal	Remarks/ Recommendations
Number of Shapefiles	22	0	1	Geolocated/Spatial files are crucial for urban planning projects. **More shapefiles should be made openly available.**
Licensing of Datasets	Creative Commons Attribution 4.0	Unclear	Creative Commons Attribution 4.0	**Creative Commons Attribution 4.0 or updated**
Metadata	Available for all datasets	Not clear	Not clear	**Should be made available.** Helps to track and improve quality of data and data source.
Feedback Mechanism	Clear "Contact Us" button at the button of the portal	Small "Feedback" link at the bottom of the portal	"Suggest Data" links on top and bottom of the portal	A clear and easy to locate button/link should be provided. **Engagement of people should be prioritized.**
Link with SDGs	Data categorized as per SDGs	No	No	Should be maintained (helps in tracking indices and targets)

- Open data portal in Barcelona is quite mature.
- Both India and Nepal can learn a great deal from the quality and standard of open data portal of Barcelona.
- Nepal has an advantage of contribution from civil societies in the field of open data.

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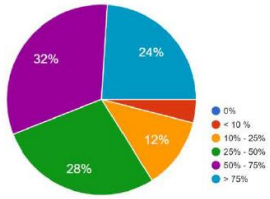
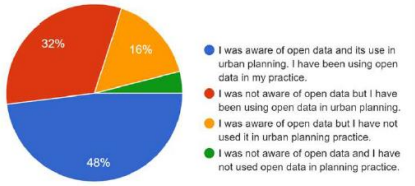
Analysis and Findings Use of Open Data in Planning of Cities in Kathmandu Valley

A KII mentioned that **planning is supposed to be a fact-based practice** that involves projection using existing archives and similar case studies. **Data is**, therefore, an **important aspect of planning**. It is also important for the planners to have knowledge about availability of the data- where and how they are available.



Result of survey question - What percent of planning process relies on use of data?



Result of Survey showing awareness of Open Data among the survey participants

Need to include concept of Open Data in Planning Education

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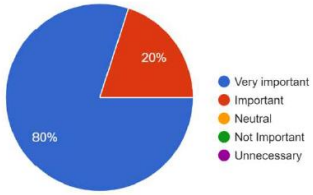
Analysis and Findings Use of Open Data in Planning of Cities in Kathmandu Valley

Urban Planners in Kathmandu Valley, when made aware about definition of Open Data, are clear that Open Data is important in urban planning



Result of Survey Question- How important is Open Data in Planning?

Example of application of Open Data in Republic of Korea (Fernz, 2022) for e-procurement system showed that open data can help decrease the bidding time and save billions of dollars.

In Nepal, although there was an initiative to make the procurement process open via the "**ppip.gov.np**" website, a lot more is still required to be done.

Procurement at district and local levels also needs to be made open and transparent. Upgrading to an open data initiative would add more value to the system and engage more stakeholders while helping prevent corruption and multiple inefficiencies at implementation of projects

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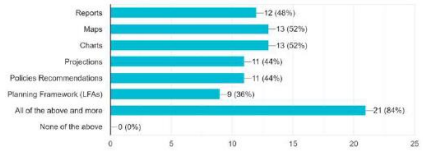
Analysis and Findings Use of Open Data in Planning of Cities in Kathmandu Valley



Maps
Charts
Service Availability
Change Matrix
SWOT
Project Banks
Inventory

Management Plans
Need Assessment
Pattern Analysis
Policies
Capacity Assessment
Strategic Action Plans

Types of Results or Outputs produced by participants using Open Data

Sector	Top 4 Results Generated using Open Data
Physical	Maps, Charts, Strategic Action Plans, SWOT
Social	Charts, Maps, Need Assessment, Policies
Economic	Charts, SWOT, Policies, Maps
Environment and Disaster	Maps, Charts, Strategic Action Plans, Need Assessment
Finance	Strategic Action Plans, Policies, Charts, Need Assessment

Top 4 Results generated using Open Data in different Planning Sectors

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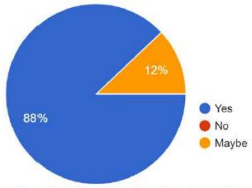
Analysis and Findings Benefits of using Open Data in Planning

Open Data ecosystem invites crowd-based support and sourcing – which can be very useful to drive innovation and make better accuracy data available. (S. Basnet, personal communication, July 2023)

In urban planning, everything is connected to data – whether its infrastructure data, or population data. Even the plans made under the influence of political will and aspirations can be substantiated by using data. (O. Rajopadhyaya, personal communication, July 2023)



Result of survey for the question- Do the use of Open Data help make informed decisions?

*Compared to traditional methods, the use of open data (or data in general) has helped to make the **planning process easier**. The use of open data from various sources like NSO, google maps has made the task of past data **analysis easier**- this has helped in analysis and **development of settlements easier**. **Searching** for data, **processing** of data, and **publishing** of data has been made easy.*

(N. Bhandari, personal communication, September 2023)

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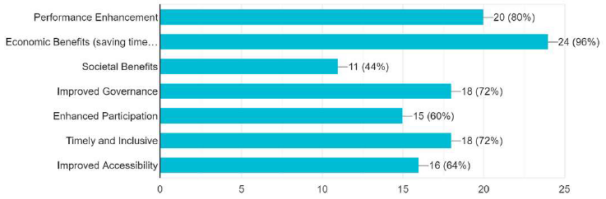
Analysis and Findings Benefits of using Open Data in Planning

A key informant informed that municipal officials lose a lot of time and effort in repetitive sharing of same resources and a one portal- one platform solution for sharing Open Data helps to utilize time of municipal officers in other meaningful engagements



Benefits of Open Data as per survey respondents

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Analysis and Findings Benefits of using Open Data in Planning

- Survey Respondents agreed on the importance of Open Data in ensuring data consistency, which simplifies the process of performing desk studies for various planning efforts.
- Open Data enables planners to move beyond guesswork and develop projects that are more likely to produce desired outcomes
- **The concept of Open Data providing a fast overview of conditions is an exciting finding from the study. This skill is vital in the field of urban planning, where a thorough awareness of the current context is required**
- This alignment eliminates the possibility of misdirected efforts and ensures that resources are focused where they will have the most impact.

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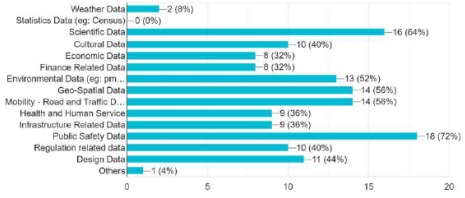
Analysis and Findings Challenges in using Open Data for Planning in Kathmandu Valley



Data that are most challenging to get online according to survey participants

The concept of data sharing is not well developed in the mindset of concerned stakeholders. Even in the age of data and information, there is no realization among the concerned stakeholders that data should be integrated into one platform and shared for effective planning.

There is still traditional thinking among various government officials. The government officials are hesitant to make registration numbers (darta chalani) available to people. This comes from the concept of preserving secrecy (gopanyata) engrained in our working attitude/mindset.
(R. Mainali, personal communication, September 2023)

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Analysis and Findings Challenges in using Open Data for Planning in Kathmandu Valley

- Data has been taken as assets, and even the public institutions that are supposed to share data freely take fee for data sharing – an example of this is the fee levied on spatial data provided by the survey department. (KII)
- Another concerning issue is the prominence of the concept of "Data/Information as power". This has challenged the ecosystem of sharing data openly, for there is no tendency to devolve the power. (KII)
- Most consultants only provide reports of projects to the government body- not the dataset. Even the data produced by various doner funded agencies do not get shared with the government.

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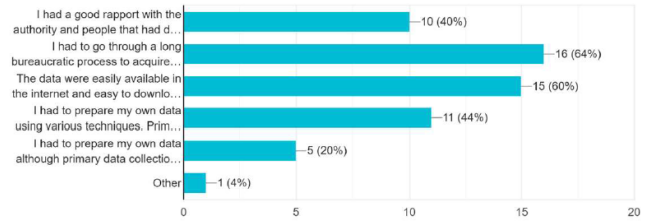
Analysis and Findings Challenges in using Open Data for Planning in Kathmandu Valley



Survey participant's response to process of data collection for planning purposes

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Analysis and Findings Challenges in using Open Data for Planning in Kathmandu Valley

- It is **difficult to get the government officials on-board to digitize data** – they are willing to perform repetitive actions but do not want to engage in entering data into data portal.
- KII of IT officers of municipalities suggest that there is **difficulty in uploading large files into government server.** Limited server and lack of dedicated server to host data are other challenges IT officers face while trying to upload data into municipal websites
- One of the biggest threats when it comes to data sharing is the **presence of data silos and system silos**- meaning that the access and use of data and systems are limited to certain groups of people or systems
- At the same time, there is a **practice of "upward reporting"** system which leads to the local system not being able to access their own data – this negatively impacts decision making

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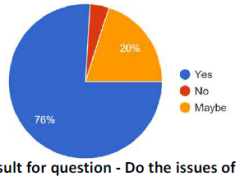
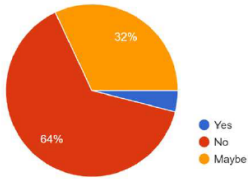
Analysis and Findings Challenges in using Open Data for Planning in Kathmandu Valley

The data shared for planning does not follow the principles of open data. The data/datasets are:

- Not Open by Default
- Neither Timely, nor Comprehensible
- Not Fully Accessible and Usable
- Not Comparable and Interoperable
- Devoid of proper Feedback Mechanism



Survey result for question - Do the issues of Data quality come up in your planning practice



Result for - Is there a feedback mechanism in institutions that share planning data?

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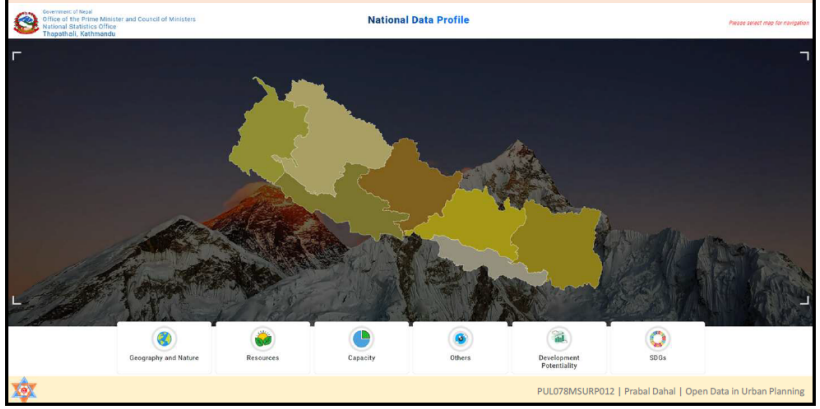
Analysis and Findings Challenges in using Open Data for Planning in Kathmandu Valley



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Analysis and Findings Gaps in Policies for Open Data for Planning in Kathmandu Valley

- The **Constitution of Nepal (2015)**, under article 27, provides right to information. **The constitution provides a strong foundation for sharing data Openly.**

Various Documents Evaluated:

- **Right to Information Act 2007**
- **National Action Plan (2017) on Open Government Data (OGD)**
- **National Strategy for Development of Statistical System (2019)**
- **The National Urban Development Strategy (2017)**
- **National ICT Policy (2015)**
- **15th 5-year Plan National Planning Commission (2020)**
- **Digital Data Distribution, Use, and Regulation Guidelines (2069)**
- **Others…**

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Recommendations

Promotion of Open Data Ecosystem for Urban Planning

i. Encourage urban planners and stakeholders to adopt an open data culture.
ii. Address the financial losses caused by municipalities' fragmented data collection activities.
iii. Create a set of open data indicators that will be used to determine budget allocation for local governments based on successful implementation. It could be embedded into scoring systems like LISA.
iv. Explore the political challenges connected with promoting the transparency and accountability of open data.
v. Ensure that urban planning data is not isolated but geographically integrated for full insights. Establish proper coordination between NSO and Survey Department. Integrate National Statistics Office data with survey department spatial data.
vi. Encourage public-private partnership to advance open data activities while protecting data privacy.
vii. Encourage groups like RUPSON to advocate for data sharing in order to promote the open data movement.

