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Integrating Soft Assets in Smart and Resilient City Development in India

Keio University

Graduate School of Media and Governance

Eiko Wataya

ABSTRACT OF DOCTORAL DISSERTATION

Integrating Soft Assets in Smart and Resilient City Development in India

Building smarter, resilient cities is a global trend in urban development, including developing countries. The effects of climate change, disasters, and unexpected external shocks on cities impact sustainable growth and well-being for citizenry requiring comprehensive solutions. Most of the key investment by cities is built on quantitative hard infrastructure, with little focus on qualitative soft assets. This research argues that integrating soft assets is important making the hard infrastructure work and creating value for cities. The literature review underlines that soft capital can be defined as: 1) human, 2) Institutional, 3) external, 4) technology and information and 5) social.

This research endeavors to examine how soft assets can be effectively integrated into smart, resilient city development process and contribute to value creation. For these purposes, two cities from the India Smart City Mission were selected for comparative analysis. The proposal and implementation stages were compared to identify the different soft asset incorporation approaches.

In case of Bhubaneswar, ‘quality communications’, and ‘community engagement’ are more influential “nodes”, while in Nagpur the focus is on: ‘equal access to services’ and ‘smarter services via technology’. Recent disasters in both the cities, including floods in Nagpur and cyclone impacts in Bhubaneswar, verify these observations. The interview results showed the same strategy in each city to soft assets integration.

The research also demonstrates that using soft assets in the early planning stages and its review are key to developing an enabling environment, and institutional mechanisms such as establishing a central coordinating function, building strong capacity for retaining knowledge for strengthening institutional capacity, and ‘quality communications’ and relationships between city administrators and citizens. The process of soft asset value creation evolves organically and the effectiveness of resilience and long-term sustainability needs to be reviewed at both project level and more broadly at city-wide level.

Keywords: Soft assets, hard infrastructure, value creation, smart, resilient cities, people-centered strategies

博士論文の要旨

インドのスマート, レジリエントシティ開発におけるソフトアセット活用の重要性

都市化が進む現在、開発途上国の都市を含む多くが様々なアプローチでスマート, レジリエントシティ開発に取り組んでいる。気候変動による自然災害や想定外の外的要因は市の持続的成長と市民が住みやすい環境づくりに影響を及ぼすため、対応に向けた包括的な取り組みが求められている。こうした状況下、ハードインフラを使って市の価値創造の源泉となるソフトアセット（無形資産）を取り込むことは以前にも増して重要になっている。文献調査の結果、本研究では以下の5つのソフトアセットキャピタル1)人的資本、2)組織資本、3)外的関係資本、4)テクノロジー・情報資本、5)社会資本、を選定した。

本研究ではソフトアセットがどのような形でスマート・レジリエントシティ開発計画や実施段階で効果的に取り込まれ価値創造に貢献しているのかを検討する。この目的のため、インドのスマートシティーミッションプログラムから2都市をケースに選び、提案段階と実施段階でのソフトアセットの取り込みの比較分析を行った。

ネットワーク分析による価値創造の影響力が強いと想定された分野と、インタビューによる価値創造マッピングの結果は同様のものであった。ブバネーシュワルは‘quality communications’, ‘community engagement’、ナグプールは ‘equal access to services’ and ‘smarter services via technology’であった。2020 年のサイクロン（ブバネーシュワル）と 2020, 2021 年の洪水 (ナグプール)を見てみると、ブバネーシュワルはコミュニティーベースでの被害軽減策とレジリエス構築、ナグプールはスマートテクノロジー活用の洪水氾濫情報システムに焦点をあてた対応は市の防災分野にも繋がるものであった。またインタビューでもレジリエンスに関しては両市とも、現在そして今後の対応に関し同様の方向性が示された。本研究はスマート、レジリエントシティ開発を可能にするための環境整備のためにも、開発途上国におけるソフトアセットの早期の計画的な取り込みとレビューが重要であることを示した。そこには多様なステークホルダーの取りまとめ機関の役割、ソフトアセットを知的財産として次に繋いでいく重要性、政府とコミュニティーの質の高い関係構築等も含むことがインタビューからも明らかになった。またソフトアセットの価値を創造していくプロセスが有機的であり進化的であることも示しており、その価値は市全体としても分析していくことがレジリエンスを高め、市の持続性に繋がるということを提示した。

キーワード：ソフトアセット、ハードインフラストラクチャー、価値創造、スマート、レジリエントシティ、市民中心政策

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LIST OF ASSOCIATED PUBLICATIONS

Journal Papers

1. Wataya, Eiko, Shaw, Rajib, 2019, "Measuring the value and the role of soft assets in smart city development", Cities 94. 106-115 https://rajibshaw.org/wpRS/wp-content/uploads/2019/06/Wataya-Shaw-Cities.pdf (Impact factor 6.077)

2. Wataya, Eiko, Shaw, Rajib (2022), "Soft Assets Consideration in Smart and Resilient City Development", Defining and Debating on Smart Cities or Smart Buildings, Smart Cities Vol. 5, Issue 1, pp. 108–130. https://www.mdpi.com/2624-6511/5/1/7 (Scopus indexed)

Conference Presentations:

1. Wataya, Eiko, "Role of Soft Assets in Smart City Development: Some Guiding Frameworks", The 9th International Conference on Building Resilience and The 3rd ITB Centennial International Conference, Indonesia, Bali, 13-15 January 2020 (English, online presentation)

2. Wataya, Eiko, "Smart and Resilient city development: Looking through the lens of soft assets", IDRiM Virtual Workshop for Interactive Discussions between Senior and Early-Career Scientists, 23-24 September 2020 (English, Online)

ABBREVIATIONS

ABD	Area Based Development
BSC	Balanced Scorecard
BUKC	Bhubaneswar Urban Knowledge Centre
COVID-19	corona Virus Disease 2019
CPS	Citizen Participation Survey
EOL	Ease of Living Index
ICLEI	Local Government for Sustainability
ICT	information and communications technologies
IoTs	Internet of Things
ISO	International Organization for Standardization
MDBs	multilateral development banks
MoHUA	Ministry of Housing and Urban Affairs
MPI	Municipality Performance Index
NMC	Nagpur Municipal Corporation
OECD	Organisation for Economic Co-operation and Development
SDGs	Sustainable Development Goals
SPV	special purpose vehicle
UN	The United Nations
UNEP	UN Environment Programme
UN-Habitat	The United Nations Human Settlements Programme
UNISDR	United Nations Office for Disaster Risk Reduction
WB	The World Bank
WBG	World Bank Group

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DEFINITIONS

Soft (intangible) asset capital:

- There are several variations of the term "intangibles", i.e. intangibles, intangible assets, intangible capital, intellectual assets, or soft assets as opposed to hard assets. In this paper, the term intangibles and soft assets are used interchangeably.

Integrating (or incorporation of) soft assets:

- The decision making process by city administration and officials to use soft assets in project planning to implementation stage. In this research, "integrating soft assets" covers the following: (i) developing enabling factors and a favorable environment to utilize soft assets; and (ii) using soft assets to operationalize projects; (iii) creating value using components of soft assets. A main assumption of this research is that: (a) integrating soft assets is more effective earlier in the planning and implementation process; and (b) this value creation process should be internalized in the development process to build smart, resilient cities.

Soft (intangible) assets:

- "Soft assets" can generally defined as non-physical, but identifiable assets. Some assets can be identified directly and valued, but some assets are intricately linked to other components, including hard infrastructure and more difficult to distinguish and quantify. Often there is no clear definition and classification of soft assets and their value depends on the specific context. Thus the concept and definition of soft (or intangible) assets embrace a broad range of areas such as human resources, policy application, institutionalized processes, stakeholder networks, data, IT applications, communication, outreach public relations, community level organization, interactions with representative groups, etc. This research makes the claim that soft or intangible assets are equally important within city planning and implementation as hard or physical infrastructure to deliver quality services to citizens.
- In this research, soft (or intangible) assets refer to the following: (a) People/Human capital, (b) Institutional capital; (iii) External capital; (iv) Technology, information capital; and (v) social capital. Further details are described in Chapter 3.

Value elements of Soft Assets in smart and resilient cities:

- Due to the characteristics of soft assets (synergetic, spillover, scalability, context specific value, etc..), this research identified 9 "value elements" in smart and resilient city. These elements are core pillars of smart, resilient city development specific to this

research purpose. They are: (i) resource management: (ii) accessibility (mobility); (iii) health well-being; (iv) equal access to services; (v) smarter services; (vi) community engagement; (vii) quality communication; (viii) security; and (ix) resilience. Further details are explained in Chapter 3.

Qualitative framework for identifying soft asset consideration

- To identify and analyze the process of value creation within city development activities, a soft asset identification tool with 45 items was developed based on nine (9) elements and five (5) soft asset capital components. Further details are explained in Chapter 3 and the results of the use of the tool is set out in Chapter 5.

Influential (large) nodes

- "Influential (large) nodes" are soft assets components that create value and more commonly utilized than other elements. Large nodes are composed from smaller nodes (represented by activities, initiatives) that are associated with elements of soft assets. These nodes are identified by network analysis.

CHAPTER 1: INTRODUCTION

1.1. Research Background

Developing countries[1] have their own development vision and objectives. Cities as a growth engines of socio economic development, however, face challenges in the context of globalization. Following global trends and endeavoring to find optimal solutions to address the challenges, many cities are focusing on building smarter and resilient cities. Although there is no single cohesive definition of a smart, resilient city, essentially it is an urban spatial concentration where efficient cutting edge technology is employed to improve city administration and enhance the convenience, well-being and lives of its citizens.

Rapid urbanization is inevitable. Globally, the urban population is about 4.3 billion or 57% of total population 7.84 billion (2021) (World Bank (WB)). By 2045, the world's urban population will increase by 1.4 times to 6 billion and by 2050, about 7 out of 10 people will live in cities. Effective and sustainable cities need to provide basic services, infrastructure, affordable housing and a better livable environment for their citizens. This is more critical in developing countries which face rapid population growth and higher population density, overcrowding and ensuring effective use of limited resources. In addition, the speed and scale of recent climate change is unprecedented, frequency of disasters, and unpredicted crisis such as recent Corona Virus Disease 2019 (COVID-19), cities need to explore their own paths to build a healthy, safe and sustainable urban environment.

As urban populations have dramatically increased, building smart, resilient cities is an accelerating global trend. The goal of a smart city is to use its resources more efficiently, generate lower emissions, reduce carbon footprint, and environment impact (European Commission). Cities also need to prepare for global climate issues, disasters, pandemics. ICLEI-Local Governments for Sustainability described the situation as follows: "a resilient city is prepared to absorb and recover from any shock or stress while maintaining its essential functions, structures, and identity as well as adapting and thriving in the face of continual change…". Smart and resilient city strategies can have two different focuses: reducing environmental load and strengthening adaptation and transformation. The integration of smart and resilient city approaches is relatively new concept. Both approaches are mutually complementary to address the complexities of the situation (Baba and Tanaka, 2015). But at the same time, the evolution of an integrated approach toward "smart

[1] Developing countries refers in this research countries classified under its lending groups namely International Development Association (IDA) eligible countries, International Bank for Reconstruction and Development (IBRD) eligible countries, and Blend that IDA-eligible but also creditworthy for some IBRD borrowing.

and resilient city' is to further enhance resilience capacity in the process of overall smart city development (Papa, et al. 2015). From these perspectives, therefore, smart city approaches have become more important than ever before.

Smart city approaches are often discussed around two major dimensions. One is an ICT technology-oriented approach (including technology embedded in hardware) and the other is a people-centered approach. Another perspective focuses on top-down and bottom-up initiatives (Ahvenniemi, et al, 2017) that used to improve relationships between people and government (WB, 2015). There are also differences between hard versus soft infrastructure-oriented strategies and the interlocking relationships between each approach (Angelidou, 2014).

To avoid critical risk, city dwellers should not be left out of the development process by an excessive IT-led hard-oriented approach. Often technology-centered development risks ignore the most critical element– community integration to ensure the welfare and well-being of citizens (a combination of bottom-up and top-down approaches). Planning and successful implementation of smart city projects requires extensive citizen and stakeholder engagement and technical expertise, adoption of sound policies, strategies, and institutional arrangements. In addition, effective connections, networks, and communications with local communities are key to enable cities to build better and more livable urban and city environments.

Cities can obtain substantial benefits for smart projects by operationalizing technology, establishing enabling factors and utilizing soft assets. Moreover, with current global challenges, including climate risks, disasters, pandemics, and other unexpected external shocks, a sustainable smart, resilient city seeks to achieve more effective use and integration of a range of soft assets to build city resilience in parallel with hard, critical infrastructure. In this way, greater use of soft assets create new values for communities and society.

However utilizing soft assets is more difficult because they are intangible, indefinable and often defy qualities of ownership (Haskel and Westlake, 2018). They are usually discussed at a broader city development context, but not always systematically applied at specific local project level and at community level. Furthermore, the soft asset value creation process is not always understood and integrated within the city development process more broadly at city-wide level.

In developing countries, especially, priority is often given to basic infrastructure to provide essential services to citizens. Soft assets that can strengthen enabling factors and operationalize hard infrastructure tend to be secondary as this involves less rigorous institutional delivery, limited budget, lack of strategic approaches, awareness, knowledge or understanding of how soft assets with their value creation potential can assist both local authorities and the community. As a result, more often planners find it difficult to incorporate soft assets into the granular nature of both city

development overall and within specific infrastructure projects in their development planning strategies.

1.1.1.Soft (intangible) assets as a driver for value creation

This research examines how soft assets can be effectively integrated into the smart, resilient city development process, contribute to value creation, and promote livable and sustainable cities. For these purposes, two cities from the India Smart City Mission were selected for comparative analysis. The proposal and implementation stages were compared to identify the different approaches to incorporating soft assets.

The value-added of soft assets has long been recognized. For the development paradigm of the 70s and 80s, the importance of the knowledge-economy was dominant (Miyakawa, Kim, 2010). During this period, several variations of the term 'intangibles' developed, i.e. intangible assets, intangible capital, intellectual assets, or even soft assets and these "intangibles" were contrasted with hard assets. The term "intangible" or intangible assets is usually closely associated with the field of accounting, finance and, organizational management. These terminologies represented an attempt to develop a new model of economic growth incorporating technological development, as well as to encompass new asset classes such as knowledge, collaboration and information. Intangible assets gained increasing attention in the late 90's when information technologies began to emphasize the importance of economic growth resulting in productivity gains (Miyakawa and Kim, 2010). In the business context, the change established that long-term expenditure influenced positive economic growth. Also researchers, policy makers and practitioners concentrated on areas such as accounting, business strategy, management, and investment.

As a result, the concept of intangible assets has become broader, more valued and used beyond the business or financial context. And more recently the concept has been applied to public sector organizational environment (Kaplan, 1999). Hence the public sector concept can be applied to both urban development and the management context. Categories of soft assets not only refer to technological innovation, but also embraces creating value and sustainability through strengthening relations between city authorities and citizens, creating viable communities, outreach and performance feedback loops.

1.1.2.The importance of soft assets for smart and resilient city development

In developing countries, urban development is largely focused on providing basic infrastructure to improve services to citizens. The level of infrastructure implemented depends on the status of development in each country. Developed countries implementing smart city policies can employ

the most innovative approaches based on their existing infrastructure, technologies and available resources. By contrast, developing countries, with their technology and resource limitations, have to cope with rapid urbanization, overcrowding and infrastructure modernization at the same time.