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Recommendations

Interventions on Existing Policies, Acts, Regulations, and Guidelines

i) The **ICT Policy 2015** should be amended to clearly state concept of Open Data in its strategies to promote ICT for government services delivery and innovation. The **National Strategy for the Development of Statistical System (2019)** strategized to open the data produced by the National Statistics Office which paved ways for the current Open Data Portal of the office for census data.
ii) The Right to Information Act (2007) should be updated to include concepts of digital data and information. There will be less confusion or hesitation for government bodies to share non-hard copy data when concepts of digital data are present in the act.
iii) The **National Action Plan (2017) on Open Government Data (OGD)** submitted by the National Information Commission to the council of ministers should be brought into attention of the concerned stakeholders including the council of ministers to facilitate development of an Open Data Policy

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Recommendations

Interventions on Existing Policies, Acts, Regulations, and Guidelines

i) Digital Data Distribution, Use, and Regulation Guidelines 2069 of Survey Department should adopt concept of Open Data. The National Geo Information Infrastructure Policy, which is still being drafted should also incorporate concept of sharing data via Open Data Initiatives. This is not to be mean all data should be given off freely. For data that can be shared, nominal charges (at subsidized rate) could be levied on some data while many datasets could be distributed online freely. For data that are private and linked with national security, data anonymization could be used wherever possible to make data as open as possible.

ii) Concept of Open Data should be made explicit in major urban development documents like the National Urban Development Strategies that are to pave ways for cities of the future where data becomes an inseparable part of cities development.

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Recommendations

Open Data Policy

Need

National Open Data Policy is of utmost importance. Municipality level Open Data Policies could be tailored as per the need of the municipalities. For planning of cities in Kathmandu Valley, institutions like KVDA could have an overarching Open Data Policy that includes the unique challenges and other aspects of cities in Kathmandu Valley.

Associated Institutional and Organizational Provisions

MoCIT and National Information Commission will be the parent organizations for the national open data policy. **MoUD should tailor a separate policy for urban planning based on the national open data policy.** There will be a need for trained and dedicated Open Data Officers at Federal, Provincial, and Local Levels. After the open data policy is made, associated guidelines, acts, and regulations should be made.

Recommended Contents

i. Background, Need and Rationale
ii. International Standards
iii. Goals and Objectives
iv. Scope and Limitations
v. Policies
vi. Implementation Strategies
vii. Data Formats
viii. Licensing
ix. Data Privacy and Security
x. Data Quality ad Updates
xi. Accessibility
xii. Monitoring and Evaluation
xiii. Stakeholders Engagement
xiv. Stakeholders Capacity Building
xv. Promotion and Awareness
xvi. Implementation Timeline

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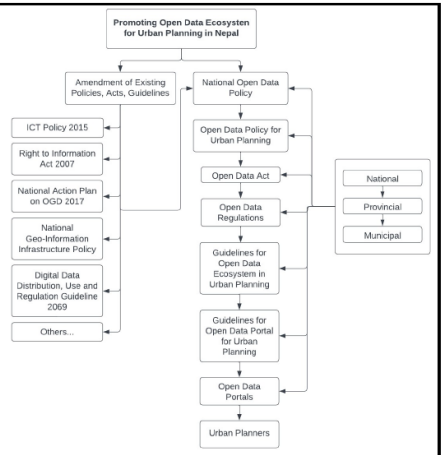
Recommendations

Suggested Process for Policy Development and Implementation

Note: Tentative Budget for various activities is present in the report.



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Recommendations

MoFAGA + MoCIT + (MoUD)
National Level, Provincial Level and Local Level
Open Data Portal Operational Guidelines

Open Data Portals

Contents:

- Availability of Open Data can be tallied with Planning Norms
- Mapping of Data sources is important to understand the open data ecosystem

i. In urban planning, data required can be listed in terms of everyday activities from morning to evening:
   - Early Morning: Open Spaces (cultural, religious)
   - Morning: School, children attending schools, vegetable markets, office goers, traffic
   - Late Morning: Industries and commerce, services
   - Day time: Energy, Communications, Sewage, status of water supply and wastewater
   - Evening: Market, recreation, entertainment
   - Night: Security, Light, Street furniture, Street design

ii. For urban planning, data required can also be listed in terms of activities from Womb to Tomb:
   - Hospitals, Day Care, Schooling, Marriage, Community Halls, Yoga, Meditation, Crematorium, Cemetery

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Recommendations

MoFAGA + MoCIT + (MoUD)
National Level, Provincial Level and Local Level
Open Data Portal Operational Guidelines

Open Data Portals

- Data could be categorized into 5-6 categories. More than this should be avoided.
- Datasets should be shared in machine readable formats, should contain metadata and clear licensing policy.
- Datasets should have Geolocation as far as possible.
- A clear feedback mechanism should be provided.

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Recommendations

Open Data Portals

Making Open Data Portals

i. Municipal data can be shared mainly in two platforms: Via Mobile App or Via Website (portal)

ii. A sample method that can be adopted:
- Make a list of documents and datasets required for Urban planning: IUDP, KVDA masterplan, New Town Documents, Municipal plans, MTMPs. Listing should be done using a participatory approach- to assign value and weightage to the data.
- Create a data storage plan.
- Create data in machine readable Formats
- Make as many data geolocated and geotagged as possible
- Have collaborations with IT institutions to get interns to help with data generation, upload, and management– ICT Scholarships (Internship to IT college students at the municipality)
- Train the municipality staff
- Allocate certain hours per week for online data creation/exercise (eg: Friday after 1 pm – 2 hours dedicated to data creation by municipal staff)

- **Provision for Crash and Backup**

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Conclusion

- **Open Data Ecosystem in Kathmandu Valley - infant stage**. Most data in Pdf form via the government websites are not interoperable between datasets and systems. An analysis of availability of sectoral data revealed that less than 50% data are openly available
- Easily accessible data in machine readable formats that are geolocated can have various benefits in planning – including efficient result generation, data-driven informed policy recommendations, informed decision making, and enhanced participation
- The issues of mindset of planners and stakeholders not open to sharing data, inclination of consultants to use public data for monetary gain, and presence of data silos and system silos were brought forth by the research. Data used in planning in Kathmandu Valley are not open by default, neither timely, nor comprehensive; they are not fully accessible and reusable, non-comparable and non-interoperable
- The need of an Open Data Policy has been clearly highlighted in the research. **This research could add to the advocacy for an Open Data Policy, as well as provide a good reference for any further research in the field of open data in planning. A potential way forward could be assessing the availability of Open Data for cities by improving on the methodology used for Madhyapur Thimi Municipality in this research.**

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ANNEX IX

Survey Summary

Open Data in Urban Planning

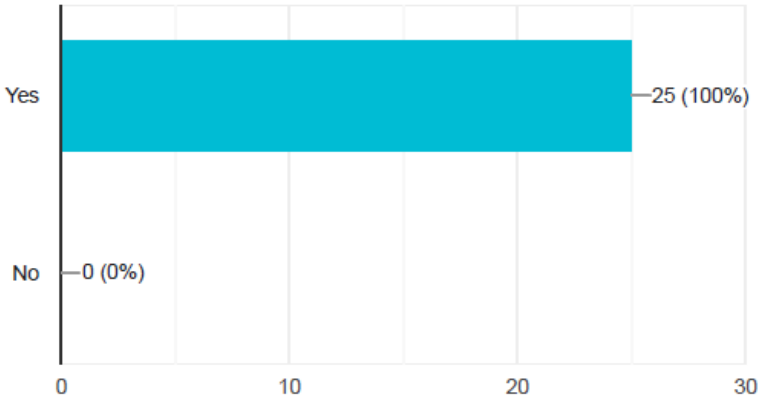
25 responses

Request for Consent and Declaration of Rights

Copy

I have read the description of the survey and agree to the premise of this survey. I am aware that this is an academic research survey and my data will not be used for any commercial purpose. I ensure that the information that I provide are truthful and the information I provide can be used by the researcher in any form desired, without falsifying the data provided.

25 responses



PERSONAL INFORMATION

What best describes you?

(Tick all that may apply)

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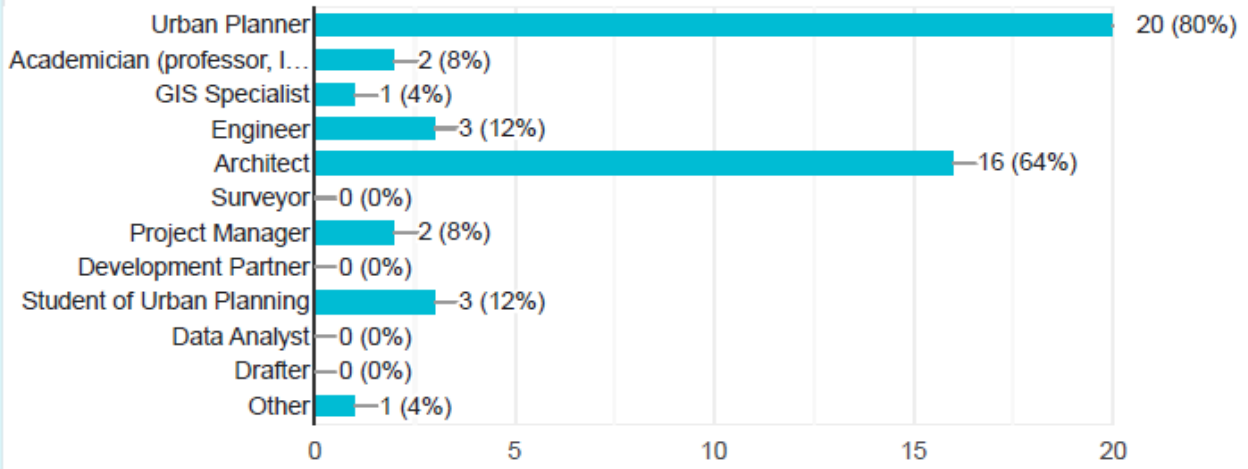
25 responses



How long have you been practicing in the field of urban planning or allied profession?