One of the approaches adopted in Japan is called 'contextualization' or 'personalization' which provides customized services and information to help citizens better address disasters. (The Centre for the Fourth Industrial Revolution Japan) Here a smart city authority (or town management company) will take residents' views into consideration, incorporate new services and technologies and continuously support the sustainable evolution of the city (or smart town) (Fujisawa SST Council, 2018). Such personal targeting and feedback systems in place is one of the major factors contributing to improving city livability and citizen satisfaction. This approach is feasible because solid infrastructure and environmental enhancements leverage the advantages of existing technology. Early incorporation of these approaches into city planning are more effective. But this does not always occur in practice in developing countries as citizen debriefings or pre-consultations are difficult to implement and facilitate due to lack of human resources, as well as level of citizens' awareness regarding potential involvement in planning and decision making.

Soft assets as invisible assets

The value and impact created by soft assets through synergetic, spillover and scaling up effects was always unpredictable and difficult to quantify (Haskel and Westlake, 2018). This phenomenon creates a sense of 'risk of the benefit of spillover' (unanticipated benefit) for decision makers. The key point about soft assets is to support the visible part (exposure part = hard infrastructure), but is to be implemented invisibly (hidden part = soft assets), shown in Figure 1 below. These can also be enabling factors and the details are discussed in Chapter 3.

Another example is to show the support to developing countries provided by multilateral development banks (MDBs). One of the financier groups of developing countries such as MDBs have continued to support the individual and institutional capacity of developing countries through strengthening their capacity development, and country systems to strengthen governance. MDBs support best ways to advise on promoting good governance, strong fiduciary systems, institutional capacity development. They also support development projects by advice on minimizing transaction costs for local authority or project implementing bodies. Providing solutions, knowledge and performance and impact evaluation are central to the work of MDBs in their support to cities in developing countries. Within the MDB portfolios, a sound body of knowledge, solutions, and best practice for city administrations implementing urban development is becoming mainstreamed.

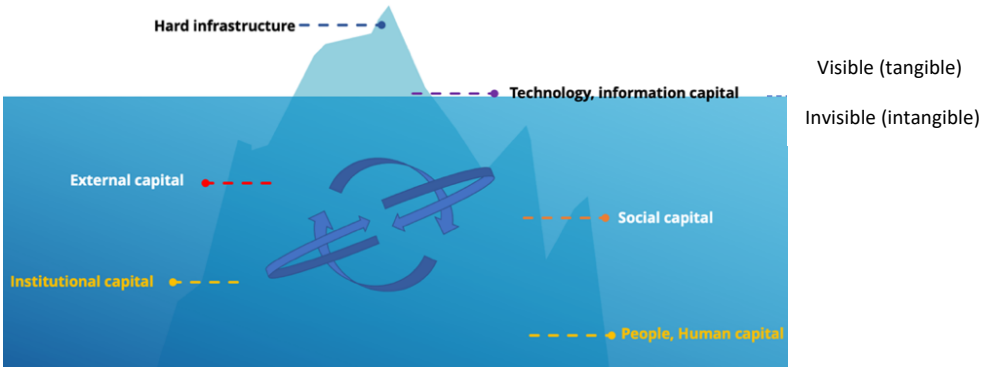


Figure 1: Visible and invisible assets

The importance of soft assets can also be explained in terms of the public sector value creation model developed by Kaplan and Bower (1999). Optimal urban development requires an increase of city level social, economic, and environmental performance. To achieve the mission (highest goal of the public sector) by local authorities, they have to provide effective, efficient, and quality services to citizens and stakeholders. This is achieved by city decision makers implementing the correct balance between hard infrastructure and soft capital development. Cities are also constrained by budgetary factors, the correct policy and regulatory mix, and the level of motivation of policy and decision makers, administrative systems, and staff to efficiently manage and operate the city. To achieve optimal outcomes, the part in the Figure 1 which is hidden can produce enabling factors. This will be discussed in more detail in Chapter 3 and Chapter 6.

1.1.3.Value creation process

Despite the importance of early soft asset incorporation, a major drawback is evaluation and measurement of soft asset integration. It is challenging due to their different features. For instance, it is similar to a black box where clear causal relations and attributions, or linear linkage between inputs and outputs are not immediately obvious (Figure 2). Also soft asset attributions to outcomes are lower at the outcome level (an orange triangle to the left-hand side), but the level of value creation will be higher (an inverted triangle to the right-hand side).

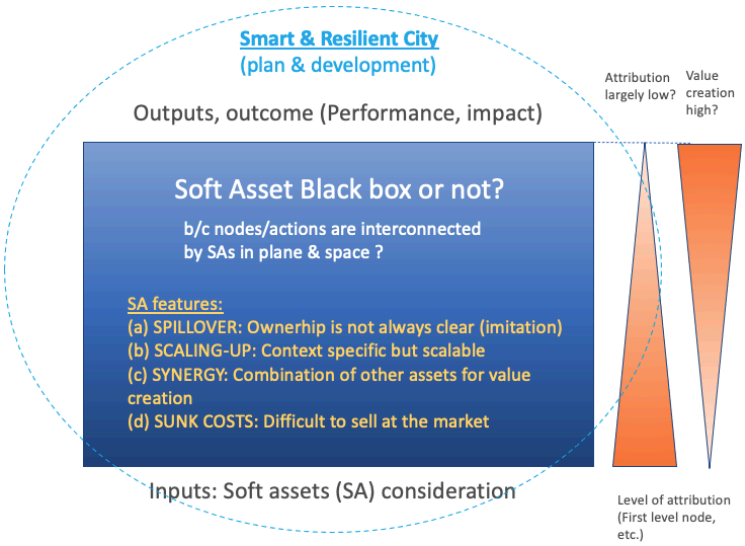


Figure 2: Soft assets in smart and resilient city

From these characteristics listed in the blue box, the value creation process is very complicated and often difficult to observe or measure in projects, activities, and the citywide level. Having said that, it remains important to understand the value creation process (= the contents inside the black box) to understand and internalize the process in planning and implementation. This point is discussed and further developed throughout this research.

The importance of understanding comprehensive perspectives to examine soft asset value creation can be gleaned from existing research. This includes guiding theories relevant to identifying soft assets and their value creation. Jiang and de Rijke (2021) explained the idea of a 'Living structure' that was originally promulgated by Christopher Alexander. They explain how notions/images, such as 'beauty', are largely judged in a subjective way, but also can explained objectively (Jiang, Rijke, 2021). Jiang also explained concepts, such as wholeness, '. . . which can be defined mathematically. It exists pervasively in our surroundings; in an ornament, in a room, in a building, in a garden, and in a city'. Alexander previously referred to this phenomenon as the 'quality without a name' (2019). Beauty and the ideas of living structure and wholeness are very similar to how soft assets can be understood, considered and evaluated. Using the concept of living structure referring to Jiang's study, soft assets should also be considered and assessed not by a static structure, but also through an organic process where value emerges and assumes it happens as in Figure 2. Black box. Such an organic process is similar to the living structure idea because, in context, soft assets create specific values by synergetic, spill over, and scaling up effects. There are two fundamental governing laws of the living structure concept. First is a scaling law that groups 'far more small things than large ones'. The second is Tobler's law which states that everything is related to everything else, but near things are more related than distant things (Jing, 2019).

Regarding wholeness, as Jiang also clearly explained in his examination of the living structure concept, '. . . the evolution process is not simply about adding new centers' more correctly, centers are induced by the wholeness. In other words, it is not correct to say: a whole comes from its parts, or a whole consists of parts; it is the wholeness that induces the centers to generate a coherent whole.' (Jiang, 2019). This argument can support the assumption that the values of a soft asset should be considered not only at individual activity and project levels, but also at the more comprehensive citywide level, if they have similar structures to what Jiang and de Rijke explained as living structures.

1.1.4. Incorporation of Soft assets: challenges and rationale

Rapid urbanization, climate change, disasters and other unpredictable risks require solutions in smart, resilient city development. The city's higher level of effective and efficient, provisions of services are created by an appropriate balance between soft assets and hard infrastructure investment. There is no one-size-fits-all approach but in general, three points in the circle below can be key approaches: (i) strategic & systematic soft asset consideration at an early stage; (ii) realistic balanced approach to meet each city's development focus; and (iii) institutionalizing soft assets management mechanisms for long-term sustainability. This includes integrating the soft asset value creation process in the development process. But there are also challenges to establish the approaches above and some are inherent to the process. This research endeavors to propose a value creation system at city level to enhance these approaches.

In order to do so, the research summarized in the next chapter will review four topics in depth: (i) urbanization; (ii) integration of smart and resilient city; (iii) the state of developing countries' smart city development challenges; and (iv) defining soft assets. Then, to understand what happens at city level, the research uses two case studies from Indian cities which implemented smart city policies. The case of India is a very useful model to examine. India has implemented one of the most extensive national smart city programs to deal with 'urbanization' by modernizing its infrastructure. Soft assets are proactively incorporated within this process and lessons can be learned from the experience of this highly populated country whose projects deal with both 'modernization of infrastructure' and 'urbanization' on a massive scale. Figure 3 below summarizes some of the challenges and rationale for soft asset incorporation.

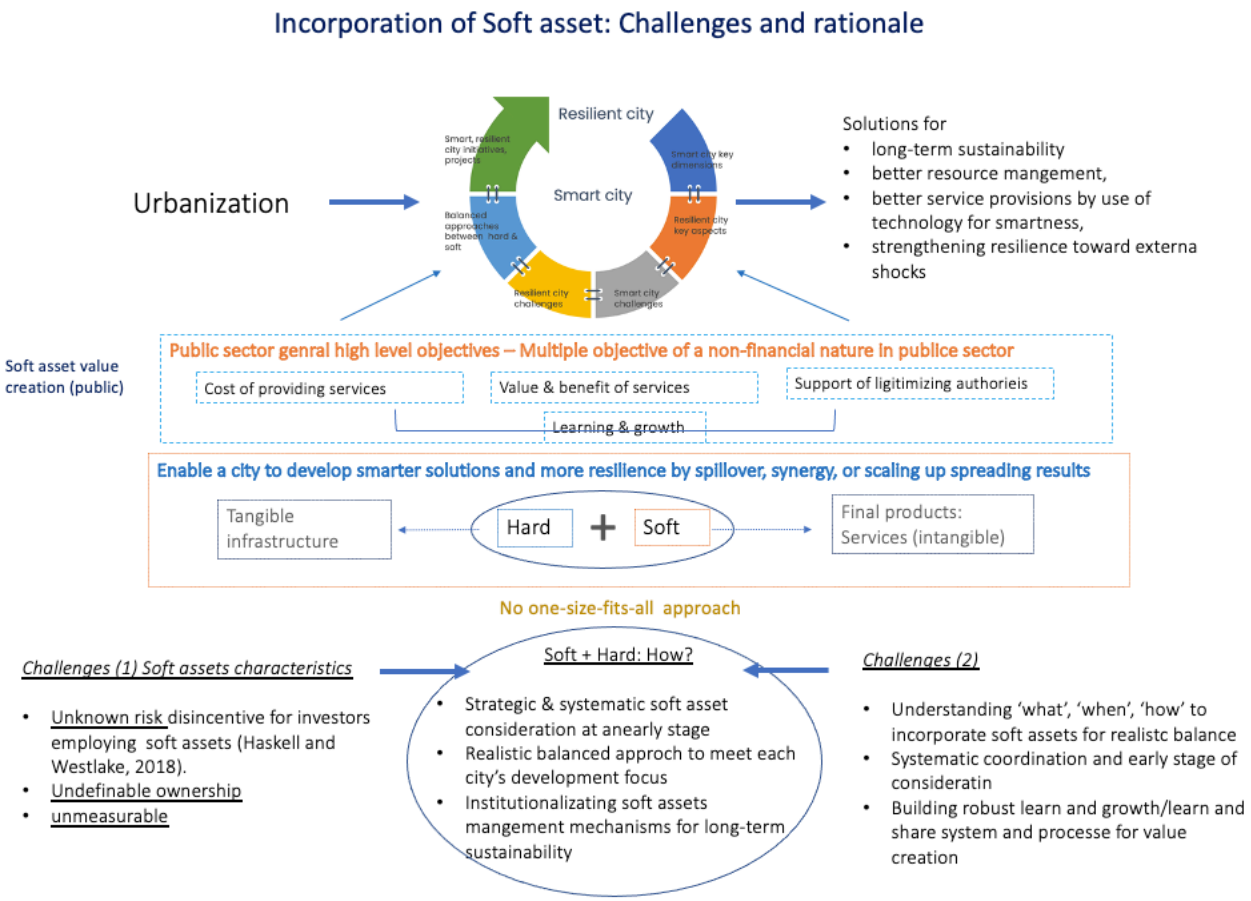


Figure 3: Incorporation of Soft assets: challenges and rationale

1.2. City case studies in India

Two Indian cities were selected as case studies from the India Smart City Mission Program to demonstrate how soft assets were incorporated into the planning process of developing country cities, namely Bhubaneswar and Nagpur. As background, the India Smart City Mission was launched in 2015 by the Ministry of Housing and Urban Affairs of Government of India to drive economic growth and improve the quality of life of people combining a two-level approached: area-based needs-focused development, and application of smart solution and technology at city wide level that leads to Smart Outcomes (Ministry of Housing and Urban Affairs, Government of India).

The lessons learned from these two Indian cities can be scaled up and applied to other Indian cities and more broadly. India is the 7th largest country in the world with 35% of total population or about 494 million people living in urban areas in 2021 (Figure 4(a), (b)). Basic infrastructure has

failed to keep up with the rapid population growth (Tripathi, 2017). The provision of basic infrastructure services is a high priority and, within the context of environmentally-friendly smart city development, mitigation of climate risks, disaster prevention and response, and improving city resiliency as a whole are also critical factors in the India Smart Mission.

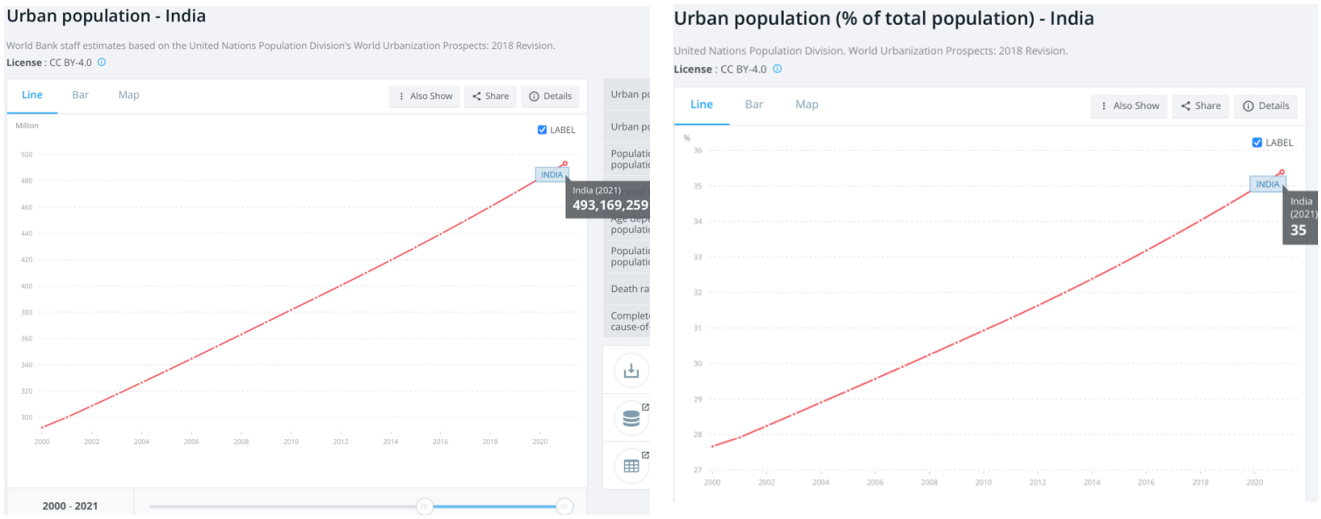


Figure 4 (a): Urban population - India,
Figure 4 (b): Urban population (% of total population) - India
(Sources: WB, https://data.worldbank.org/indicator/SP.URB.TOTL?locations=IN
https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=IN)

Each city demonstrates the value and best practice of India's Smart City Mission program: both ranked very high in the Government of India's Ease of Living index 2020 (Ministry of Housing and Urban Affairs (MoHUA), Government of India) (Bhubaneswar: Rank 2 in 'less than million category'; Nagpur: Rank 25 in 'Million+ category'); each city has a different vision and focus for smart city development; each city has different climate and geological profiles which enables comparison of different resilience policies and results. As both cities also have higher scores than the national average of the Citizen Perception Survey (CPS) score.