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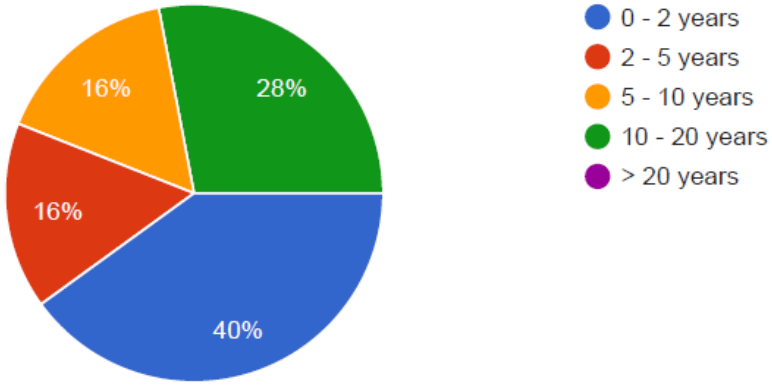
25 responses



What kind of organizations do you usually work for?
(tick all that apply)

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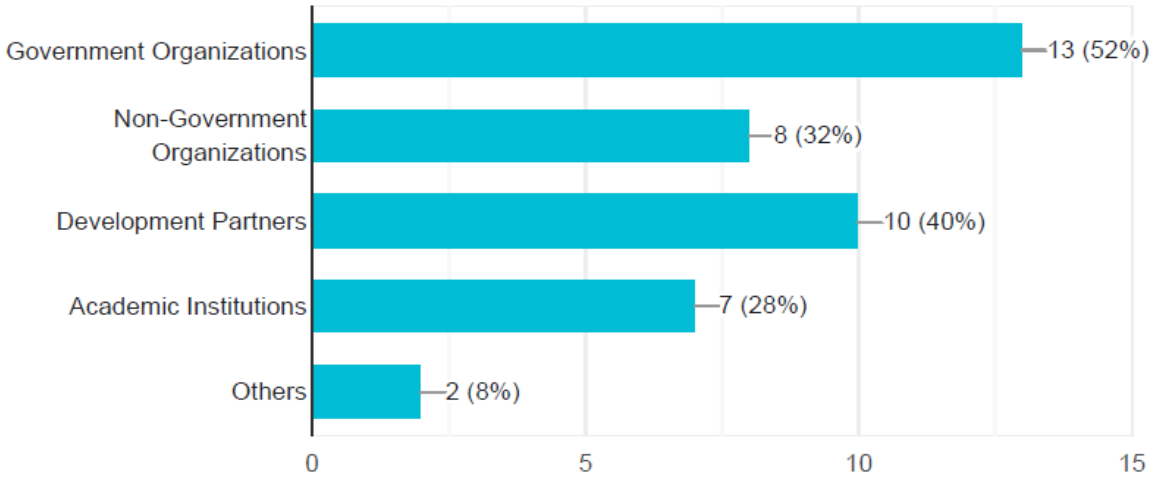
25 responses



What kind of planning practices have you been engaged in? *(please tick all that apply)*

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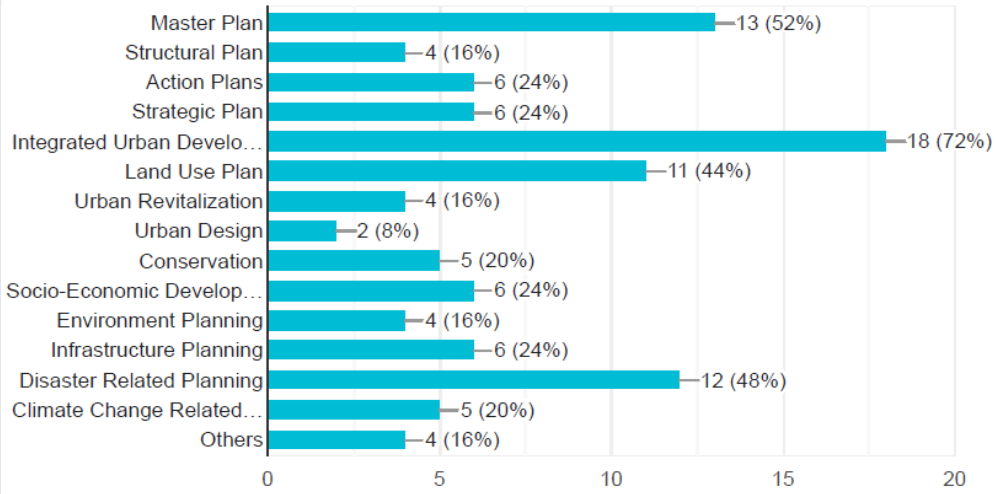
25 responses



DATA IN URBAN PLANNING

3.1. Have you come across, collected, or analyzed any of the following data while practicing in the field of planning?

Please tick all that apply

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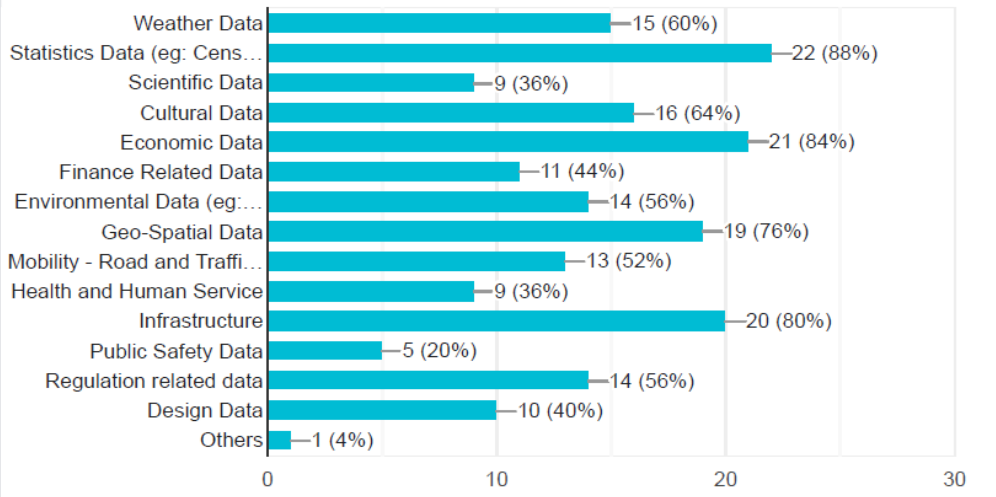
25 responses

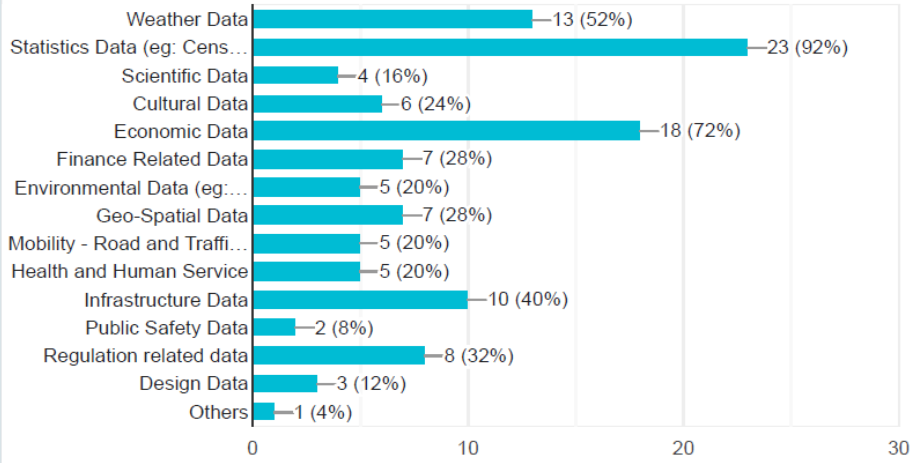


3.2. What types of data listed below are available online freely for reuse?

Copy

Please tick all that apply

25 responses



3.3. In your opinion, what percentage of urban data listed in the previous question are openly available online for reuse and redistribution?

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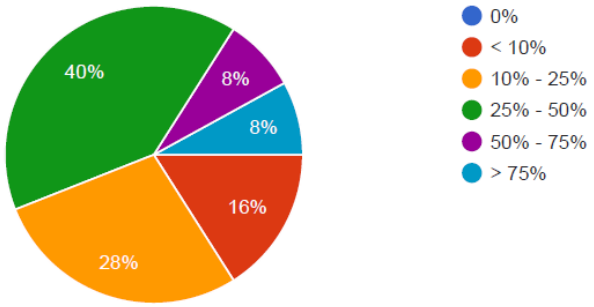
25 responses

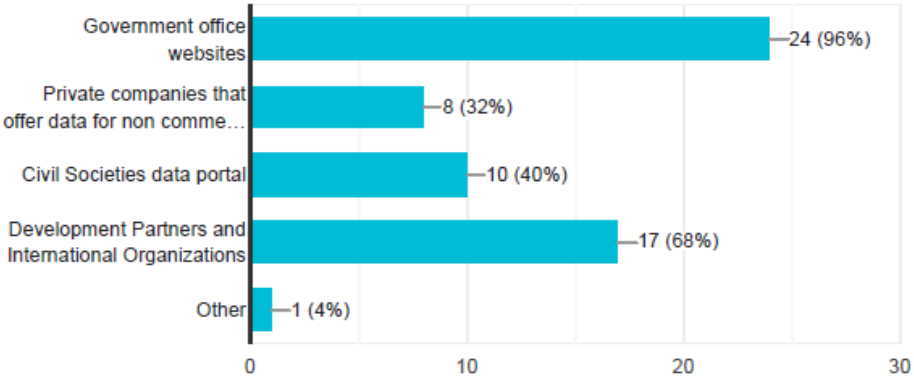


3.4. What are the sources of these online data?

Copy

(please tick all that apply)

25 responses



3.5. What could be other sources of online data that are freely available?

13 responses

Internet and survey department
CBS ,municipality website
Open source data
Census, Google maps
Open Street Maps, Google Earth
Academic Institutions who have carried data in academic exercise
Topographic Data (ASTER DEM), Google Earth Data
Education related data by PABSON etc
Local level data related to population, education, disability, land use, socio- economic data
I think the sources are covered up in the list above
Development of separate data portals in municipal websites and other governmental office websites
Academic Institutes & Local government may do a lot regarding this
Satellite images

3.6. What is the PRIMARY source of these online data?

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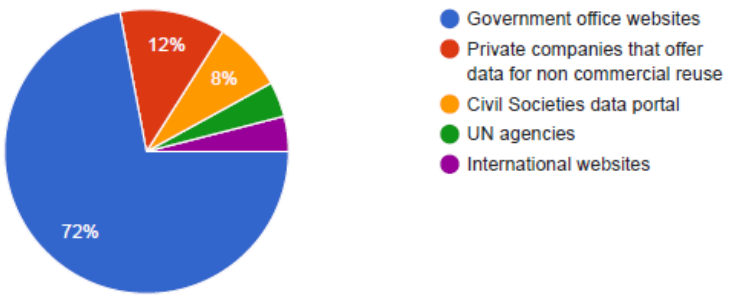
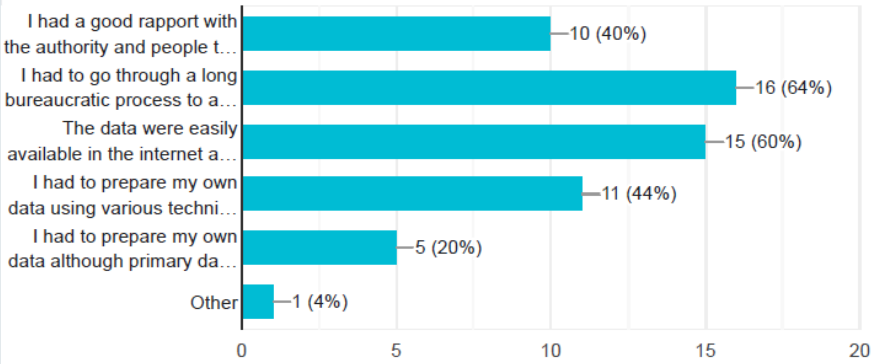
25 responses



3.7. How have you collected data for planning purposes ?
(data listed in the previous question)
You may have had different experiences in different projects. Tick all that apply to various projects.

Copy

25 responses



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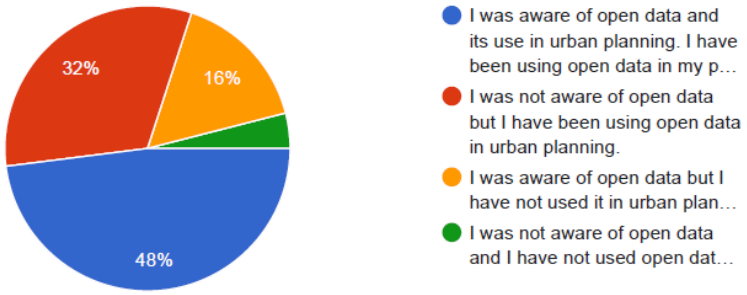
OPEN DATA is an important type of data in the field of urban planning. Open Data is information gathered, produced, or paid for by public agencies and made freely available for re-use for any purpose, and the term of use is included in the license (European Commission, n.d.). Examples of common open data: geospatial information, weather data, and census data. While most open data are generated by public institutions, some private institutions also produce open data and make them available for non-commercial use. *(Sometimes, a very minimal fee may be required to acquire data from government bodies.)*

3.8. Were you aware about Open Data and its use in urban planning?

25 responses



USE OF OPEN DATA

4.1. In your opinion, what percentage of planning process relies on the use of Data (may or may not be open data)?

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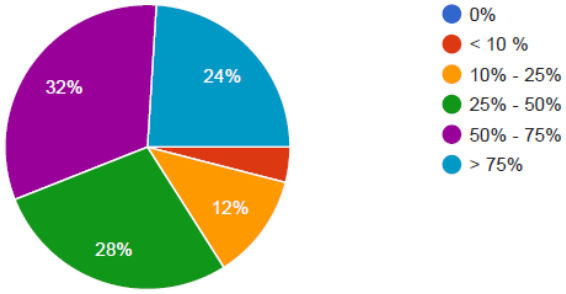
25 responses



Planners often use census data, geospatial data, weather data, cultural data, etc that are available openly to public and make plans by analyzing these data. These data may be available in data portal websites made available by government bodies (example : census data, geological survey data), or civil societies, or even directly available online in websites of concerned authorities.

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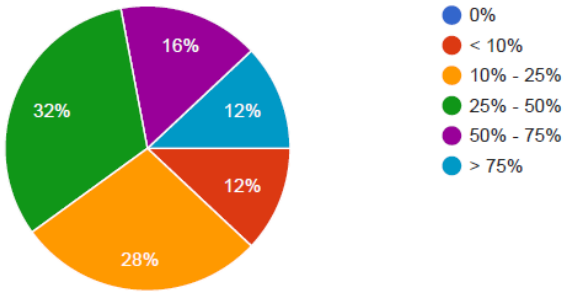
4.2. Of all the data that you use in your planning process, what percent of data, in your opinion are open data (i.e. they should be open to reuse and redistribute)?

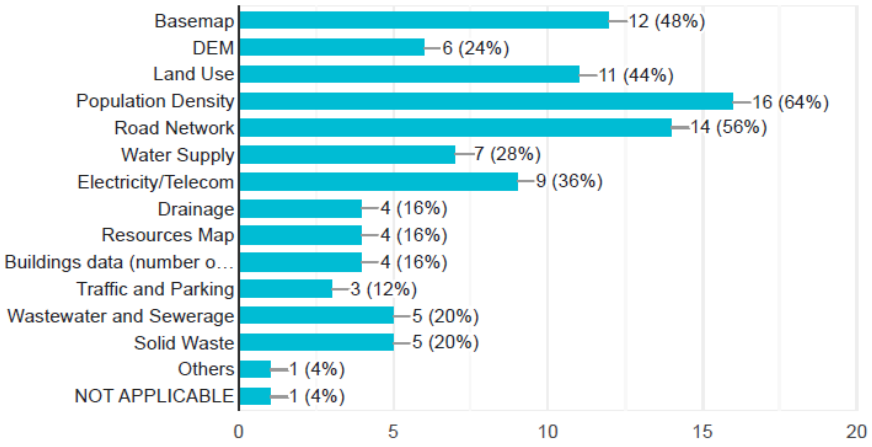
25 responses



4.3. Data for PHYSICAL DEVELOPMENT PLAN. If the planning you carried out consisted of physical development sector, what kind of data (from following) were available online? *(please tick all that apply)*

Copy

25 responses



4.4. What percentage (in your opinion/personal experience) of data required for planning of Physical Development available online?

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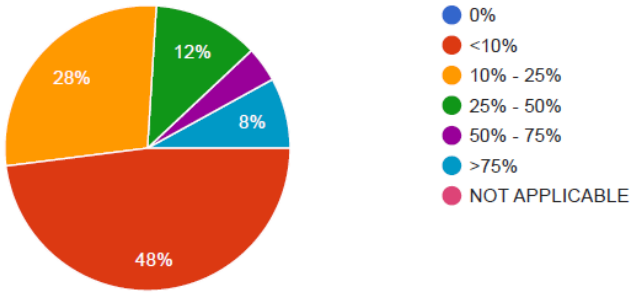
25 responses



4.5. In what format were these Physical Development related data available? *(please tick all that apply)*

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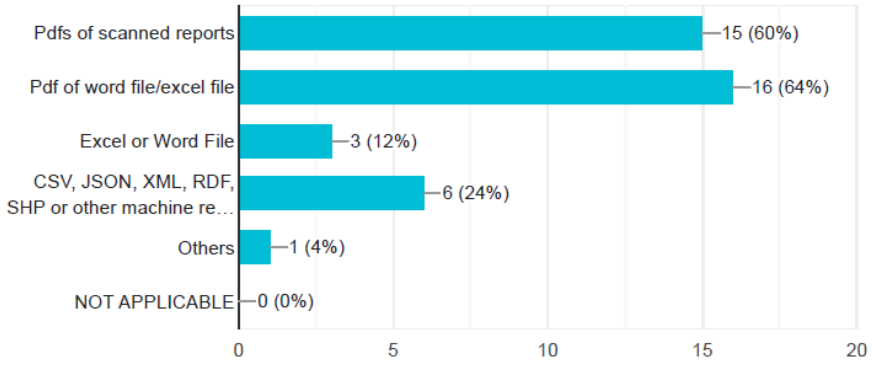
25 responses



4.6. What were the open data for physical development used to produce? *(please tick all that apply)*

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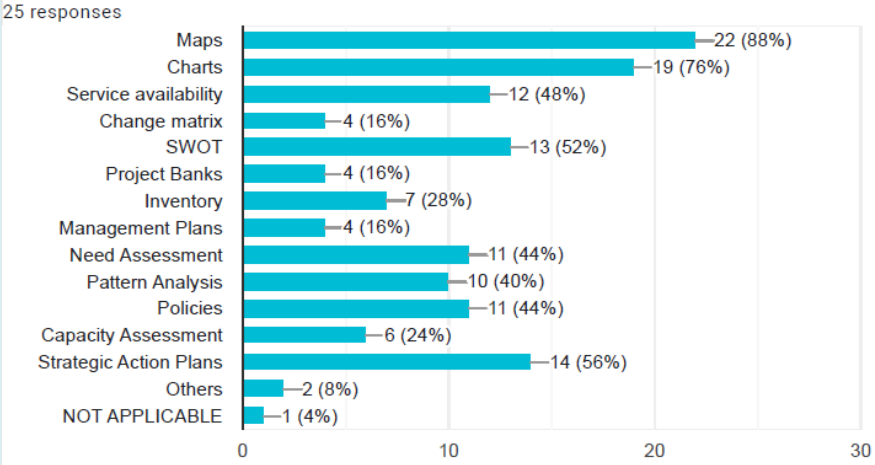
25 responses



4.7. Data for SOCIAL DEVELOPMENT PLAN. If the planning you carried out consisted of social development sector, what kind of data (from following) were available online? *(please tick all that apply)*

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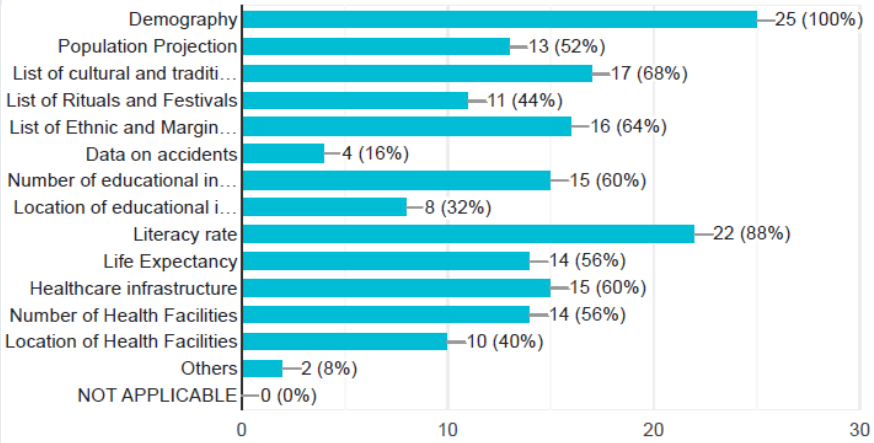
25 responses



4.8. What percentage (in your opinion/personal experience) of data required for planning of Social Development available online?