According to the EOL, the CPS 'acts as an instrument to validate the citizens' experience in service delivery and assess whether it is congruent with the Ease of Living Index findings. Although the scope of the survey is not exactly the same scope of India Smart City Mission (Pan and Area based development), it is a valuable starting point to investigate soft asset integration within the city.

Nevertheless each city still has a positive score and are excellent cases to research, better understand and examine: (i) how city planners and stakeholders make decisions to incorporate soft assets during planning and implementation of the Smart City Mission; (ii) how a balance

between soft and hard assets is achieved and; (iii) how incorporating soft assets creates value, impact and enhances the functioning of the Smart City Mission.

1.3. Research objectives

The purpose of this research is to better understand how smart, resilient cities decide to utilize soft assets along with hard infrastructure to make cities more efficient, resilient and livable for their citizens. It is important to define the nature of soft assets and assess the criteria and influences on decision makers, city planners utilizing them.

Data and research from two Indian smart city case studies are reviewed to better understand how soft assets are used systematically by city authorities and stakeholders in the various planning and implementation stages.

The overarching hypothesis is that consideration and utilizing soft assets in the early stage of planning and implementation provide a greater contribution to the long term development of the city as well as deliver a higher level of services to its citizens. To meet the three challenges mentioned earlier, effective implementation requires "building effective relations between government and community", a "robust institutionalized system of monitoring, evaluation", and "creating a feedback system".

This research has three objectives:

Objective 1:
Using previous research, to examine the approaches to measuring intangible assets and identify two key factors supporting integration of soft assets: (i) key soft asset capital; and (ii) the value elements of soft assets in smart and resilient city development, and key bottom-up and top down elements essential to create value.

Research questions:
What can be learned from past studies and research about the benefits of soft assets? What approaches or models underscore the value of using soft assets?

Justification:
The models will be a basis for evaluating soft assets value elements in smart and resilient cities and clarify how their value is generated using which key value creation perspectives.

Objective 2:

To examine how smart and resilient cities make decisions to incorporate soft assets in the planning stages by developing qualitative tools and applied to selected city cases for identifying potential influential value creation areas.

Research questions:
Using the concepts of soft asset capital and value creation model, how is utilizing soft assets consistent with smart and resilient city objectives?

Justification:
There is an important linkage between deciding to use soft assets with their capital utility and their value-added. These need to be aligned with the city's development objectives. This linkage can be examined by reviewing separately the value creation of each element.

Objective 3:
Examine how soft assets can be more effectively integrated and utilized to create potential values leading to effective resilience and long-term sustainability.

Research questions:
What are the perspectives of city stakeholders toward soft asset consideration and how do decision makers and city planners find good entry points to incorporate soft assets and integrate a value creation process in the smart, resilient city development process?

Justification:
Directed identification of influential nodes to understand different approaches by each city on integrating soft assets and verify them by survey and additional research. By doing so, (i) understand how values are created or could be created that could help to integrate process in planning and implementing stage; and (ii) discuss the importance of holistic city level examination and propose possible value creation modes from the lens of soft assets.

1.4. Research approaches and methodology

This research used qualitative methods to examine and analysis to interpret the material information and data.

Literature review

A major literature review focuses on intangible asset management in both the private sector and public sector contexts.

The different approaches to identifying and measuring intangible or soft assets by leading researchers and practitioners in published articles, publications, thesis, and relevant websites are reviewed and critically evaluated. Corporate precedents were used to identify and select five types of soft asset capital and nine elements of value creation that can be adapted for utilization by smart and resilient cities. They were also used to develop a tool for identification and evaluation (consideration) of soft assets under objective 2.

Development of a tool (qualitative framework) for identification and adoption of soft assets incorporation and application of the tool to the smart city proposal (desktop research)

A major focus in developing the tool was to calibrate soft asset consideration in the planning stage of India smart city mission of two case studies.

A tool was developed to identify how two smart Indian cities prioritize utilization of soft assets specifically within their city development proposals (from India Smart City Mission). During the India Smart City Mission, two cases are examined about how soft assets were incorporated. The case assessment was conducted through:

Visualization of application results by an open source tool (Cystoscope)

Major focus is what assumptions the visualization can reveal and discuss how they can be translated in terms of value creation by soft (or intangible assets).

The case assessment was conducted through open source application. The level of soft assets consideration in nine elements of value creation (connection or network) can be identified and analyzed in terms possible greater influence over the connection (or network) structure. The analysis is assisted by referring to the theories of 'living structure and its fundamental laws; (Jiang, 2019)

In-person interviews

Face to face interviews reveal how the local city officials actually make decisions about incorporating soft assets systematically in planning and implementation stages from cases in India.

Building on the outputs and assessment of Objective 1 (identification of soft assets capitals and their value elements) the value proposition for soft assets and Objective 2 (preliminary examination of how decisions to incorporate soft assets are made), Objective 3 seeks to conduct interviews of relevant stakeholders to examine:

How influential value elements interact with other factors in the development process; and Cities' implementation and perspectives on the proposal (plan) and current levels of utilization in the decision-making process. Interview and comparative research was conducted to develop a reliable approach to assess how soft assets are used and valued by city decision-makers.

1.5. Structure of the Thesis

The thesis consists of seven chapters, including case studies from two Indian smart cities. The outline is as follows:

Chapter 1. This chapter briefly describes the key background points of this research. Starting with the challenges created by urbanization, importance of integration of smart, concept of resilience, the importance of soft asset integration for sustainable smart resilient city development by explaining the 'Blackbox' concept.

Chapter 2. Though the literature reviews situations where soft assets are considered important to support smart, sustainable city development, this chapter describes smart, resilient city development that focuses on risk and crisis prevention for building sustainable cities. Smart city trends in developing countries are also examined. Key pillars of smart cities are also discussed as well as aspects of soft assets for sustainable city development.

Chapter 3. This chapter continues the literature review with a focus on describing soft assets and value creation approaches used within the private sector context. It also examines how soft (intangible) assets are evaluated by previous research and uses them as a reference to identify five soft asset capital components and nine key core value creation elements to develop a qualitative tool for identification of the level of soft assets incorporation in smart, resilient city development.

Chapter 4. This chapter describes the Smart City Mission program by India for urban renewal and retrofitting and highlights its unique approaches and implementation arrangements. Two cities were selected – Bhubaneswar and Nagpur. This chapter also reviews the Government of India's indicators – "Ease of Living" (EOL) and "Municipal Performance Indicator (MPI) that are comprehensive references to evaluate smart city performance.

Chapter 5. This chapter presents a comparative case analysis of the level of soft assets incorporation between the proposal and implementation stages by use of connection analysis (desktop) and in-person interviews. This examines the value creation influential nodes and actual actions taken by cities. This chapter also endeavors to illustrate examples of the value creation process using a visual mapping approach. Community engagement and using consultations to improve the quality of communications are also reviewed based on the survey results.

Chapter 6. Based on the findings in the previous chapters, this chapter discusses the timing and approaches for effective integration of soft assets in smart, resilient city development and examines some appropriate cases from the interview responses for addressing soft assets, then proposes several options including institutional arrangements to achieve long term sustainability. This chapter also raises the importance of the perspective of "wholeness" to map the quality of a whole city context. With this foundation, the co-value creation model is proposed.

Chapter 7. This chapter summarizes the research findings and suggests directions for future research.

CHAPTER 2: LITERATURE REVIEW

Though the literature reviews situations where soft assets are considered important to support smart, sustainable city development, this chapter describes smart, resilient city development that focuses on risk and crisis prevention for building sustainable cities. Smart city trends in developing countries are also examined. Key pillars of smart cities are also discussed as well as aspects of soft assets for sustainable city development.

2.1. Urbanization, prevention of crises and building resiliency

In recent years, urbanization has gained pace and has led cities to become socially, economically, and environmentally sustainable. The urban population is about 4.43 billion or 57% of total global population of 7.84 billion (2021). By 2045, the world's urban population will increase 1.4 times to 6 billion (WB) (Figure 5 (a), (b)).

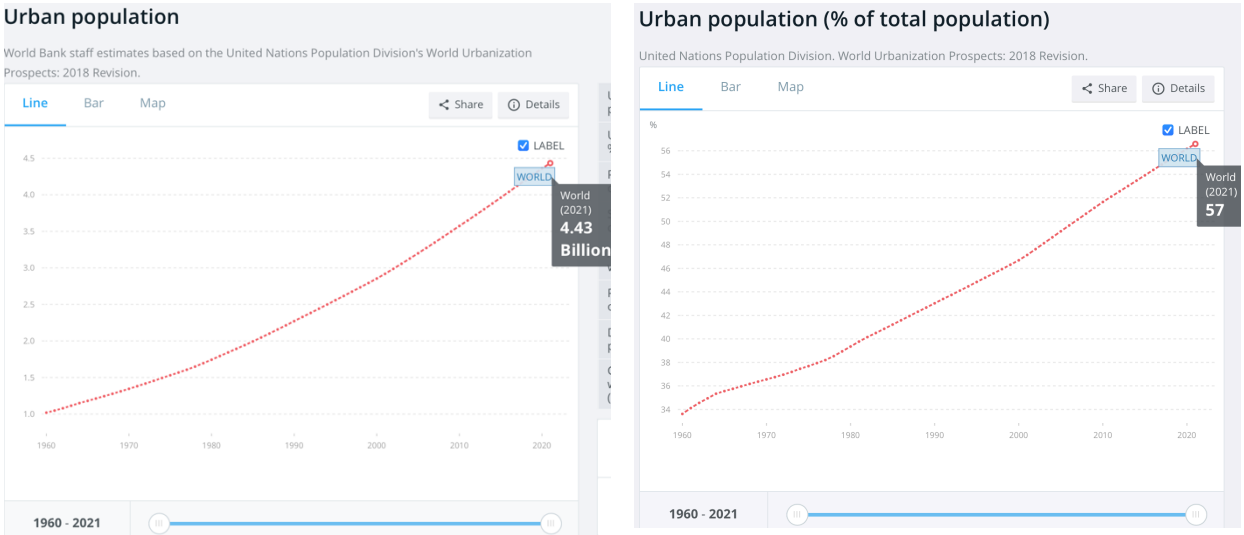


Figure 5 (a): Urban population; Figure 5 (b): Urban population (% of total population) (Source: WB Data, https://data.worldbank.org/indicator/SP.URB.TOTL, https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS)

Rapid urbanization places great strains on service provision, and has resulted in a growing number of slum areas (United Nations (UN) Sustainable Development Goals, Goal 11 Make cities inclusive, safe, resilient and sustainable). However, cities are potential powerhouses of economic growth, and seek to provide opportunities for its citizens, jobs, economic development and better living standards. Migration of people into cities, growing economic development and industrialization create greater population densities and congestion (Hayat, 2016). These rapid population increases have created challenges for cities which frequently lack resources and suffer environmental deterioration.

The World Health Organization report (World Health Organization, 2021) indicates that from 2015 to 2020, the number of people without properly managed services actually decreased by 225 million in rural areas, but increased by 32 million in urban areas. Rapid urbanization also contributes to key global challenges such as global warming and climate changes. From 1970 to 2010, greenhouse gas emissions rose from 30 tons to 50 tons (Asia-Pacific Economic Corporation, 2020)

Greater use of resources and increased waste generation resulted in serious ecological consequences locally (urban center), regional (resource and waste flows from urban to the wider area), and globally (in regard to climate change, etc.) (Satterthwaite, 2011). Satterthwaite also argued that not only urbanization alone created these outcomes, but also responsible were higher levels of consumption patterns and lifestyles by middle and upper income rural inhabitants.

Crisis, Risk, Resiliency

Crises and disasters occur at any time and at any level of society. They are part of life and need to be managed appropriately to mitigate impacts and maintain or build a better environment to mitigate future crises and risks. On this issue, Michelle (2013) aptly summarizes as "..strengthening the resilience of people and the state to shocks and stress could help protect lives before a crisis hits, reduce potential economic losses, and empower people to take better decisions about the risks.."

The concepts of urban resilience can be examined over different development stages. Kong et al (2022) divided it into three states: first, engineering resilience requiring a sound physical system. Secondly, ecological resilience suitable to protect the ecosystem. Thirdly, evolutional resilience which covers long-term development by constantly adjusting its economic, social and political structure to adapt to frequent disequilibrium. This explains the evolution of a broken system and emphasizes the adaptability of the cycle of innovation and learning. This is widely used for the application and practice of resilient theory (Kong et al, 2022). In other words, resilience has an

organic feature which can be transformed and greatly improved by inputs from innovation and learning.

This concept supports cities seeking to achieve the resilience from increased risks from extreme weather, disasters and other external shocks. Economic activities and industrial revolutions associated with the greater use of fossil fuels increase in emissions of carbon dioxide (CO2) causing global warming and climate change. Disasters have increased more than three times from the 1970s and 80s (Food and Agriculture Organization of the United Nations, 2021). Also, cities that were poorly planned and developed resulted in inadequate management of rural-urban migration, lower job creation and poor services reducing citizen's well-being and making the city more vulnerable. Cities reduce vulnerability by improving resilience and mitigate risk by employing smarter solutions to address these urban challenges.

Resilience is not only associated with events such as extreme weather, disasters or rural-urban migration. In recent years, the impact of multiple crises like the Corona Virus Disease 2019 (COVID-19) pandemic, climate change, disasters, conflicts, including the Russian invasion of Ukraine, have placed severe strains on cities. In developing countries, COVID-19 had an major impact on the poorest communities. Hunger and death will continue to increase significantly in urban areas if nothing is done to feed the poor (UN Sustainable Development Goals). In parallel, the associated economic effects has led to higher inflation, and recessions (WBG. 2021, 2022).

Different types of natural or man-made disasters or crises have caused significant damage to people's lives, loss of assets, property and socio-economic disruption. Seeking new approaches to resilience is key to address unexpected events beyond municipal control. An OECD paper highlighted: 'National, regional, and local governments find they cannot count on following a straight or line as a course of policy action to manage, exit and recovery from the crisis.' One of the report recommendations underlines the importance of regional policy to build more resilient communities and better address future shocks by re-evaluating policy objectives including urban and rural equilibrium, the climate imperative, the digital divide, the balance between tangible and intangible assets (infrastructure such as broadband, public transport, and social housing, R&D, innovation), citizens' well-being, and the importance of supporting culture (Organisation for Economic Co-operation and Development (OECD), 2021).

2.2. Different Approaches to Smart, Resilient Cities Development

The sustainable city growth model provides solutions to address urbanization challenges. However, the model has certain contradictions. It aims to achieve socio-economic growth and well-being by using natural resources and services for development in a sustainable manner, enabling future generations to be able to meet their resource needs. Also, to manage a greater level of inputs (i.e.

people, services, resources, data, etc.) with fewer resources in a smarter way, using information and communications technologies (ICT) linked to hard infrastructure strengthens city development, but there is often a digital divide in many cities (Shin, et al. 2021).

2.2.1. Smart city: Definition and approaches

The concept of an optimal "smart city" has no common definition in research or practice. The World Development Report (WB, 2016) definition is 'a city that leverages the latest in technology and connectivity to make better decisions and achieve the urban aspirations of its residents.' The European Commission definition: 'A smart city uses its resources more efficiently, with less emissions and carbon footprint, minimizing environment impact (European Commission).

In the example of Japan, the Prime Minister's office explains its smart city's characteristics as 'solving global issues such as the Sustainable Development Goals (SDGs), etc. through Japan's society 5.0' (Prime Minister's Office of Japan). Smart cities are also providing services tailored to individual citizens using new technologies and various types of data from the public and private sectors and upgrading management in various fields, continues to create values and sustainable cities and regions that are not limited to 'urban' initiatives, but also includes regional development.

Japan's smart city framework involves three pillars linked to its urban infrastructure development, namely: (i) eco-cities (environmentally symbiotic cities); (ii) Transit-Oriented Development or TOD; and (iii) Building Disaster-Resilient Cities (Resilient Cities). They underline the strategy for data-driven cities. In parallel, Japan focuses on a human-centered society ('Society 5.0') using digital tools to solve socio-economic issues to improve urban infrastructure. The strategy reflects and combines Japan's competency in quality infrastructure and advanced digitization to build smart cities which are more inclusiveness and conducive to business to create growth with openness and transparency as the central principle and concept (Prime Minister's Office of Japan).

What is the core concept of a smart city? It remains highly heterogeneous, but most of the studies conclude that cutting-edge technological applications are the most important components in smart city development to create urban efficiency. Use of technology and real-time data provides a smart city with innovative solutions for the many socioeconomic and environmental challenges it faces. (Tan and Taeihagh, 2020).

Diverse approaches

As well as there being no common definitions, there are also different approaches to designing and implementing smart cities. There are two main dimensions in the evolution of the smart city concept. Review of empirical studies varied from policy level examination and implementation

and challenges, smart city framework, indicators to evaluate performance to high end technology, Internet of Things (IOTs), big data, artificial intelligence, risks in technology integration (involvement) in smart city development (Neirotti, 2014)

One is the ICT and technology-oriented approach (hardware) and the second is a people-oriented approach. Today smart technology-linked hard infrastructure (referred to in this research as 'hard infrastructure[2]) is implemented by the government through community mobilization and applied to enhance the daily lives of citizens. Another perspective focuses on top-down and bottom-up initiatives with the objective of improving relationships between people and government (Neirotti, 2014, Angelidou, 2014) and also differentiates between hard versus soft infrastructure-oriented strategies and the interlocking relationships between each. ICT-integrated hard infrastructure is not sufficient alone and is ineffective without soft assets to deliver outputs and ultimately services to city dwellers. Moreover, hard assets alone do not define a city; it is the participation of people and other enabling factors that are vital. Some major different approaches are briefly explained below.

Hard infrastructure, technology-centric: A smart city needs to distribute limited resources in an effective way and the use of innovative technology for smart infrastructure is indispensable. Smart solutions contribute to making people's life more convenient. However, an exclusive focus on hard infrastructure and technology risks ignores the most critical element – community integration and acceptance to ensure the welfare and well-being of citizens.

In the smart transport sector in Japan for example, collecting and translating large amounts of data are utilized to improve city traffic operations. These include mobile-based ITS solutions, including provision of real-time data for public transport services and assuring public security. In smart solid waste management, the IoTs enables tracking waste in South Korea using radio frequency identification to locate and track containers, identify waste, and verify services. In smart renewable energy, mini-grid renewable energy in Sri Lanka, village hydro helps the provision of electricity and socioeconomic improvements in rural areas through PV, hydro, wind, and biomass renewable energy technologies. In smart water management, smart sensors to detect available drinking water is used for efficient water management in Mexico, there are a few examples among many other areas where smart technology provides significant benefits (Wataya, Shaw, 2019).

People, human-centric: The importance of human and social capital needs to be highlighted and emphasized, since smart city development relies on a variety of resources, along with innovative and creative approaches to customize a city to build robust social systems for its citizens.

2 'Hard infrastructure' means ICT-integrated physical infrastructure since today, most of physical infrastructure are linked to technology

Technology or digital transformation is very important for smart, resilient city development, but the approach needs to engage all residents and urban stakeholders with city authorities (The United Nations Human Settlements Programme (UN-Habitat), 2020). Some major arguments are listed below. First, this is because hard infrastructure comprises 'tangible (physical) assets' where investment returns are easily measurable. However, hard infrastructure alone cannot deliver optimal "people-centered" services without human/institutional and other non-physical assets. Second, new gimmicky technologies are an easy investment choice for city authorities. However, hard infrastructure is not always appropriate for many city contexts due to different development objectives, strategies, and resource constraints, including capacity gaps for planning, managing, operating, and improving city performance. Third, digital technologies have significant potential for sustainable urban development. Therefore, smart cities can provide a solid basis to improve people's lives and build city systems that effectively serve their communities (UN-Habitat, 2020).

There are some examples where cities can improve living environments without depending on high-end technologies or newly fashionable hard infrastructure. One example is Amsterdam (Wataya, Shaw, 2019), where the city has incorporated climate proof infrastructure by prioritizing non-motorized, and public transport, permeable green paving, park and recreational space offering additional benefits for water drainage and improving air quality. Another example is Paris, where old buildings have been converted into multi-purpose use such as providing office space for social enterprises, sharing workplaces, or using public space for both residents and tourists. All of these facilities aim to make a city more livable and provide a human environment for citizens. Hard infrastructure and technologies are embedded in the social fabric and used to improve human interactions, bring citizens together, solving problems, and reducing barriers to access resources.

One example from Japan, Kakogawa smart city, Hyogo prefecture, illustrates a citizen inclusive approach in its smart city planning stage. The city used a communication technology platform as a central tool to tackle safety and security issues to make the city a 'town chosen by the children-rearing generation' based on Kakogawa City Town, People, and Work Creation Comprehensive Strategy. Kakogawa-city launched the project called 'Kakogawa City Project' aiming to solve regional issue to improve citizen satisfaction and quality of life. The city uses a data platform to collect feedback from various areas for analysis. It builds an initial system in which various stakeholders can participate. The city is promoting a project to examine the best way to create a smart city by proactively engaging citizens. The collected open data is used for the administrative information dashboard and the application called 'Kakogawa App' for smartphones (Cabinet Office, et al., 2021, Fusa-Net, 2020)

Other cases also show how people are factored into different levels of smart city development and also how local authorities pave the way for the public to contribute to innovative solutions to improve quality of life and services. Nigeria's 'Eyes & Ears project' is designed to combat overspending and under-delivered government infrastructure projects by enabling citizens to

monitor and evaluate with various devices and applications despite Nigeria's key challenges of digitization as key infrastructure. Madrid launched the open-source platform software for the public to engage in the policy making and spending processes in the field of budgeting, proposals and support new legislation, consultation on council proceedings and debate, deliberation. Amsterdam started the Chief Technology Office in 2014 using innovative short-term pilot projects in collaboration with local IT businesses and startups, maintaining an open data portal with datasets for each project. In partnering with local academia, the Chief Technology Office plays an important role at the intersection of policy, technology and design to improve quality of life for citizens (UN-Habitat, 2021).

From these cases, some lessons can identified, including that technology empowers citizens by facilitating feedback into the decision making process. Quality of life is improved by an holistic approach and use of soft assets across the economy, environment and social sectors (Wataya, Shaw, 2019). The People-human centric approach can blend hard and/or technology-centric solutions to achieve a city's objectives to be smart, budget conscious, integrated, cost-effective, and resource efficient. In this way, cities can be environmentally friendly, sustainable, but also create a positive impact on citizens' well-being and financial sustainability.

2.2.2. Resilient city

"Resilience" covers different urban domains, such as social and ecological resilience, the socio-ecological system, urban hazard mitigation, community resilience, and other aspects. Resilience is becoming a key principle in re-framing policy strategies with comprehensive cross boundary approaches to address challenging development agendas (Galderisi, et al, 2020,). Resilience has also a more organic nature which can absorb inputs from innovation and learning. The OECD describes it as follows: resilient cities are cities that have the ability to absorb, recover and prepare for future shocks (economic, environmental, social and institutional) and also promote sustainable development, well-being, and inclusive growth (Resilient Cities, OECD).

In the urban context, the definition of a resilient city is still evolving. ICLEI-Local Governments for Sustainability described it as follows: "a resilient city is prepared to absorb and recover from any shock or stress while maintaining its essential functions, structures, and identity as well as adapting and thriving in the face of continual change." Building resilience requires identifying and assessing hazard risks, reducing vulnerability and exposure and lastly, increasing resistance, adaptive capacity, and emergency preparedness (ICLEI, 2019).

With more specific focus on disaster risk, the United Nations Office for Disaster Risk Reduction (UNISDR) characterizes a resilient city as a city capable of withstanding the impact of a hazards through resistance or adaption, which enable a city to maintain certain basic functions and

structures during a crisis, and recover from a disastrous event. (UNISDR, 2012, Making cities Resilient).

The importance of resilient cities reflects some major initiatives by leading institutions such as Making Cities Resilient 2030 by UNISDR which lays out plans for cities to become inclusive, safe, resilient and sustainable by 2030 (UNISDR, Making Cities Resilient 2030), Resilient Cities by CGIAR (Consultative Group for International Agricultural Research) which provides research support to strengthen informal urban and peri-urban agri-food sector, to help improve sustainability, equity and opportunity growth, and to mitigate risks to human and environmental health (Consultative Group for International Agricultural Research (CGIAR)). The Resilient Cities Congress by ICLEI has provided an international platform to share the latest knowledge, good practices, challenges, and innovations for creating more resilient cities (ICLEI 2019). The 100 Resilient cities initiatives by the Rockefeller Foundation is designed to help cities build resilience supplying guidance in finance and logistics, resilience strategy development and solutions from experts through a network consisting of private, public and NGOs to access, and peer learning from network members (The Rockefeller foundation, 100 Resilient Cities).

The definition of resilience used by the Foundation is 'the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow not matter what kinds of chronic stresses and acute shocks they experience" (The Rockefeller Foundation, 2015). This approach also aligns with the transformative definitions of resilience previously discussed.

Past experiences with disasters and unexpected shocks made cities more aware of resilience issues. It is also undeniable that COVID-19 also heightened awareness and preparedness of the city to provide guides, tools and solutions for scaling up responses. It also highlighted the robust inter-relation between the environment and livelihood (ICLEI, 2021). There is a demonstrated need for a coordinated and systemic multi-hazard prevention and reduction mechanisms within and across all developmental sectors due to increasing global risks and population (Food and Agriculture Organization of the United Nations (FAO) 2021). It is also argued that nature-based solutions are needed to deliver solutions to urban populations by providing green places and infrastructure to build resilience and improve adaptation and mitigation measures (The United Nations Environment Programme (UNEP), 2021). The solutions need to be adapted and implemented by a well-trained city administration not hampered by bureaucratic barriers. Also it should underscore the importance of comprehensive or holistic approaches towards sustainable and resilient cities.

2.2.3. Integration of smart and resilient city concepts

There are several studies identifying the differences between the two concepts, smart and resilience. For example, one combines the components and character of a smart city and a resilient city

(Arafah, Y. et al, 2018). Another seeks to achieve better integration of the widely pursued strategies. However, successful integration has to be based on a robust scientific approach to provide methodologies and tools to promote cross-sectoral and multi-objective strategies (Papaa, R. et al, 2015).

A smart city using ICT provides citizens more flexibility in time and space, mobility, and both physical and virtual access. Such features augment connectivity and enhance a sense of belonging and social cohesion where communities are fully engaged in the process of smart city development. A resilient city improves the quality of life with a capacity to absorb shocks and cope with unexpected threats to protect people's lives, assets and property maintaining a safe environment, preserving nature, a functioning socio-economic system. Preserving citizen safety and security is optimized by the city's indigenous knowledge, development experiences, social ties, robust legal systems, and effective technologies.

The approaches to building smart and resilient cities overlap. In short, smart and resilient city approaches are mutually complementary models with two different focuses: reducing environmental load (in the case of a smart city) and strengthening adaptation and transformation (for a resilient city) (Baba & Tanaka, 2015).

Figure 6 (a): Smart and resilient cities – differences, synergy, and integral parts

Figure 6 (a) shows a simplified picture of the integration of two different cities and their commonalities Figure 6 (b) illustrates the process of smart city development as resilience capacity is improved and absorbed, then readjusted, leading an evolution of dynamic disequilibrium as part of the process of smart city development.

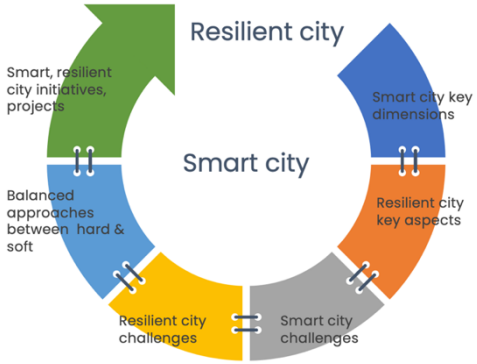


Figure 6 (b): Smart and resilient cities – differences, synergy, integral parts and evolution

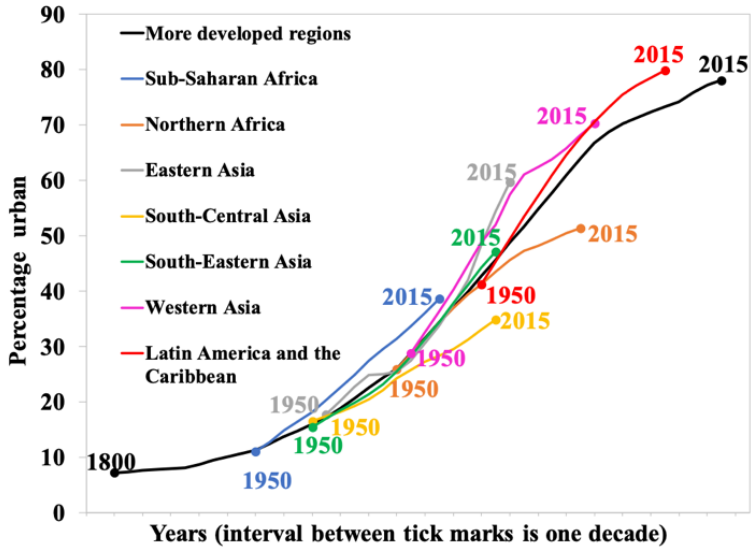
Figure 6 (a) shows the overlapping dynamics of smart and resilient cities. Figure 6 (b) suggests these items do not occur in precise or predictable order. The key point is that resilience is strengthened through an organic process, changing, transforming and absorbing better inputs from innovation, experiences, information, knowledge and learning. In this regard, full integration of the smart and resilient city is more appropriate than addressing resilience as only an integral part of smart city. There is more scope to integrate soft assets as enabling factors to build cities, not only by focusing on traditional 'smartness' aspects, but also factoring in 'resilience' as an integral part of holistic city development (Papa, et al. 2015).

2.3. Smart city and developing countries

From the previous literature review and analysis, the discussion of smart and resilient cities involving ICT, digital technology improving citizens' quality of life is largely similar across most countries. However, developing countries have different challenges and priorities compared to developed countries. Figure 7 shows the trends and speed of urbanization in selected regions. For the comparison of the speed of urbanization between developed and developing countries, trends in urbanization for less developed regions start in each region with the percentage urbanized in 1950. They were plotted at the point along the black line when the more developed regions experienced the same percentage of population living in urban areas. Therefore, the line for the region above the black line shows the rapid pace of urbanization. If the line for the region is below the black line, the speed is lower than developed regions areas (United Nations Department of Economic and Social Affaires Population Division).

Figure 7 shows the rapid urbanization in the regions of sub-Saharan Africa, East Asia, Western Asia and Latin America and Caribbean, East Asia. The most rapid urbanization occurred in Eastern

Asia: percentage increased from 18 to 60%, Sub-Sahara Africa with 11 to 39% and South-Eastern Asia with 15-45% over 65 years.