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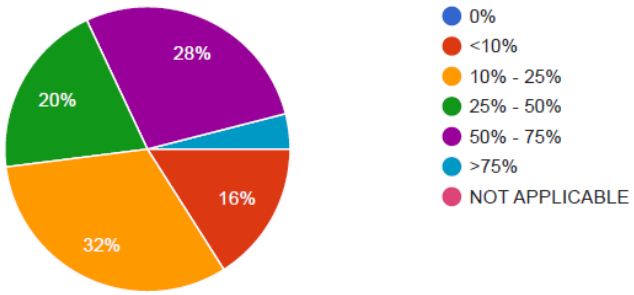
25 responses



4.9. In what format were these Social Development related data available? *(please tick all that apply)*

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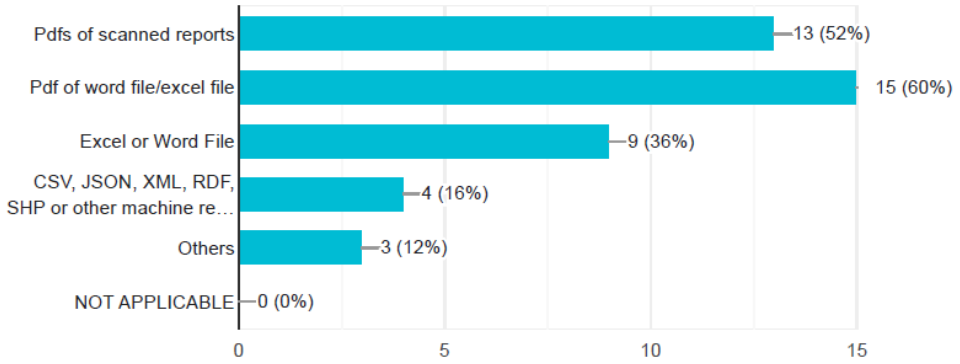
25 responses



4.10. What were the open data for Social Development used to produce? *(please tick all that apply)*

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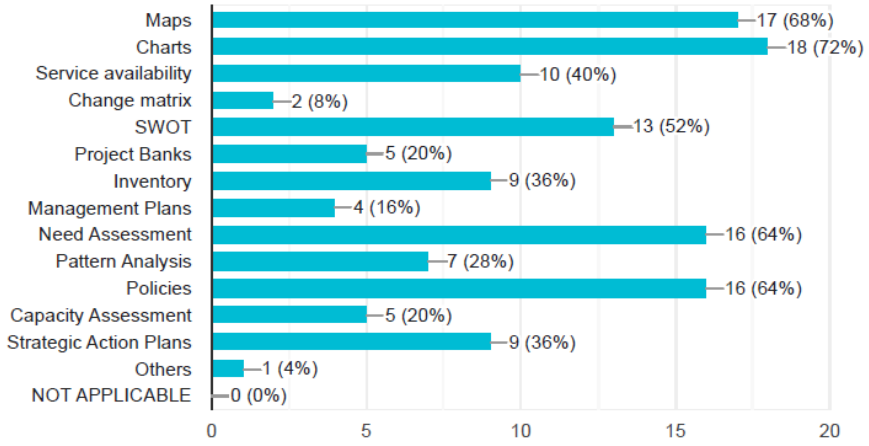
25 responses



4.11. Data for ECONOMIC DEVELOPMENT PLAN. If the planning you carried out consisted of economic development sector, what kind of data (from following) were available online? *(please tick all that apply)*

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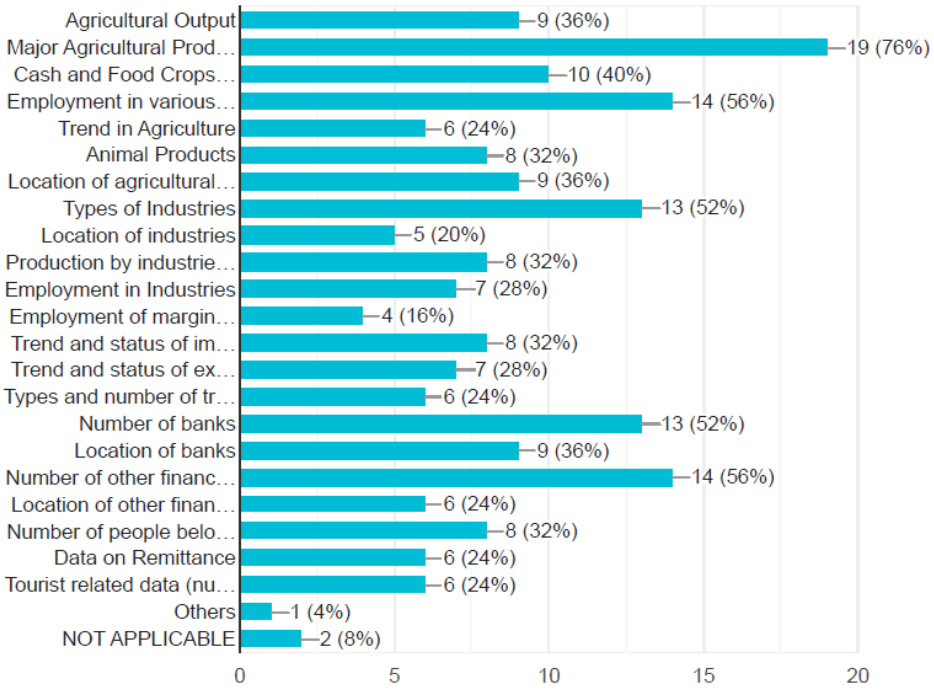
25 responses



4.12. What percentage (in your opinion/personal experience) of data required for planning of Economic Development available online?

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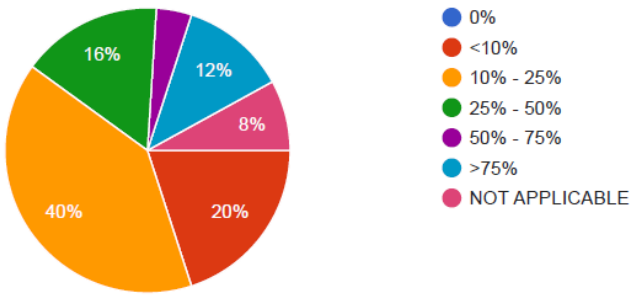
25 responses



4.13. In what format were these Economic Development related data available? *(please tick all that apply)*

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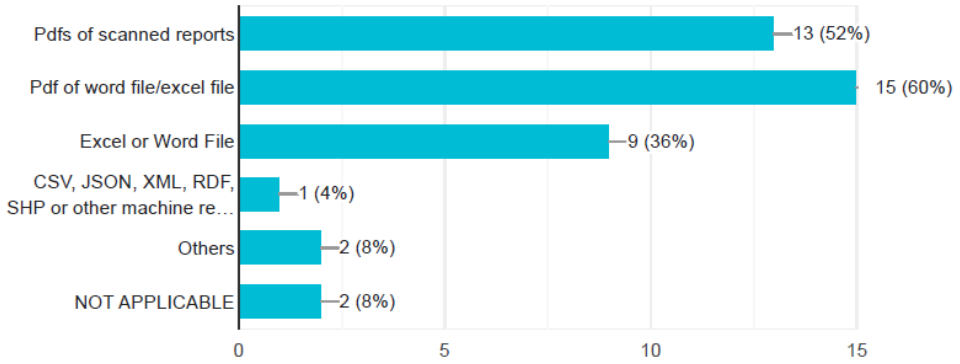
25 responses



4.14. What were the open data for Economic Development used to produce? *(please tick all that apply)*

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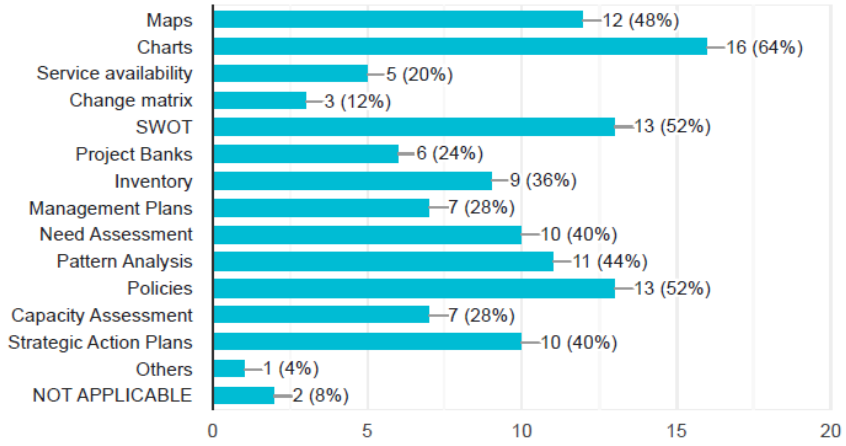
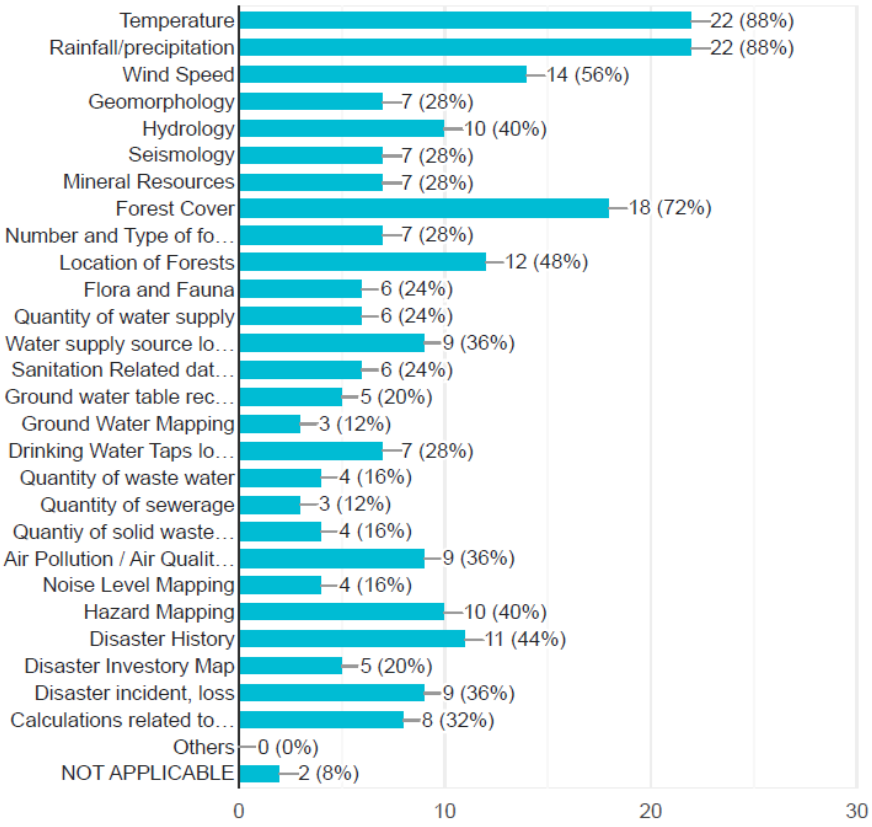
25 responses



4.15. Data for ENVIRONMENT and DISASTER MANAGEMENT PLAN. If the planning you carried out consisted of environment and disaster management sector, what kind of data (from following) were available online? *(please tick all that apply)*

Copy

25 responses



4.16. What percentage (in your opinion/personal experience) of data required for planning of Environment and Disaster Management available online?