Data sources: 1800-1925: Taken from Grauman (1976: 32); 1930-1945: Interpolated values; 1950-2015: United Nations (2018).
Notes: Based on and updated from Dyson (2010: 148). The *x*-axis shows the number of years from the starting year of the trajectory of each region.

Figure 7: Level and trends of urbanization in selected regions
(Source: United Nations Department of Economic and Social Affaires Population Division)

In 2008 to 2019, 153 cities around the world have published official smart city strategies (Berger, 2019) Figure 8 shows region based official smart city strategies published in 2019. Europe is the biggest percentage. In Asia, the People's Republic of China (PRC) and India have the most published strategies (Asian Development Bank, 2020). According to Berger, despite the growing number of published official smart city strategies (about 500 cities globally), only 49 strategies were published. The low number of published strategies can be attributed to poor capacity and lack of resources to develop smart city strategies or a lower priority because establishing basic infrastructure and services was more urgent (Asian Development Bank 2020).

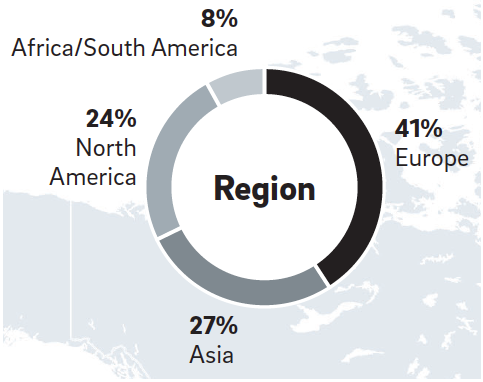


Figure 8: Percentage of official smart city strategy publication (Source: Berger, 2019)

Smart city development in developing countries

To fully benefit from smart, resilient city development, developing countries face challenges to implement the required human, legal, regulatory reforms. Also governments need to deliver basic infrastructure to meet the needs of citizens, raise revenues to provide better services, enact regulatory frameworks to mitigate the technological risks involved, develop human and institutional capital, ensure digital inclusiveness, and promote environmental sustainability (Tan and Taeihagh, 2020) Contrast developed countries where basic infrastructure is already deployed with the necessary institutionalized systems established to enable smart city development.

Tan and Taeihagh (2020) conducted a literature review which surveyed key factors that motivate developing countries to develop and support smart cities: (i) improving government efficiency in public service delivery; (ii) improving citizen quality of life; (iii) promoting inclusive governance; and (iv) inclusiveness of vulnerable and disadvantaged populations. Developing countries also have different priorities in their smart city development. For smart cities, technology infrastructure is a priority. Other major areas of focus are financing capacity, regulatory development, including promulgating a clear set of laws, regulations, and policies that guide smart city development; human capital development including technical capacity and motivation to implement IT-enabled services. In addition important is citizen engagement that embraces, citizen empowerment, ownership building and behavioral changes leading to building strong social capital.

On the other hand, there are also implementation challenges. Beside budget constraints and lack of investment in basic infrastructure, there are many areas where soft assets should be employed to play a major role to fill the gaps, including: (a) technology-related infrastructure readiness; (b) governance frameworks and regulatory safeguards for smart cities; (c) skilled human capital; (d) inclusivity; (e) citizen participation. In addition fragmented governance, environmental concerns, lack of technological knowledge and capacity among citizens were identified.

These challenges are not unique to developing countries as many countries lack soft asset capital and capacity. Tan and Taeihagh (2020) argued that cities face different challenges due to availability of foreign investment resources, adequate regulatory environment, political systems, and other factors. It is difficult to generalize and important to carefully study each unique city context and strategic challenges required for optimal smart city development.

2.4. Key Components for a Smart City and Some Assessment Frameworks

Despite varied definitions, the different approaches and performance assessments of smart cities in different development stages need to be assessed. Cities are growth centers and melting pots for social change, and there are significant challenges including environmental degradation, poverty, inequality, social violence, and others (University of Birmingham, 2016). How can the key elements of a smart, resilient city to capture 'smartness' and 'resilience' be identified. Some assessment frameworks are briefly examined below.

Characteristics for a smart city

Giffinger et al (2007) identified six characteristics of a smart cities which provide a framework for indicators to assess a smart city performance: (i) 'Smart Economy' that includes all economic activities and connections around competitiveness; (ii) Smart people' that includes not only level of education or qualification but also interaction and connectivity with externalities; (iii) 'Smart Governance' that includes political participation, service for citizen and administrative functionality; (iv) 'Smart Mobility' that includes accessibility in local and international and information availability for people to utilize for transport and to make smart transport works; (v) 'Smart Environment' that is about green space, low pollution, resource management for protecting from environmental degradation; and (vi) 'Smart Living' that includes various factors and aspects of quality of life, health, safety, culture, affordable housing, and others supporting citizens' quality life.

These characteristics are a valuable list of factors demonstrating a combination of two ends of the spectrum - largely recognized smart city aspect (hard side) and crucial contributing factors such as people, governance (soft side), and the rest are recognized under both spectrums. These are easily understandable building blocks essential to establish a smart city. The characteristics are also referred to again later in the discussion of soft assets value elements in Chapter 3.

Various assessment frameworks

Outcomes of integrating soft assets is not always the same as measuring smart city performance based on project sustainability by project-specific based indicators or more extensively based on ISO 37120. This is widely known with nineteen themes from economics to basic needs such as water, wastewater, sports, culture, and others under three different pillars consisting of core, supporting and profile indicators (International Organization for Standardization (ISO) 37120).

Since it covers a broader scope of city implementation, soft asset integration for outcomes can be appropriate complementary approaches. On the other hand, the set of indicators are very general. Therefore there are some views that the ISO 37120 lacks more regional specific contexts (Berman and Orttung, 2020) where it applied to Arctic cities.

United Nations Sustainable Development Goals (UN SDGs) 11 refers to making cities and human settlements inclusive, safe, resident, and sustainable, or city levels that focus on the citizens' well-being, their quality of life, green cities, etc.. Some city level indicators focus on sectors or projects, systems or processes, but the majority of indicators are still conventional ones to measure improvement by calculating project-based outputs (action performance).

Other indicators such as the EcoCity Framework that comprises 18 standards in four categories namely 'urban design', 'big geo physical conditions', 'social cultural conditions', and 'ecological imperatives' (The EcoCity Standards). The indicators were developed around how cities can make better progress toward creating conditions for ecocity status. It is one aspect that a smart city can also be integrated into for comprehensive smart city assessment.

On climate change, the government of India launched Climate Smart Cities Assessment Framework 2.0 (Ministry of Housing and Urban Affairs, Government of India). The framework is for the 100 Indian smart cities to enhance a holistic, climate, responsive development and to raise awareness and foster behavioral or mind-set changes while cities engage in smart city development initiatives or projects.

As shown below, the Climate Smart cities Assessment Framework 2.0 covers 5 key pillars which contribute to climate change and environmental degradation. They are: (i) urban planning, green cover & biodiversity; (ii) energy and green building; (iii) mobility & air quality; (iv) water management; and (v) waste management. As the government requires preparation of the city's assessment, it is a good opportunity for cities to use these tools to conduct self-assessment. Cities conducting the assessment observed that there are peer-learning opportunities through knowledge sharing platforms which motivated them to collectively address climate change impacts. The government also plans to create feedback loops to reflect to improve the indicators, assessment methodology, and others for better assessment (Sustainable Urban & Industrial Development).

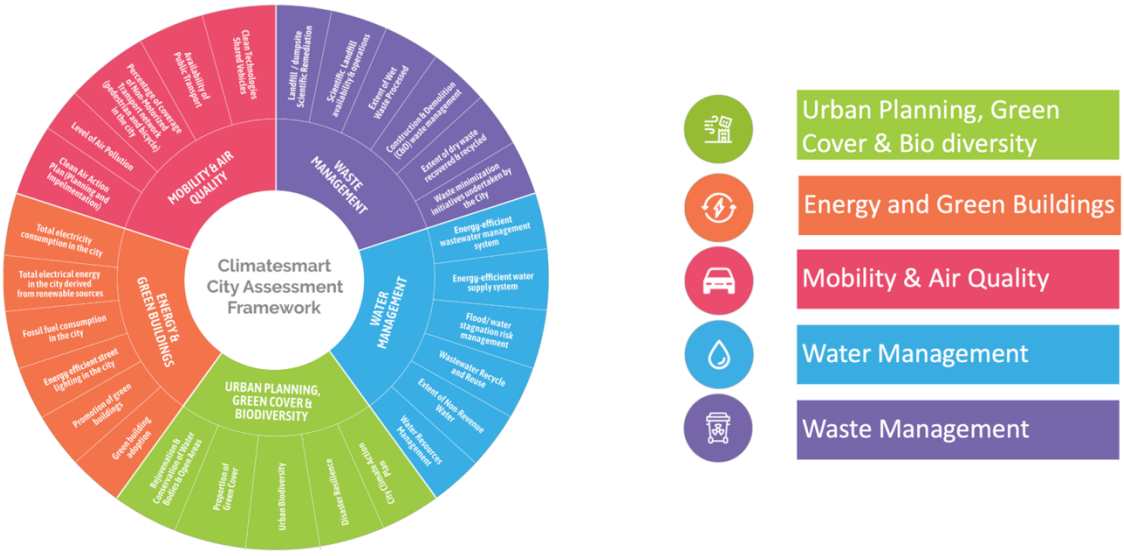


Figure 9: Climate smart city assessment framework
(Source: Climate City Assessment Framework, Sustainable Urban & Industrial Development, https://urban-industrial.in/csc/our_work/national_level/climate_smart_cities_assessment_framework/index_eng.html)

There are other smart city indicators and assessment frameworks. Among the ones briefly reviewed, they have similar or overlapping areas to cover overall sustainability, urbanization, habitat focuses, ecocity development, and climate city development. These areas can become a source of growth and value creation. Hence they are a good reference to identify the key core soft asset elements in smart, resilient cities. The comparison tables are shown below.

Table 1: Comparison of key theme, sectors, pillars under different assessment indicators and framework

	ISO37120	UN SDG 11	EcoCity	Govenement of India
Purpose	Urban sustainability	Making cities and human settlements inclusive, safe, resident, and sustainable, or city levels that focus on the citizens' well-being, their quality of life, green cities, etc	City can make better progress toward ecocity status or conditions	Climate Smart Cities Assessment Framework
Indicators	19 themes with 3 different pillarsz: core, supporting and profile indicators Indicator	9 Indicators by 2030	5 kay categories with 18 indicators	5 key pillars with 28 indicators

Key theme, sector, pillars				
	Economics	Target 11.1 By 2030, ensure access for all to **adequate, safe and affordable housing and basic services and upgrade slums**	Urban design	Urban planning, green cover & biodiversity
	Education	Target 11.2: By 2030, provide access to **safe, affordable, accessible and sustainable transport systems for all**, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons	Big gio physical	Energy and green building;
	Energy	Target 11.3: By 2030, enhance inclusive and sustainable **urbanization and capacity for participatory, integrated and sustainable human settlement** planning and management in all countries	Social cultural condition	Mobility & air quality
	Environment and climate change	Target 11.4: Strengthen efforts to **protect and safeguard** the world's cultural and natural heritage	Ecological imperative	Water management
	Finance	Target 11.5: By 2030, significantly r**educe the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters**, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations		Waste management
	Governance	Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying **special attention to air quality and municipal and other waste management**		
	Health	Target 11.7: By 2030, provide **universal access to safe, inclusive and accessible, green and public spaces**, in particular for women and children, older persons and persons with disabilities		
	Housing	Target 11.a: Support positive economic, **social and environmental links between urban, peri-urban and rural areas** by strengthening national and regional development planning		
	Population and social conditions	Target 11.c: Support least developed countries, including through financial and technical assistance, in **building sustainable and resilient buildings utilizing local materials**		
	Racreation			
	Saety			
	Social waste			
	Sport and Culture			

	Telecommunications Transportation Urban/loal agriculture and food security Urban Planning Waste water Water			

(Source: Berman and Orttung, 2020; UN SDG indicators, https://unstats.un.org/sdgs/metadata/?Text=&Goal=11&Target=; MoHUA, Climate Smart Cities Assessment Framework, 2.0, https://ecocitystandards.org/framework/; https://smartcities.gov.in/climatesmart_cities)

These indicators provide further guidance on how soft assets incorporation can be addressed. Regardless of the level of the breakdown of sectors or pillars, these are areas where balanced approaches between hard and soft assets are required for sustainability in addition to smartness and resiliency. The smart city characteristics, factors, and assessment areas reviewed in this section become part of the foundation for identifying key soft assets value elements in smart cities.

2.5. How soft assets facilitate sustainability

Quality infrastructure is critical for sustainable city development. An excellent initiative has been undertaken by the government of Japan – Partnership for Quality Infrastructure, Investment for Asia's Future (Ministry of Foreign Affairs, Government of Japan, 2015). With accelerating population growth and overcrowding, urban communities have demanded from city authorities improved efficiency from brick and mortar (hard) infrastructure and basic services. Equally important, citizens expect from delivery less visible or intangible benefits, broadly the final results of "intangible or soft[3]" assets. This can be supported by a discussion of quality of life, livability, people-centered approach, that the research has reviewed so far.

Managing and measuring soft assets (intangible assets) are challenging. The way soft assets are managed in city development can result in maximum impact in the long term as it can be considered as quality infrastructure because it is associated with value for money, and life-cycle costs which the Government of Japan addresses as three elements "Quality Infrastructure Investment" namely (i) cost-effective in the long run; (ii) enhancing connectivity for local skills and improving people's lives; and (iii) customized support for each country's development plan. Soft assets can play a critical role here to improve the quality of infrastructure.

To better understand this aspect, one example is that value creation by soft assets incorporation can be characterized as knowledge assets. For example, if some soft assets are considered as a knowledge or intellectual asset, they create knowledge accumulation and intellectual values in organization. A clear illustration of how soft assets were valued in development is the experience of the World Bank and followed by other multilateral development banks where they have been trying to integrate value creating systems into their projects and operations. Some cases below show these efforts and challenges regarding managing and measuring intangible assets framework. This point is examined in depth in Chapter 3.

knowledge institutions and the system

More than twenty years ago, a World Bank president announced a new vision for a "Knowledge Bank", using knowledge as a driving force to help developing countries build development capacity and find operational solutions. The approach evolved from traditional development banking business - offering a package of concessional lending/investment in hard infrastructure and policy recommendations to developing countries - to knowledge-bank solutions emphasizing knowledge or soft assets as powerful tools for achieving desired development. Now the knowledge-bank idea using soft assets is widely accepted and implemented by many other International Financial Institutions. One of the challenges is, not surprisingly, how to properly evaluate the knowledge approach. An excellent example is "The development of the knowledge bank and the goal of encouraging indigenous knowledge are hampered by pressures to show a tangible result" (Cohen and Laporte, 2004). It was a major challenge for the World Bank to justify investment in intangible assets and knowledge products to increase the quality and quantity of development outcomes and now others have followed this paradigm. as well. Sound evaluation frameworks were developed by each organization such as the United Nations Development Group (United Nations, 2017), but ‘difficulties’ remain. This is also a challenge for national and city governments, or other entities to show clear evidence that investment in soft assets creates positive outcomes and impact for their developing country beneficiaries.

A study on Eurasian countries highlighted similar challenges. They succeeded in natural resources management, but failed because of weak institutions to deliver effective public services, education and other key service areas with severe impacts on productivity and growth. This is because the Eurasian countries focused on extracting and depleting natural resources rather than improving the efficiency of public investment and prioritizing intangible assets. To develop further, they urgently needed to invest in intangible assets (Gill, et al. 2014).

Knowledge, intellectual assets

Since 1980, developing methods to measure soft assets has been an important topic to accurately capture the growth of business activities. Technology development created a paradigm shift in business investment. Focusing on the importance of intangible assets has gained more attention due to the changing business environment and increasing attention to the knowledge-economy. In public sector context, local authorities invariably give a lower priority to soft assets than hard assets as their direct influence on outputs, outcomes, and performance are more difficult to measure than hard infrastructure investment. But in the smart city context, there is increasing focus on the importance of monitoring, evaluation, and learning during different stages of the smart city development process. A good example is one of the key processes used by India to create its smart cities (MoHUA, Government of India, 2021).

The next chapter examines different approaches to managing and measuring soft assets to create values and their application to the public sector, including defining intangible assets and outlining different tools for measuring their performance. The review becomes a basis for analyzing why soft assets are a value driver, what assets are involved, and identifying the key components of and the specific tool (qualitative framework) used for identifying soft assets.

CHAPTER 3: DEFINING SOFT ASSETS

This chapter continues the literature review with a focus on describing soft assets and value creation approaches used within the private sector context. It also examines how soft (intangible) assets are evaluated by previous research and use them as a reference to identify five soft asset capital components and nine key core value creation elements to develop a qualitative tool for identification of the level of soft assets incorporation in smart, resilient city development.

3.1. Characteristics of soft assets

Soft assets (or intangible assets) are powerful assets which create value when combined with other assets. Some soft assets can be easily identified as valuable, but some of these intangible assets are more difficult to quantify or classify. The soft asset value proposition will often depend on the specific context of the city environment as well the type of assets utilized to align with the city's vision and strategy (Kaplan, Norton, 2004).

In the business context, a soft asset often refers to its productive capacity. It is also used in city development as a tool for managing its on-going infrastructure challenges. Thus, soft assets are applied more broadly than hard infrastructure. Compared to hard infrastructure or hard assets, the measurement of soft assets in the urban development context is more complicated because of their following features: (i) not inherently producing outputs; (ii) context is specific but scalable; (iii) difficult to sell in the market (including market availability) value is not always measured, e.g., manual, system, branding, sunk costs, etc.; (iv) combination of other assets for value creation/for sustainability (synergy); and (v) ownership of assets is not always clear, referring to a possibility of imitation (spillover). Value and impact created by these features are basically unpredictable. Haskel and Westlake (2018) summarize the characteristics as the four Ss – scalability, spillovers, sunk cost, and synergies. Therefore, the unpredictability of soft assets involves the 'risk of the benefit of spillover' producing unanticipated benefits and unquantifiable results which often influence decision makers on how they prioritize and invest in soft assets.

Cities need to demonstrate overt performance to citizens (taxpayers), but risk averse city bureaucratic silos may hamper prioritizing soft assets to enhance service delivery. Breaking through bureaucratic inaction in city administrations is a major challenge to using soft assets to support and add value to hard infrastructure which underpin smart and resilient city development.

3.2. Defining intangible assets

3.2.1. Various definitions, classifications, and measurement approaches of intangible assets

Considerable previous research has involved different perspectives to classify and measure intangible assets. Originally, as the need to measure intangibles evolved, Kaplan and Norton (1987, 2004) developed four "core competencies" for intangible investment items: R&D, software, training and marketing (Young, 1998). These became extremely influential on later studies in this area. Table 2 contains several definitions and components of intangible assets. Broadly, there are two approaches. One is to capitalize intangible assets and treat the result as a contribution to GDP. In addition to Kaplan and Norton (1996), Corrado, Hulten and Sichel (2009) also endeavor to measure intangible capital by formulating how intangibles may be incorporated into the national accounting framework. The other is a value-based approach used as a firm's performance management tool. There are different frameworks and in this research, some of the Scorecard type frameworks and Report focused frameworks are briefly explained as several aspects are useful to identifying intangible assets.

Table 2: Classification of intangible categorization

Framework	*Scorecard type framework*				*Reporting framework*		*Accounting-based framework*	
					Knowledge management tool	*Strategic management*		
	Kaplan & Norton (Strategic Readiness)	*Skandia (Intellectual capital)*	*Sveiby (Invisible capital)*	*Lev (Value Chain Scoreboard)*	*Danish Intellectual Capital Statement. Guideline*	*Meritum project / Meritum Guideline*	*Corrado, Hulten, & Sichel (CHS) (Intangible capital)*	*Corrado, Hulten, & Jona Lasinio (Public Intangibles)*
What are intangible assets / Intellectual capitals?	Intangible assets from learning and growth objectives and value of intangible assets	Intellectual capital provides an effective instrument to manage and develop the company, as well help strengthen competency.	Intangible assets were considered in knowledge organization context and they were described as invisible capital.	Intangible assets as an 'asset that is a claim to further benefits that does not have a physical or financial (a stock or a bond) embodiment' (Lev 2001)	Intellectual capita = knowledge resources 4 interrelated elements (knowledge resources = Core components) that should describe a corporation's knowledge resources	Intangible assets include three following capitals (under Intangible Resources & Activities - see below)	Intangible capital should be capitalized in national accounting system that enables to capture new economic development & change measuring economic growth.	Used CHS model for categorization but broaden the concept of capital (mostly tangible) to that includes intangibles and long-lasting social assets.
Core components / (innovation focused) information to assess readiness	**People/Human capital** (skills, talent, employees' knowledge)	**Intellectual capital** (Product names, branded products, customers, distribution, competitors, management system, IT system, core competence, key persons, partners, etc.)	**Individual/People's competence** (Individual ability to act in various situations, including skill, education, experience, values and social skills.)	**[S1] Internal renewal** (Research and development; Work force training and development; Organizational capital, processes)	**Employees**	**Human Capital** (knowledge that employees take with them when they leave the firm, including the knowledge, skill, experiences and abilities of people)	**Computerized information** (software, databases)	**Information, Science** (software, Open data, R&D, Cultural and heritage, mineral exploration)
				[S1] Acquired capabilities (Technology purchase; Spillover utilization; Capital expenditures)				
				[S1] Networking (R&D alliances and joint ventures' Supplier and customer integration; Communities of practice)				
	Technology/Information capital (database, information	**(under Intellectual capital) Human capital**	**Internal structure** (Organization - patents, concepts, models, and	**[S2] Intellectual Property** (Patents, trademarks, and copyrights; Licensing agreements; Coded know-how)	**Customers**	**Structural Capital** (knowledge that stays within the firm, comprising	**Innovative property** (R&D, entertainment & artistic originals,	**Organizational Competencies** (Brands, Organizational capital – professional and manager

	system, networks, technology infrastructure)		computer and administrative systems)	**[S2] Technological feasibility** (Clinical tests, Food and Drug Administration approvals; Beta tests, working pilots; First mover)		organizational routines, procedures, systems, cultures, and databases)	design, mineral exploration)	capital, purchased organizational services -, Function-specific human capital – employer provided training)
	Organization climate/capital (firm culture, leadership, alignment of people with firm's strategic goals, employees' ability of knowledge-sharing)	**(under Intellectual capital) Structure capital** *(under Structural capital)* -*Customer capital* -*Organizational capital*	**External structure** (Relationships with customers and suppliers, brand name, trademarks, and reputation or image)	**[S2] Internet** (Threshold traffic; Online purchases; Major Internet alliances) **[S3] Customers** (Marketing alliances; Brand values; Customer churn and value; Online sales) **[S3] Performance** (Revenues, earnings, and market share; Innovation revenues; Patent and know-how royalties; Knowledge earnings and assets) **[S3] Growth prospects** (Product pipeline and launch dates; Expected efficiencies and savings; Planned initiatives; Expected breakeven and cash burn rate)	**Process** **Technologies**	**Relational Capital** (all resources linked to the external relationships of the firm, comprising human and structural capitals, stakeholders, perceptions about the company)	**Economic competencies** (brands, organizational capital – manager capital & purchased organizational services -, firm specific human capital -employer provided training)	
Perspectives / Monitoring areas / Measurement criteria / Steps	[Perspectives] - Financial matrix - Customer - Internal Process - Learning & Growth	[Perspectives/Competencies] - Financial Focus -Customer Focus - Process Focus - Renewal & Development Focus - Human Focus	[Monitoring indicators] i) Organizational growth/Innovation (renewal/utilization) ; ii) Efficiency; iii) Stability	[Measurement criteria] i) quantitative; ii) standardized; iii) Empirically linked to value	[Interrelated elements in IC model] - Knowledge Narrative - Management challenge - Initiatives - Indicators	[key section of reporting] - 'Vision of firm' - 'Summary of intangible resources and activities' (in where intangible resources are classified) - 'System of indicators'		
Source	Kaplan & Norton (2004)	Edvinsson (1997)	Sveiby (2010)	Lev (2001),	Guimón (2009)	Guimón (2009)	Corrado, Hulten, and Sichel (2009)	Corrado, Haskel and Jona Lasinio (2015)

(Source. Wataya, Shaw 2019)

3.2.2. Scorecard type framework

Kaplan and Norton's core components of intangibles are designed for organizational resource management, such as People, Technology, and Organizational Climate. Their well-known Balanced scorecard method (BSC) measures management performance with multiple perspectives combining finance and non-financial perspectives. (Here, "Financial" means the firm's outcome measures for success and supplements the metrics of "Customer", "Internal Process" and "Learning and Growth to respond to long-term shareholder value). The idea is how to facilitate and promote strategic communication among the various parties. The value of intangible assets is derived from how effectively they align with the strategic priorities of the enterprise (Kaplan and Norton, 2004). Here the level of contributions of intangibles to the firm's strategic objectives is measured rather than the costs.

BSC was developed specifically for the private sector, but it has also been appropriately applied to the public sector.This is briefly reviewed and examined later in this section. One of the models derived from BSC is the *Skandina Intellectual Capital Navigator*. The Skandia Navigator used by the firm explains that intellectual capital provides an effective instrument to manage and grow the company, as well as strengthen its range of competencies. The set of competencies is similar to those of BSC, but differs in that the aim of the Skandia navigator is to measure the organization's intellectual capital. The areas of focus (competencies or perspectives) are Finance, Process, Renewal & Development, Customer, and Human. Each competency has a number of indicators categorized in monetary terms. (Lonnqvist, 2004)

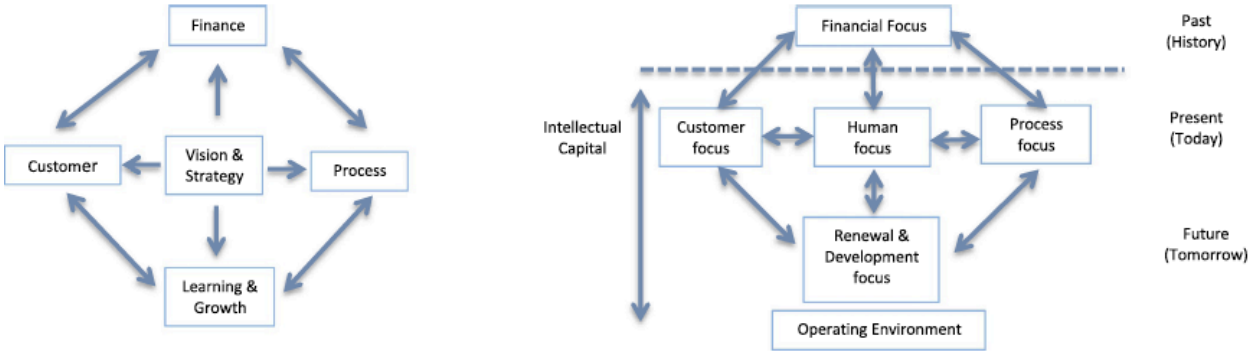


Figure 10 (a): Value creation framework (Kaplan & Norton, 2004) (Left);
(b): Navigator measurement framework (Edvinsson and Malone, 1997) (Right)

On the knowledge-focused approaches, Sveiby explains intangible assets in the context of a knowledge organization as "invisible capital" (Sveiby, 1997), describing people as the true agents of business and creating intangible relations and tangible products by actions and continued

internal and external efforts. By contrast, the financial measurement approach is only used to assess fiscal efficiency demonstrating the need to have alternative indicators beyond monetary ones. The *Intangible assets monitor* is a method to measure an organization's intangible assets by presenting three types of standards/indicators including "Growth/Renewal" (which indicate performance in areas of growth), "Efficiency" (of the organization in general); and "Stability" (the degree to which an organization can sustain its performance in a certain area is its stability/risk standard) applied to three forms of intellectual capital. (Sveiby, 2010)

Table 3: Intangible Assets Monitor

The Intangible Assets Monitor		
External Structure	Internal Structure	Competence
Indicators of Growth/Renewal	Indicators of Growth/Renewal	Indicators of Growth/Renewal
Indicators of Efficiency	Indicators of Efficiency	Indicators of Efficiency
Indicators of Stability	Indicators of Stability	Indicators of Stability

(Source: Sveiby, 1997)

On value creation, Lev's *value Chain Scoreboard* approach provides a comprehensive system to evaluate the process of intellectual capital creation that is divided into three steps (value chain/process of innovation) i.e. Discovery and learning; Implementation; and Commercialization. Each step consists of three different 'information boxes' that are a broad cross section of economic sectors and technologies respectively to fulfill each of nine processes. By doing so, the measurement criteria within each of these processes aims to provide an objective result. Evaluation criteria focus on several aspects, including i) quantitative (qualitative can be supporting information to quantitative aspect); ii) standardized (for easy comparison across firms); and iii) Empirically linked to value (Lev, 2001).

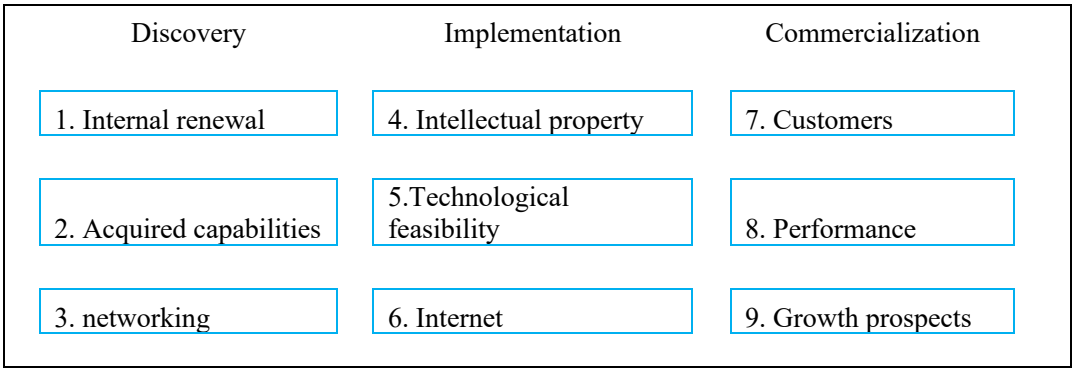


Figure 11: The Value Chain Scoreboard (Source: Lev. 2001)

3.2.3. Key lessons from different models:

Different frameworks underlie the different approaches and methods of organizational resource management. Some can be extrapolated to the public sector and applied to national or local governments that are working on smart, resilient city development. The following areas can be modified to apply to difficult smart, resilient city development initiatives.

First, private firms assign more value investing in soft assets to develop and nurture their firms. This could not be done without clear objectives and strategies, including what firms want to achieve. Second, the organizational resources management system in firms' soft assets is designed for effectiveness of client service delivery through their products, services, or other forms that benefit clients. Third, although effective and efficient services (or provision of solutions for clients) add to a firm's value, this is closely linked to strengthening a firm's human capital and accumulated technical and operational knowledge. Therefore, the firm's products or services alone are not objectives, but rather tools or means to accomplish a firm's business model. Fourth, achieving these desired outcomes cannot be produced in a silo working environment. A process that aims to fulfill different areas of expertise and functions requires broad cross-sectional collaboration to provide objective results. These efforts encourage scaling-up the activities to meet higher outcomes. Lastly, open communications across the varied levels of staff in a firm are important. This facilitates an open environment with a balanced top-down and bottom-up culture. The process of creating value needs involvement of all levels of stakeholders participating in an iterative process.