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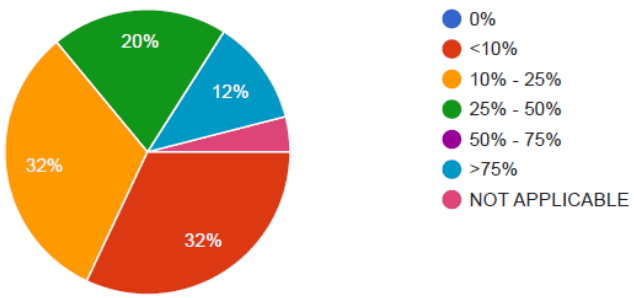
25 responses



4.17. In what format were these Environment and Disaster Management related data available? *(please tick all that apply)*

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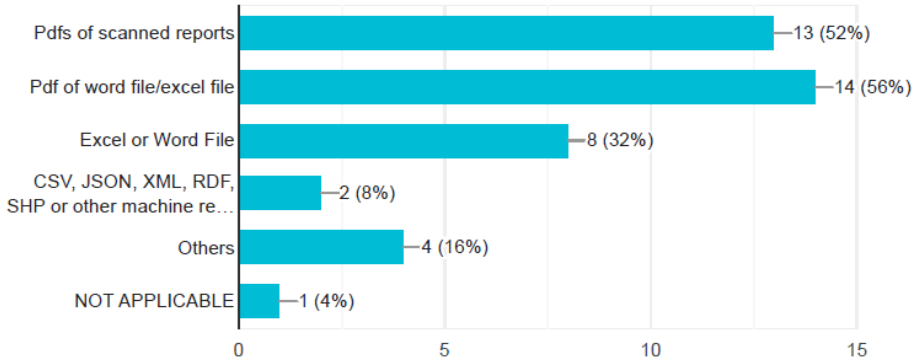
25 responses



4.18. What were the open data for Environment and Disaster Management used to produce? *(please tick all that apply)*

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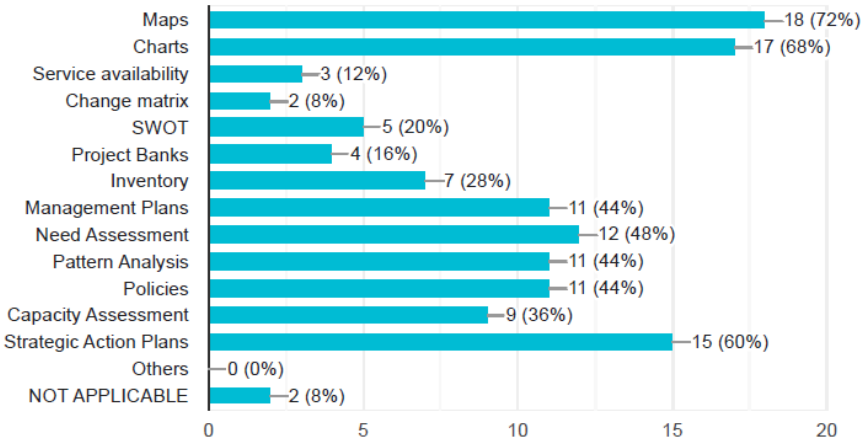
25 responses



4.19. Data for FINANCIAL DEVELOPMENT PLAN. If the planning you carried out consisted of financial development sector, what kind of data (from following) were available online? *(please tick all that apply)*

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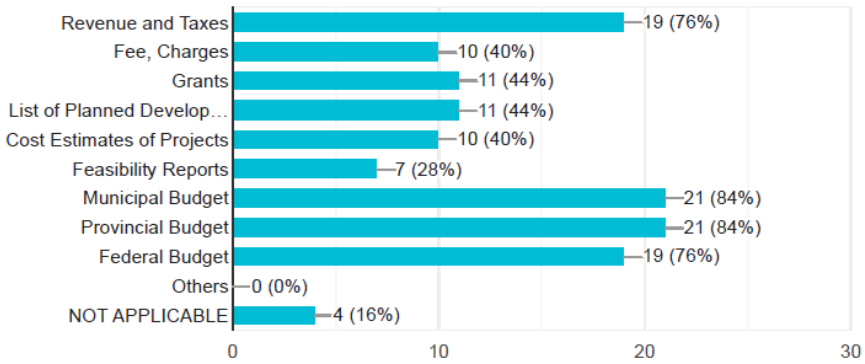
25 responses



4.20. What percentage (in your opinion/personal experience) of data required for planning of Financial Development available online?

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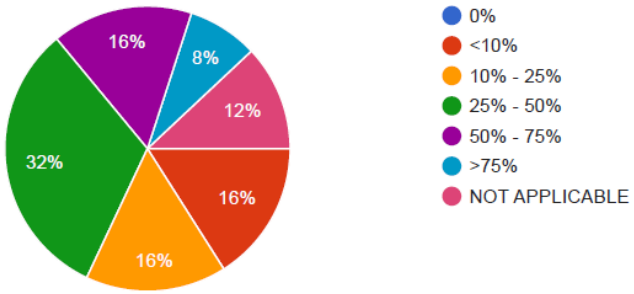
25 responses



4.21. In what format were these Financial Development related data available? *(please tick all that apply)*

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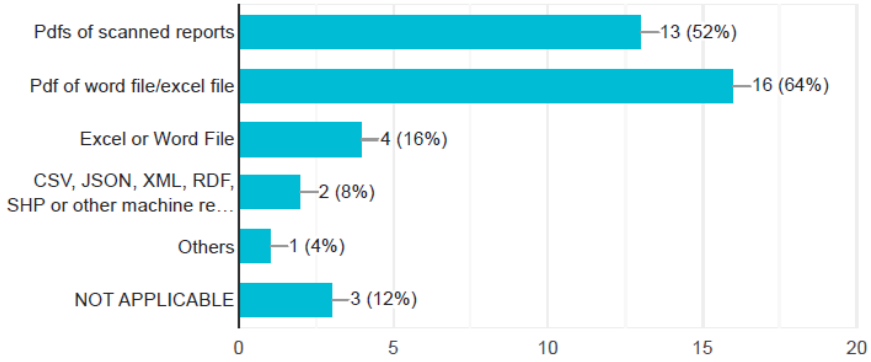
25 responses



4.22. What were the open data for Financial Development used to produce? *(please tick all that apply)*

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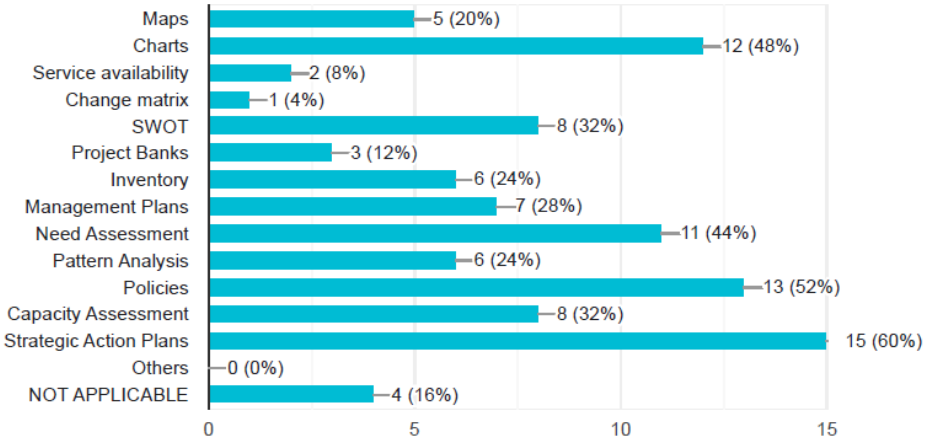
25 responses



4.23. In what formats are the Open Data generally available for your work?

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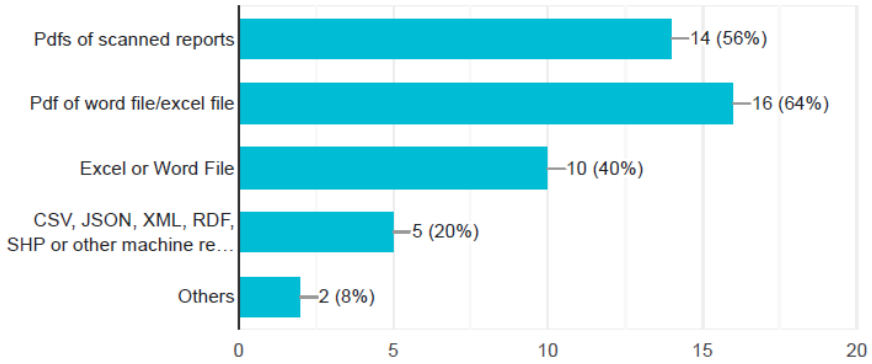
25 responses



4.24. How important is Open Data for planning?

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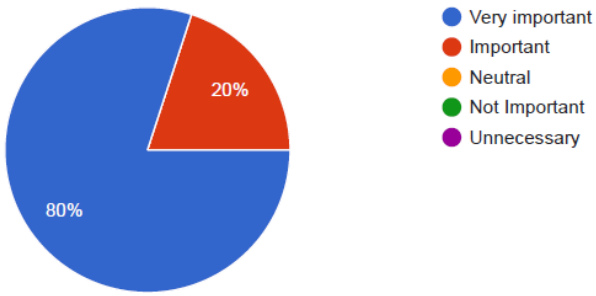
25 responses



4.25. Do you think Open Data makes planning easier?

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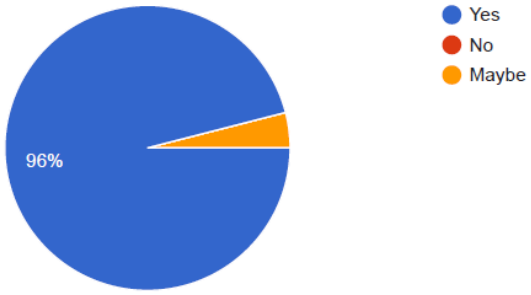
25 responses



4.26. Do the use of Open Data helps make informed decisions?

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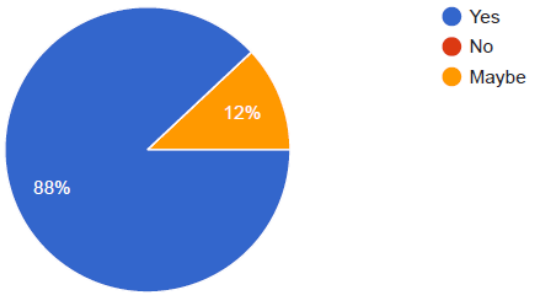
25 responses