3.3. Types of soft assets reviewed in this research

There has been considerable research by private firms in past decades with different perspectives/objectives on the classification and measurement of intangible assets (Wataya, Shaw, 2022). This research refers to some leading studies by Kaplan and Norton (strategic readiness), Sveiby (invisible capital), and Edvinsson and Malone (intellectual capital) for identifying soft asset capital, as reviewed in the previous section (Table 4).

Table 4: Major models that were referred to this research

	What are intangible assets / Intellectual capitals?	**Core components of intangible assets**
Kaplan and Norton, 2004 *(Strategic Readiness)*	Intangible assets from learning and growth objectives and value of intangible assets	People/Human capital; Technology/Information capital; Organization climate/capital
Skandia (Intellectual capital) by Edvinsson and Malone, 1997	Intellectual capital provides an effective instrument to manage and develop the company, as well help strengthen competency.	Intellectual capital; (Under Intellectual capital) Human capital; Structure capital;
Sveiby, 2010 *(Invisible capital)*	Intangible assets were considered in knowledge organization context and they were described as invisible capital.	Individual/People's competence; Internal structure; External structure

Kaplan and Norton identified intangible assets from learning and growth objectives and emphasized the value of intangible assets (Kaplan and Norton 2004); Sveiby defined intangible assets in the context of knowledge organization and were described as invisible capital (Sveiby, 2010); while Edvinsson and Malone (Edvinsson, Malone, 1997), using the Skandina Intellectual Capital Navigator measurement framework (Lonnqvist, 2004), identified intellectual capital that provides an effective instrument to manage and develop corporate activity. Corporate soft assets are those assets which are developed and sustained by learning for growth; serve as engines of development within a knowledge organization environment; and are able to help strengthen corporate expertise. Therefore, corporate practices are reliable precedents for selecting appropriate soft assets within the urban environment.

To define soft asset capitals for this research**,** Table 5 shows the broader groups of soft asset components (modified by the individual context).

Table 5: Broader set of soft assets classifications

Classification	**Hard assets**	**Soft assets**	
Sub classification	**Hard assets**	**Soft assets**	**Medium assets**
Type of assets	**a) Assets** - Physical infrastructure	**a) Institutional assets (**organization capital) - Individual capital, knowledge (function-specific) - Institutional capital, knowledge, professional technical knowledge & experiences, management capacity, - Training (both for individuals and institutional contexts) - Learning and growth capacity - Relationship with external stakeholders - Institutional credibility, reputation	**e) Computerized products & information (**information and knowledge-related capital) - Apps - Database (Information and/or applications that can be integrated into physical infrastructure)
		b) Framework & systems (organization capital) - Policy, strategies, plan,	
		c) Social assets (social capital) - Social system - Community network - Social norms, value	
		d) Intellectual product (information and knowledge-related capital) R&D, Reports	

These are broadly similar to the intangible asset components that are reviewed in the earlier section. Sustainable urban development for smart resilient cities in this research embraces public sector development initiatives, including international development assistance and project outcomes. The definition of soft assets in this context is to develop an enabling environment to build and maintain the key areas constituting smart, resilient city development.

While each of the soft asset categories are interlinked, they are broadly divided into three groups, namely organizational capital-related i.e. a) Institutional assets, and b) Framework and Systems; c) Social capital-related, i.e. Social assets; and d) Intellectual products and e) Computerized products and information, i.e. Information and knowledge asset-related. A qualitative analysis is more reliable than quantitative analysis to assess the impact of the soft assets. The aim of this categorization is to identify the effective integration of soft assets to capture outcomes and impact.

The classification can be further sub-classified as there are different levels of capital such as enabling factors e.g., individual capital or people, human capital, system, or process capital. An

example of an enabling factor is where local authorities as the main implementer of public works, strengthen the governance system, including policy-making and planning, to provide the best services to their citizens to create a foundation for innovative solutions supported by soft assets. Building a solid foundation to accomplish local authorities' goals and responsibilities, the implementation of public works requires dealing with a range of issues, including political, analytical, planning, systems, and accountability.

Regarding 'Computerized products and information', ICT-linked hard infrastructure is becoming a more important factor for city development. Therefore, the soft assets section is divided into 'Soft assets' and 'Medium assets' in Table 5 above. Data, apps, and other related technologies are included in this category. A useful distinction is to classify the assets by the "degree of soft assets" to understand the type and nature of soft assets. This means, for example, technical soft assets such as computerized products have an obvious value while the more indescribable soft assets, such as human, institutional knowledge and capital are more difficult to quantify. The important point is that these assets, although difficult to assess, are nevertheless a primary source of unique value creation in smart, resilient city development.

Table 6: Five soft asset capitals

Soft asset capitals	Description
People/Human capital	• Technical, operational individual capacity (Knowledge that employees take with them when they leave the firm, including the knowledge, skills, experiences, and abilities of people)
Institutional capital	• Legislation, policies, strategies, standards, frameworks, systems, mechanisms, modality, and other relevant items. They are backbone of smart city development • Processes, procedures, data, systems, culture, designs, and knowledge (knowledge retention to execute tasks and responsibilities
External capital	• Relationships with stakeholders such as citizens, donors/financial sources, private sector, academia, LGU, SPV *(depends on your roles)* • Network or any form of crating benefits to stakeholders for promoting relationships
Technology, information capital	• Computerized products, databases, information systems, networks, technology infrastructure, also covering a wide meaning of the use of technology for smart city development
Social	• Community rules, regulations, framework, community representative groups (e.g. contribute to LUG's planning/consultation process) • Local level organization, values (trust, solidarity, reciprocity), social norms, behaviors, attitudes (strength, number, quality of relationship among people in a society)

Based on the broader set of soft asset classification, and also taking into consideration enabling factors of soft assets, Table 6 above shows the list of potential soft assets. They are further narrowed down in Table 5 and utilized for this research. Social capital is often understood and identified from a community-based or bottom-up perspective. Hence two levels of descriptions were included.

3.4. The benefit and challenges of soft assets for smart, resilient city development

Soft assets provide value added creation opportunities and its process should be an integral part of resilient city development. As examined in the previous chapter, 'resilience is the capacity of a social-ecological system to absorb or withstand perturbations and other stressors such that the system remains within the same regime, essentially maintaining its structure and functions'. It describes the degree to which the system is capable of self-organization, learning and adaptation. (Resilience Alliance, 2002).

From the sociological perspective, many key soft assets are focused on people, human and institutional capital as enabler to create robust community (social) systems and organizational structure. UNISDR defines a resilient city as a city capable of withstanding or absorbing the impact of hazards, shocks and stresses through adaptation or transformation, in order to guarantee long-term sustainability, as well as its basic city functions, characteristics and structures (UNISDR 2012).

Adaptive capacity is also developed through a repetitive learning process and growth from lessons from past experience. Norris, et al.(2008) emphasized: "community resilience emerges from a set of capacities – community resilience from a set of networked adaptive capacities. And resilience rests on both the resources themselves and the dynamic attribution of those resources". Therefore, adaptive capacities consist of a set of *networked resources* i.e. economic development, social capital, information, communication, and community competencies, that are supported by soft assets.

Soft assets increase resiliency at different community levels within a city. However, they are intangible, difficult to quantify, with undefinable ownership, and unpredictable due to their characteristics. As explained by Haskell and Westlake (2018), the 'risk of the benefit of spillover' makes soft assets difficult as an investment target by city decision makers. There is a challenge for both the private and public sector to show clear evidence that investment in soft assets creates positive outcomes and impact for their stakeholders and beneficiaries (or taxpayers). In addition, public sector bodies have made less effort to value intangible assets because of their multiple objectives of the non-financial nature and intangible final products (Serrano Cinca, et al. 2001).

Given this situation, soft assets in the city context are less likely to be a tangible target for public investment.

To respond to citizens' needs and provide comprehensive functional city services and build smart, resilient cities, city administrators need to achieve a balance between the investment of hard and soft assets.

3.5. Value creation framework for smart, resilient city development

Earlier in this chapter, the various management tools used by the private sector were reviewed. Those tools not only helped firms better measure management performance but also identify and understand which soft assets are required in specific contexts. This methodology can equally be applied to the public sector. Using the BSC value creation framework, this section briefly reviews the model and examines how it can be applied to smart, resilient city development.

Local authorities including public organizations have to make deliberate choices about policies and strategies to deliver optimal services to their citizens. Their projects, in most cases, generate multi-dimensional, multi-sectoral results and impact.

In the value creation model, a local authority has its own 'mission to accomplish' while a firm has its business and profit enhancing 'strategy to achieve' to accomplish their objectives (Kaplan, Norton, 2004). A local authorities' goal is to effectively and efficiently provide quality services to satisfy citizens' needs. The 'Customers' perspective in the private sector is not equivalent to public sector citizens who are both beneficiaries (consuming services) as well as stakeholders (taxpayers). Citizens monitor whether their city's service delivery is fair, transparent, effective, and consistent. Kaplan and Bower (1999) explain that public organizations have three significant objectives to accomplish their mission i.e. Cost incurred, Value created, and Legitimizing support. These are all related to the differences mentioned above. Cost includes the public organization's direct expenses and social costs to be covered by citizens and services providers. Minimizing these costs and optimizing delivery of services to meet the needs of citizens is critical. Value creation is difficult to measure, but Kaplan explained that organizations can identify outputs by the balanced scorecard and benefits judged based on their outputs and inputs. *Legitimizing support* is associated with funds (= financier/donor/taxpayer) required to provide stable and quality services. To do so, their actions need to be justified and demonstrate accountability. On the 'Balanced' side, the value creation framework for the public sector has the three following perspectives:

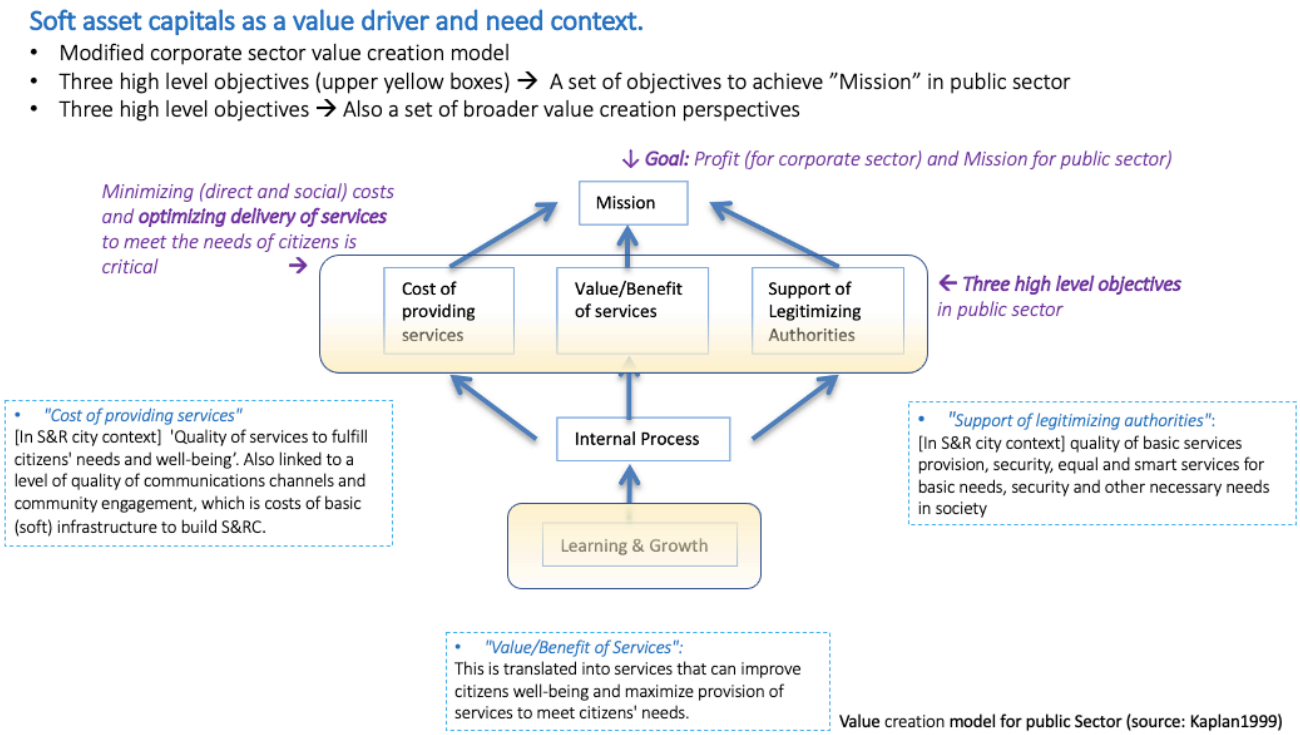


Figure 12: Value creation framework for public organization (Source: Kaplan and Bower, 1999)

For this research, three higher level objectives that demonstrate the characteristics of public organizations can also be useful to identify smart, resilient city development.

The concept of competitiveness in the private sector equates to 'value creation' in smart, resilient city development. A long-term strategy which sets a clear vision is indispensable to improve community well-being, including basic service provision, safeguarding the environment, and creating job opportunities for economic development to promote citizen wellbeing. The framework only demonstrates a set of broader perspectives to make a smart, resilient city with their unique values competitive.

To achieve these higher objectives, it is necessary for local authorities to understand the needs of citizens and understand how to improve service delivery to meet their needs. Also it is important to identify key city domains or areas where soft assets can play an important role to create value. This is a natural convergence of a city's policies and plans. This is because, a city's high level objectives are achieved by projects and initiatives designed for citizens (= taxpayer) and other stakeholders. Furthermore the quality of projects and activities to contribute to these three objectives should be developed within a learning and growth process that underpin this value creation framework. One example is the value associated with the social benefits or impact

provided by social infrastructure (e.g. hospital, school, housing, and others). Corrado, et al (2015) stated that this social benefit is the spillover or an externality that results from citizens consuming the social goods and services. Creating and delivering services are supported by hard infrastructure, but greatly strengthened by soft assets, which are a dominant source of innovative solutions.

Challenges in applying BSC to public organization

There are some challenges to apply the BSC model to public organizations. As shown in Figure 12, BSC principles applied to public sector organizations need adjustments in design and implementation of BSC due to its unique institutional and structural environment (Kaplan 2001 in Gadenne and Sharma (2009)). Some challenging areas emerge such as the difficulty to select and incorporate the key performance indicator BSC due to inconsistency with existing medium- to long- term policy or outline of administrative reform, which is articulating their mission and associated strategies. This also links to prioritizing the introduction of performance measurement systems in the public sector environment rather than key performance indicators in the four BSC perspectives. Gadenne and Sharma (2009) mentioned in their research that BSC implementation is challenging due to planning, deployment, review, motivation, leadership, resources communication, measurement and date collection techniques, and the role of knowledge management. BSC is a powerful tool to implement strategy effectively with combined consideration of intangible assets and tangible assets. It indeed needs to adjust for application. The aim of this research is not to apply BSC, but apply its value creation system elements to the method of identifying soft assets consideration.

Co-value creation model

Considering that development of smart, resilient cities is achieved at several levels, there is always a two-way interaction between the city authority (as a service provider) and consumers/citizens (as consumers, beneficiaries, and stakeholders). The value-added of soft assets is created at both ends of the spectrum and their processes are invariably interlinked. Figure 7 below shows an initial form of value creation models that are developed in this research.