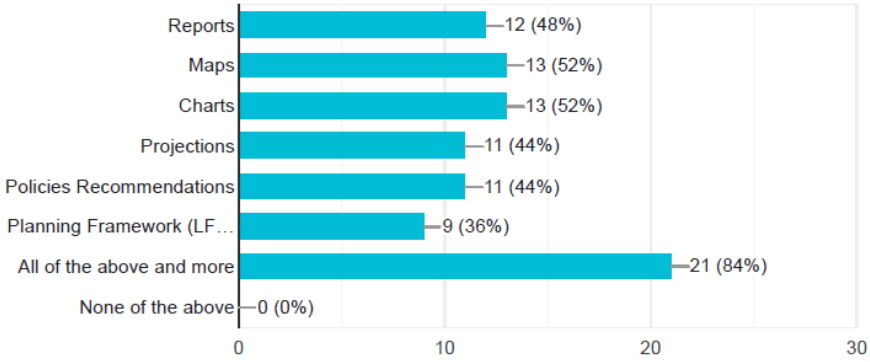


4.27. What kind of results do you produce using Open Data while practicing planning?

(Tick all that apply)

Copy

25 responses



4.28. What benefits do you think Open Data provides?

(Please tick all that apply)

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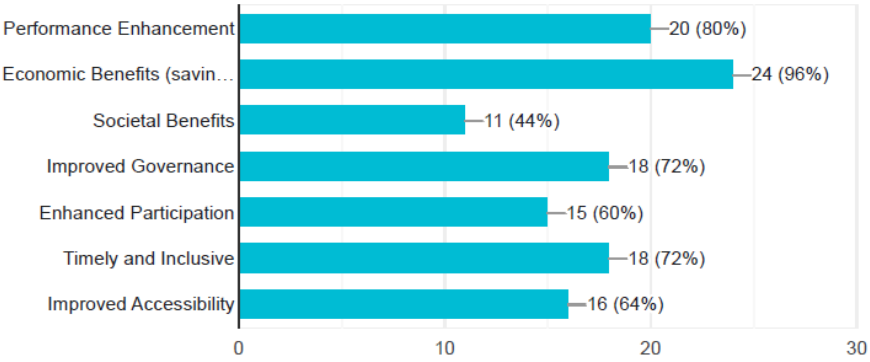
25 responses



4.29. Any other benefit you could think of?

10 responses

Better planning and informed decisions

Consistency

Easy for desk study

Credibility and authority to what you are proposing, help attain Measurable goals, improvement in strategy based on analysis

Provision of open data means access to data for research uses that will help in improved planning and informed decision making.

Gives quick overview of the situation.

Open data has many benefits. But it should be used with caution. Sometimes, data from these sources are not reliable or not accurate enough. For instance, temperature data, rainfall data etc obtained from website like accu weather is only approximate. We have to obtain from DHM for collect data from field survey. in addition to data from open source, field work is also very essential to have real ground truth data.

Provide a proper direction for socio-economic development and also can contribute for policy reform

More research and analysis

Beneficial for Individual scholars and students too

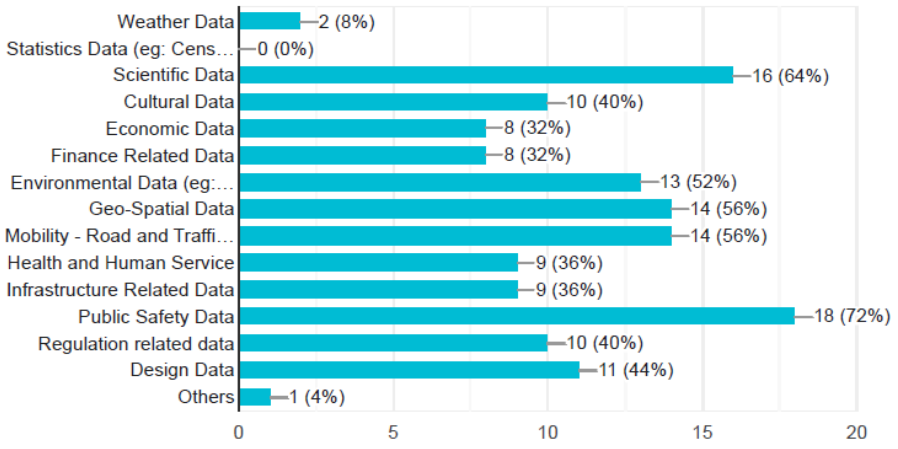
CHALLENGES IN OPEN DATA

5.1. What types of data listed below are the MOST CHALLENGEING to get online (freely) for reuse?

Copy

Please tick all that apply

25 responses



5.2. What are some of the challenges you face while acquiring data for planning?
(please provide a short answer)

25 responses

institutions not having enough data or not enthusiastic enough to provide.

In governmental office, there is lack of coordination between officer resulting in time consumption. Online data are very difficult to obtain as they are not available in required section most of the time.

No open access

Measuring cultural values might be the concern

Snowballing transferring responsibility to another person or agency

Difficult to find updated data.

Departments and Institutions with cross cutting issues don't exactly know who acquires related data

Lack of coordination and not willing to cooperate

Its expensive to students

Most of the government organizations and private institutions do not provide data easily and the process is a hassle. In many cases, even if the process is followed the authorities do not seem very keen on giving the data.

Although there may be data, they are not shared openly. Sometimes, it is difficult just to figure out where the data could be available from. It is also time consuming to collect the required data from different sources.

lack of aceess to data

Availability of the data is the major challenge, as the data itself is not available and can't be traced back. Most of the data are very old and can't be used in present context.

Lack of updated data is one of major problem we face when we get data. For eg. landuse/landcover data. In such cases, we have to update ourselves and sometimes it can be timeconsuming.

Data on different sites differ with each other...so validation of available data is the challange.

Availability of data

Example- There is no proper data related to urban poverty and that created difficulties while developing project proposal. Whole municipal areas with rural characters are also considered as urban area and that has created problems in project planning and designing. There is no proper parameter to identify urban area within the municipality and rural municipalities. There are lots of rural area in municipalities and few urban areas are existed in the rural area but there is no proper screening system which has created difficulties in project planning.

More often it happens that the agencies do not have data organized and readily available. They are to be accessed upon the official recommendation from the government office. And the agencies are relucntant or unwillng to provide the available data as well.

Availability of necessary and up to date data, mostly geospatial data (data and map layers) related to infrastructure, disaster and environment from related institutions

Mind set, acceptance of technology

No base and updated data

availability of funds and time

Many data are not up to date

Loss of previous studies/data

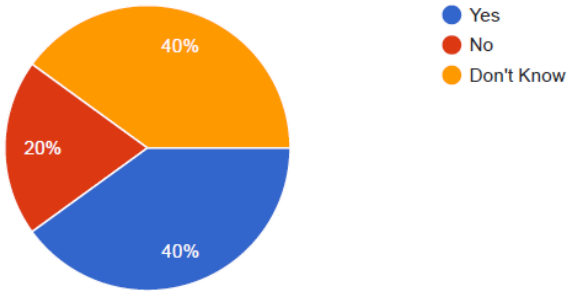
Outdated day, not readable formats, hassle to acquire

As planners or allied professionals, our practice produces various results in forms of maps, charts, projections, policies, and planning.

Copy

5.3. Have the results you produced been shared openly to public in an online - downloadable format?

25 responses



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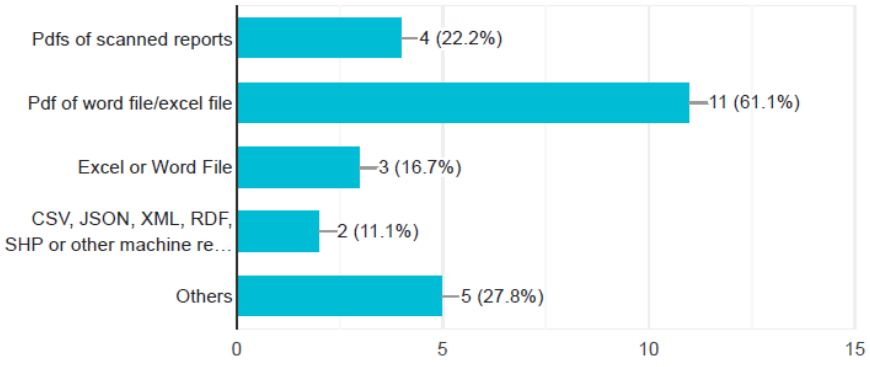
5.4. If you answered Yes to the previous question, in what format have you shared the results?

18 responses



5.5. In the case where you have worked for government bodies, have you followed up about whether or not the data you collected or produced and results you obtained have been made public online in downloadable format?
(Please provide your thoughts on this matter even if you have worked in/for non-governmental bodies)

25 responses

No

-

I have not made it online as it was educational document and requires permission of professor for publishing such report.

Not made public

No, i haven't worked

No because they don't have time for this

Haven't worked for government bodies

Yes, they try to maintain transparency as much as possible keeping the confidentiality factor in mind.

No no, too much of a hassle.

No.

It is very unfortunate that the data we submit to government bodies are not shared. They could not be even traced to where they are kept once the working officer at the time gets replaced.

No, I haven't followed up. But few of the documents are available in online platform that I have submitted to the clients.

Not all data that we submit to govt projects are available for free. We have to pay nominal amount to get it.

Not yet

Yes

Yes. I have done.

no

Yes. Some data and studies are made available online, some are not.

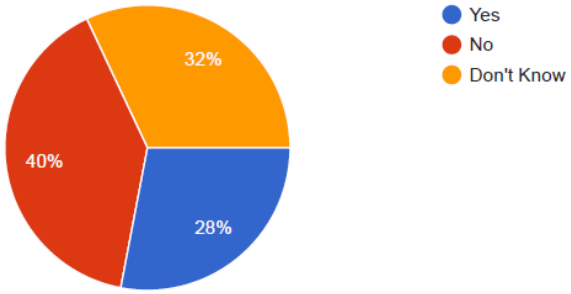
very limited

They only make ppt available but in case of guidelines that I prepared they are uploaded on websites after approval of ministry

actually its a job of government bodies so i dont know whether they make available for public or not

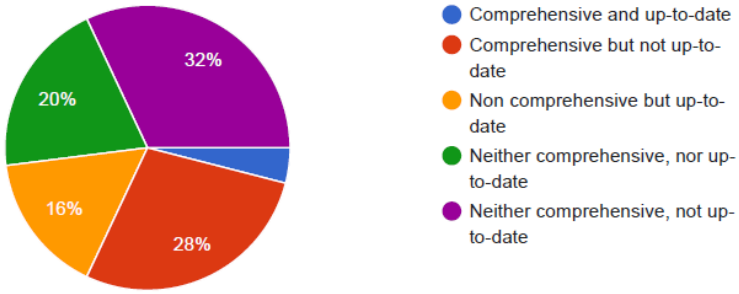
5.6. Are you aware of any government initiatives or programs in place to promote availability of open data? Copy

25 responses



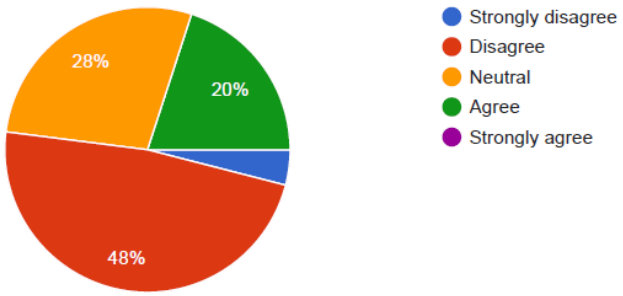
5.7. How comprehensive and up-to-date are the datasets available online for planning? Copy

25 responses



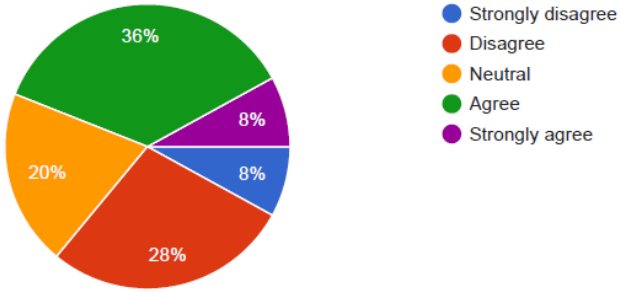
5.8. You are confident about the completeness of the (open) data available online. Copy

25 responses



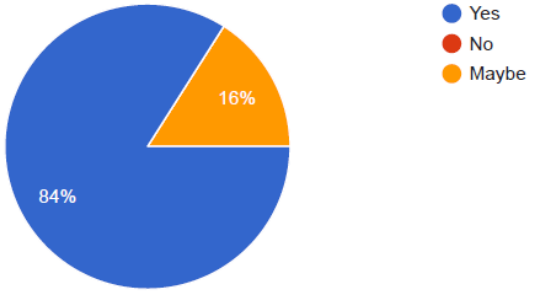
5.9. The (open) data available online are easy to access and process. Copy

25 responses



5.10. Do you think the open data has a good impact on urban planning practice in your country/region? Copy

25 responses



5.11. If possible, please share about an instance of using open data in planning practice.

13 responses

No such

Most of the trend and social analysis is based on census data published by CBS. Most of the mapping is based on openstreet map data

Using demographic data in feasibility study.

I do not recall not using open data for any of the planning projects.

Google maps allowed me to find the distance to health facilities, which helped me assess its accessibility in planning.

Data from CBS have always been useful for planning practice. It has helped in analyzing population projections which further help in needs assessment and strategic planning.

DRR has good updates, Census are also working towards it. Nepalindata, factsnepal , initiated by private sectors, are also good sources. Security forces-Nepal police have good sources. Increasing number of cctv will gather more data in coming days like traffic counts and safety issues.

Using google earth / Open street data for preparing base maps and updating old GIS data, use of CBS data for demographic profile study

Use of Census data

It drivers our planning works in a right track.

Our team has used open data in analyzing population trend in municipalites of valley, land use and land cover change, and several other sectoral analysis

-

The census data 2021 is available in disaggregated form on government website used for socio economic analysis of recent energy related survey

5.12. Are there any technical or infrastructural challenges related to open data implementation in your country or region's context?

25 responses

Yes

yes

Lack of knowedge about open data nad its importance

Not transparent data

No idea

Yes there is no dedicated body or entity within government organization for data collection n handling.

Yes, due to the lack of accessibility.

Depends on the region, there aren't easy access to data when working in rural and indigenous communities in Utah. The challenge is technical. infrastructural and bureaucratical in this context.

No

Yes.

The challenge is that the government bodies do not have a system to store the data properly. The submitted data lie in the hands of an individual (the working officer) instead of the institution it is submitted to.

i don't have much idea on this - legal issues might be there

Yes, some inaccessible regions are not included and does rely on online sources which may not be upto date and relevant. New technology will definitely help to get upto date information.

More of the data should be made available to the public (for our case, planning purpose), before it gets phased out, or becomes too old to be used. But just to make sure the data is used wisely, there should be a mechanism check the who the user is, by say registration system, so that only needy person fetch it.

Collection and validation of data is one of the major challenges related to open data implementation.

Data production by concerned agencies and its availability to the public.

No.

Infrastructure challenge may not be an issue if all the concerned agencies publish the updated data in their respective website and accordingly the data users will process them as per their purpose.

Yes. There has been very less effort in creating, tabulation and consolidation of data and information, and making them available/ open to use

very less technical HR, data centre and up to date mechanisms

Up to date data not available making it difficult to adopt for implementation

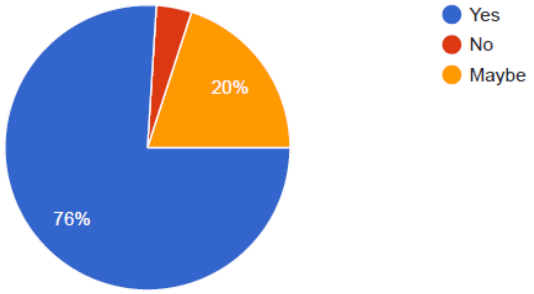
Not infrastructure or technical challenges but intension of government bodies is really poor to create such database

Who will do the Data validation?

Lack of digitisation

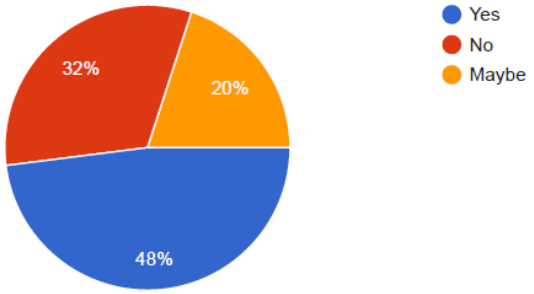
5.13. Do issues of data quality come up in your planning practice? Copy

25 responses



5.14. Do issues of data privacy and security come up in your planning practice? Copy

25 responses



5.15. Please share about any instance of issues related to data quality, privacy and security that have come up in your planning practice.

(You may skip this question if you did not answer yes to the previous two questions)

8 responses

Data quality becomes questionable when the data collected are not reliable or when they are too old. Privacy and security issues arise because even though the data are shared, they do not get correctly credited for.

Not all data can be relied on. so has to double check or triangulate with other informations.

In preparation of Physical Development Plan of New Town.

Some socio-cultural data generated from urban based experts were far from ground reality due to heavily dependent on secondary source and their low interest to travel the rural area.

The issue of data quality is mainly associated with outdated data while issue of privacy is related with the concern of government agencies with their data being misused by other goverrmment agency or the non government agencies

-

Eg. After federalization, many local VDc data and municipality census data cannot be compared because of change in their political boundaries

Noone cares about privacy while collecting data generally

5.16. Are you aware of and taken part in any capacity building programs or trainings for open data utilization (in planning)?

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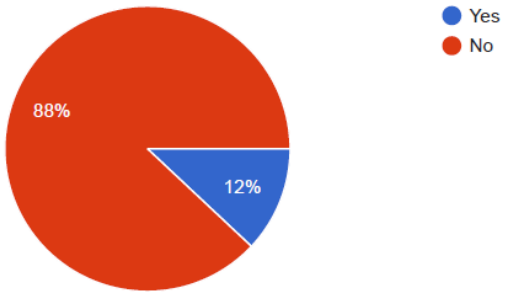
25 responses



5.17. If you indicated Yes to taking part in capacity building or training program for open data utilization in planning, please share your experience.

4 responses

Openstreet mapping is being carried out by different parties.

Was a part of team for giving trainings for usage of GIS for municipal database preparation and management during the Urban Basemap and Metric Addressing System preparation projects.

-

It was based on gis and recent census

5.18. If there was proper management, training and awareness about importance and use of open data, what percent of the data that planners use could be made available and accessible as open data by government bodies and civil societies?

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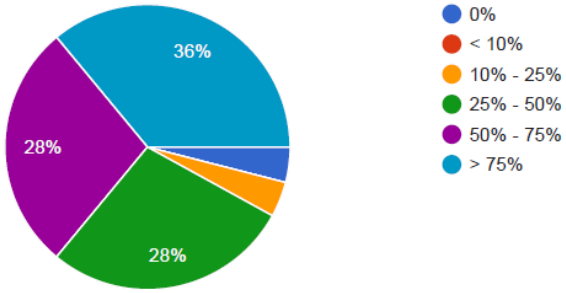
25 responses



5.19. There are various data openly available to the public and planning fraternity. **Is there a system of feedback mechanism by which the institution delivering data online are connecting with the planners or general people to improve the quality and relevance of data they share.**

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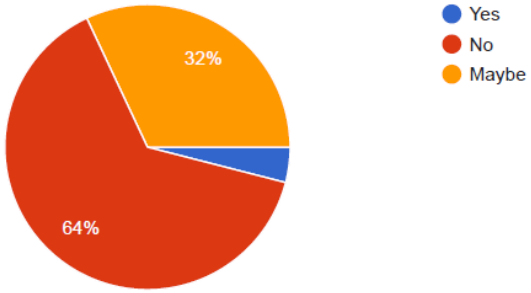
25 responses



5.20. There are various data openly available to the public and planning fraternity. Is there a system of feedback mechanism by which the institution delivering data online are connecting with the planners or general people to improve the quality and relevance of data they share?
(Please explain your choice or cite an example)

25 responses

No

-

no

There may be system of feedback in some cases but they take those feedback lightly and do not make necessary change to make data extraction easy.

No

None that i know of

Don't know

I am not aware of this to answer

With international companies such as google there are feedback loops, but it is hardly the case with government bodies.

Not sure if such system exists.

I think this part is crucial to have data triangulations and needs to double check the data quality.

I have not participated in any such feedback mechanism as of now. But it is important.

I don't think so

Some institution seek the feedback eg DUDBC

There are few formal mechanism but rarely implemented.

not that i know of

No.

I am unaware of such mechanism

Not aware much

Maybe

THE ENDING SECTION

Is there anything you would like to add about Open Data or Data in general in context of its use, challenges and prospects in the field of planning?

14 responses

if more data were made open it would be lot better for planners and the work could be done even faster.

Would be easy

While there have been initiative for unification of open data the initiative have not been able to keep up probably due to lack of fund.

To conduct the planning process, open data are crucial. Since open data in our environment lacks both accessibility and accuracy, the government and various corporate sectors must encourage open data's accessibility.

Sometimes there is confict in the data provided online. Thus it should be up to date and correct

Scope of big data is large especially in this day and age where everything is data driven.

the questionnaire is not site specific. For e.g. I might have lots of open data relating to Kathmandu, but it may not be the same case of, say a rural region.

Nope

Open data + field work data, both are essential. We cannot only rely on open data.

Useful and should produce by the concerned agency

Its a bavkbone of planning. Without open data, the urban planning work will be far from reality. We have a downloading culture, not a uploading culture. This disbalance culture must be minimized.There are various legal, institutional and attitudinal barriers to share the data generated from different institutions.

I think making data available online in all government agencies is still challenging as government agencies have practice of selling the data they produced. Planning in itself is all about making decisions through analysis of data so there is for sure huge prospects of open data in planning.

has huge scope to develop opendata

Digital data , editable formats