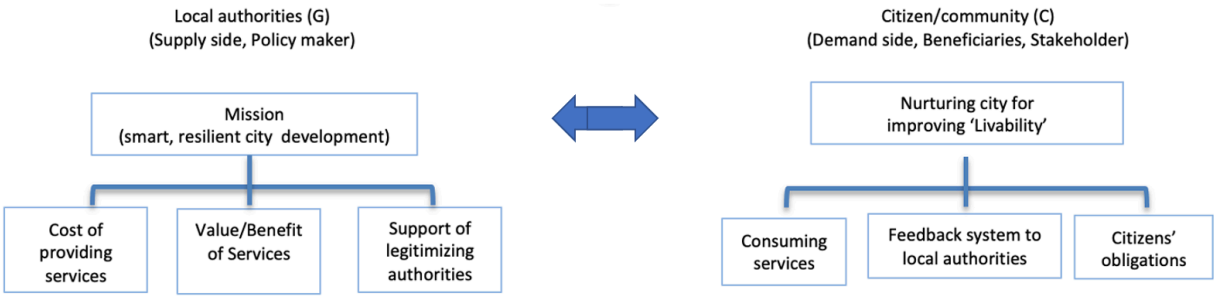


Figure 13: Soft assets co-value creation in smart, resilient city development (local authority and citizen/community) (Source: Created by the author based on Kaplan and Bower, 1999)

In responding to Figure 13 above, three key objectives can be developed:

- "Cost of providing services" that is closely linked to "Legitimizing support" in terms of a source of funding (= tax payer's money). In the SC context, this can translate into 'Quality of services to fulfill citizens' needs and well-being'. The foundation of these services is also linked to a level of quality of communications channels and community engagement, which is costs of basic (soft) infrastructure to build SC.
- "Value/Benefit of Services": This is translated into services that can improve citizens well-being and maximize provision of services to meet citizens' needs.
- "Support of legitimizing authorities": This means city authorities or service providers have to satisfy citizens with their services. Since they are both clients as well as a source of financial resources (= tax money) for provision of services, city authorities or service providers have to constantly considering good planning for quality of basic services provision, security and other necessary social needs.

Using the idea of co-value creation, the framework above combines two sides of the equation – providers (local authorities) and beneficiaries (citizens/community). The idea is that the value creation process occurs at both ends - city administration and citizens - also within the city as a whole. The assumption is that there is a two-layered reciprocal value creation process. The value creation framework creates a foundation for quality of life, benefiting from 'smartness' by use of technology, and strengthening resilient capacity of the city. Identifying soft assets and aspects of value creation will be examined is the next section.

3.6. Defining nine soft asset value elements essential for smart, resilient cities

Identifying soft assets integration and defining value creation requires a context (= value creation elements). To define the key soft asset value elements in smart, resilient cities for this research, several existing key smart city pillars or dimensions are a useful reference as they represent unique, but comprehensive features of smart, resilient cities.

Giffinger et al (2007) conducted a ranking of European medium-size cities identifying six smart city pillars and these are appropriate starting points to examine which elements are more significant for soft assets value creation. While there are different ways to view smart city characteristics, most fall into these categories. On the resilient city side, ICLEI's report on connecting green recovery and resilience in cities (ICLEI, 2021), listed four key factors that bring multiple benefits to communities in the Resilient Recovery Framework, namely (a) equity-centered (empowering multiple stakeholders); (b) risk-aware (planning for recovery to leverage date and technology); (c) system-enabled (recovery intervention design in terms of both multiple benefits and nexus between different systems); and (d) climate-focused (fossil-fuel to renewable energy based recovery planning) (ICLEI, 2021).

Considering the key pillars or themes in various indicators have greater synergies with the above dimensions, they can be a foundation for identifying soft assets value elements in smart, resilient cities.

For this research, the selection of key areas or elements are selected by referring to the references above and the higher objectives inherent in the public sector value creation framework. There are different classifications of key smart city pillars, but Giffinger, et al (2007) created a comprehensive model for customization for this research, Resilience aspects should also be included in major areas. And in terms of the value creation aspect, three higher objectives provide guidance to identify key smart, resilient city development. The objectives were interpreted for this study as follows:

(i) **Cost of providing services**: It is cost effectiveness of basic services provision in smart, resilient cities. So quality of services to fulfill the citizens' needs and well-being is achieved by better resource allocation. It relates to a system or platform for quality of communications and channel of community engagement to ensure an approach from the ground up.
(ii) **Value/Benefit of services**: This also relates to creating new value and innovative approaches. So this can be translated into service that can improve citizens well-being, smarter services and technology and maximum provision of services to meet citizens' needs.

(iii) **Support of legitimizing authorities**: Under this objective, citizens pay taxes in exchange for receiving essential services from the city. Citizens are both taxpayers and customers of the city. Provision of services that keep citizens safe, secure and enhance are key. So, quality of basic service provision, security, equal and smart services, and resilience are basic needs in society

Table 7 shows a 'comparison between different dimensions of smart cities' and figure 14 shows nine value elements essential for smart, resilient cities.

These nine value elements are unique to this research. The purpose is not to list various sectors for quantifying results, but anticipated value creation clusters to identify the level of soft assets integration. The nine elements are sufficient to cover key clusters.

Table 7: Comparison between different dimensions of smart cities

Giffinger, et al	ICLEI	Kaplan	This research
Smart city 6 dimensions: Ranking for European medium-sized cities	Green recovery & Resilient cities	Value creation model for public organizations - 3 high-level objectives	Soft asset value elements
Smart economy	Equity-centerd	Cost of providing services	Resource management
Smart people	Risk awareness	Value/benefit of services	Mobiliy (Accessibility)
Smart governance	System enabled	Supporting of leginimizing authorities	Health, Well-being
Smart mobility	climate-focused		Equal access to services
Smart environment			Smarter services via technology
Smart living			Community engagement
			Quality communications
			Security
			Reslience

(Source: Giffinger et al. (2007), ICLEI, 2021)

Giffinger et al. further subdivided each six smart city characteristics with assigned sub-factors then creates 31 sub-factors with 74 indicators to cover important city elements. A notable feature is because it involves city functions, community engagement, communications, and social capital related factors are incorporated into several major characteristics.

Based on the framework, nine soft asset value elements cover the following: (i) resource management: (ii) accessibility (mobility); (iii) health well-being;(iv) equal access to services; (v)

smarter services; (vi) community engagement; (vii) quality communication; (viii) security; and (ix) resilience. Each element represents the following areas.

Figure 14. Nine (9) value elements essential for smart, resilient cities

Resource management is to optimize limited human and natural resources to build a smart and resilient city. This element covers not only the effective use of resources but focuses on efficient systems. It reflects strategic readiness, planning, competencies in resource management planning, benefits to stakeholders, and use of technology to optimize outcomes.

Accessibility (mobility) is to achieve reduced automobile dependence, providing alternative modes of transportation. It reflects the competency of establishing an holistic urban development plan. It also addresses availability of cross-sectoral planning, provision of a citizen-friendly public transport system, implementing an IT-led system and facilitating the engagement of citizens in planning.

Health well-being underlines building an environmentally sound (green), healthy environment for citizens. It focuses on establishing a shared vision of a healthy community for residents; a better and healthy living space, positive impact on human health by creating public gathering places, improving accessibility to services for a healthy environment, and incentivizing the community to support and participate in improving health-related initiatives.

Equal access to services is designed to maintain social stability. Also securing support from citizens, stakeholders, and beneficiaries. It focuses on satisfying basic community service needs

and measures to mitigate risks, create sustainable financial options, strategic readiness, improving citizens tracking process for accessing services, IT literacy improvement, and facilitating levels of citizen engagement and decision-making processes.

Smarter services via technology provides access to effective and efficient services that meet the needs of citizens and improve service quality through the use of (smart) infrastructure. It concentrates on developing a holistic vision/strategy across sectors, readiness, availability of the plan/system to improve citizen's technical literacy, establishing efficient communication channels, and facilitating levels of citizen engagement and decision making.

Community engagement underlines the improvement of quality of life by strengthening the community's capability and supporting the city by close involvement of citizens over a long period. It focuses on developing effective community engagement plans, including public awareness raising activities, strategic readiness, availability of support for community based awareness raising efforts, strengthening community engagement in public events, providing feasible technology and IT systems for an inclusive society, facilitating levels of citizen engagement, and contributions to strengthen social values.

Quality communications stresses the need to improve communications between local government and communities to build a sustainable and resilient smart city. It seeks to establish a citizen–government communications channel, streamlined coordinating mechanisms between LGU and stakeholders, regularly conducting feedback on the provision of city services, a feedback collecting system, a collective/transparent decision-making process, and a method of accountability of leaders.

Security emphasizes providing a stable, secure environment for citizens' daily life and improving smart city resiliency against unexpected external shocks and disasters. All nine elements are considered the main pillars of developing soft asset consideration indicators. They attempt to improve a city's safety plan for better risk management, developing framework for ensuring the welfare of citizens in times of crisis, developing community security services, enabling police departments and law enforcement for a safe and secure city, quality of data management systems, collective/transparent decision-making processes, accountability of leaders, and strengthening social values.

Resilience refers to making a city stronger against external shocks and risks, prepare it for short-term hazards and mid- to long-term adaptability. The resilience element refers to the Climate Disaster Resilience Index(CDRI) methodology (Joerin, et al. 2014) as it has already defined the resilience of communities in a city in relation to climate-related disasters. In addition, this research extends aspects of resilience beyond natural disaster risk management. It covers effectiveness of a crisis zone management framework, natural resource management, knowledge management and

dissemination, mainstreaming of disaster risk reduction and climate-change adaptation, good governance, land use planning, effective transport, clean energy, institutional collaboration with other organizations and stakeholders during a disaster, effectiveness of early warning systems, internet access, community disaster preparedness, education and awareness, and methods of strengthening social capital.

The nine value elements are closely related to each other and there is some duplication across the elements. For example, the 'Smarter services via technology' element is closely interlinked to 'Security' and resilience; also 'Quality communications' and 'Community engagement' have similar activities. Together with the five soft asset capital components, the proposed evaluation tool comprises 45 items (9 x 5 = 45) (Table 8). Summary of definitions of the Nine (9) value elements in this research is shown in Table 8.

Table 8: Definitions of the Nine (9) value elements essential for smart, resilient cities

Resource management:	To optimize limited human and natural resources for building a smart and resilient city.
Accessibility (mobility):	To facilitate reduced automobile dependence, providing alternative modes of transportation.
Health well-being:	To build an environmentally sound (green), healthy environment for citizens.
Equal access to services:	To maintain social stability
Smarter services via technology:	To provides access to effective and efficient services that meet the needs of citizens and improve service quality through the use of smart infrastructure.
Community engagement:	To improve quality of life by strengthening the community's capability and nurture the city by citizens' close involvement over a long time.
Quality communications:	To improve communications between local government and communities to build a sustainable and resilient smart city.
Security:	To provide a stable, secure environment in citizens' daily life and improve smart city resiliency against unexpected external shocks and damage.
Resilience:	To make a city stronger against external shocks and risks, prepare it for short-term hazards and mid- to long-term adaptability.

Qualitative framework to identify an adaption of soft asset incorporation:

To identify and analyze the process of value creation within city development activities, a soft asset identification tool with 45 items was developed based on nine (9) elements and five (5) soft asset capital components (Table 9). This is formed by two factors:

One comprises soft asset value elements in smart and resilient cities, and the second is five soft asset capital components. The objective of the tool is to show which competencies can be considered by cities to deliver smarter quality services.

Soft asset capital, although obscure and granular, need context to generate value through synergies, spill-over and scaling up. Specific values are created in initiatives or projects but the tool is not to evaluate them. The purpose of tool is not to evaluate their performance at initiatives or projects level but to assess the level of utilization of soft assets in line with smart, resilient city vision and objectives.

Therefore, unlike other indicators, the proposed tool is not purely for quantitative assessment. It extracts soft asset consideration aspects from information in proposals disclosed by cities establishing a smart city.

This implies that the qualitative framework with 45 items shown in Table 9 may overlap with each other at some level depending on the type of soft asset capital and the value elements. This is a limitation of this type of tool as it focuses on qualitative aspects, not numeric data. There are some additional aspects about this qualitative tool as follows: (i) some overlapping is inevitable due to the qualitative nature of the tool; (ii) 'Smarter service via technology' (value element) and; Technology and information capital (soft asset capital) may overlap to some extent, but there is a difference – both are related to technology, but the value element is where soft asset capital can yield value; (iii) there may be some overlap at two different levels within the same elements (e.g. 'use land pooling for real estate creation in eastern periphery of city' under 'Resource management' where both are connected by 'People/Human capital/ and 'Institutional capital'). Another case is comparing different elements (e.g. Transit Oriented Development or ToD for metro root development' under 'Accessibility (mobility)' and 'Health, Well-being' are both connected with the capitals of 'Institutional capital' and 'External capital'). Greater detail on this overlapping characteristic will be examined in Chapter 5. Although each element is not exclusive or all encompassing, and may overlap, it is nevertheless possible to identify the degree of soft asset incorporation. However, if the five soft assets and the nine value elements are further subdivided into more detailed sub-categories, it will reduce the possibility of overlapping.

The information selected from the materials is examined and assessed in terms of the level and strength of connectivity between selected actions or initiatives associated with soft asset capital components in Chapter 5.

Table 9: Qualitative framework to identify an adaptation of soft asset incorporation

Soft Asset Value Elements	Soft Asset Capitals
RESOURCE MANAGEMENT	People/Human capital (competency in resource management related policy, strategy, planning development, air quality, biodiversity, water conservation, energy efficiency, SWM, etc.) Institutional capital (strategy, planning, approach to mainstream resource efficiency in city development policy and strategy) External capital (coordinating mechanisms between LGU and stakeholders to embrace unique local character, benefits to stakeholders (citizens) for promoting resource management) Technology (information capital) (promotion of automation-based smart resource management systems and technology in public service provision) Social (structural) (level of contribution to strengthening collective/transparent decision-making processes) Social (cognitive) (facilitating level of participation in policy/planning processes)
ACCESSIBILITY (MOBILITY)	People/Human capital (competency in establishing holistic urban development plans) Institutional capital (availability of cross-sectoral coordinated land-use planning (and readiness for implementation)) External capital (provision of citizen friendly public transport services; benefits to stakeholders (citizens) for promoting accessibility) Technology (information capital) (developing data management tools, digital technology for better resource management) Social (structural) (level of contribution to strengthening collective/transparent decision-making processes) Social (cognitive) (facilitating level of participation in policy/planning processes)
HEALTH WELL-BEING	People/Human capital (competency in establishing a shared vision of a healthy community for residents; better and healthy living places, good green spaces; equal and inclusive society) Institutional capital (creating policies and a system for making health choices easy for citizens; better and healthy living places; equal and inclusive society) External capital (making a direct, positive impact on human health by creating public gathering places; benefits to stakeholders (citizens) for improving health/well-being) Technology (information capital) (developing data management tools, digital technology for improving accessibility to healthcare service facilities, healthy living environment) Social (structural) (level of contribution to strengthening collective/transparent decision-making processes) Social (cognitive) (facilitating level of participation in policy/planning process, making values (trust, solidarity, reciprocity) stronger in policy and systems development processes)

EQUAL ACCESS TO SERVICES	People/Human capital (competency in basic community service needs identification and making countermeasures for risks) Institutional capital (making sustainable financial strategies available for providing equal access to services) External capital (development or update of systems for monitoring integration to identify key challenges and track progress over time; benefits to stakeholders (citizens) for improving equal access to services) Technology (information capital) (number of citizens without IT systems (internet connectivity) decreases) Social (structural) (level of contribution to strengthening collective/transparent decision-making processes) Social (cognitive) (facilitating level of participation in policy/planning processes (Citizens can easily engage in public service monitoring to give feedback on services provided by LGU))
SMARTER SERVICES VIA TECHNOLOGY	People/Human capital (competency of developing holistic visions/strategies across sectors) Institutional capital (readiness, availability of the plan/system to improve citizens' technical literacy) External capital (establishing efficient communication channels within an organization; benefits to stakeholders (citizens) for improving smarter services) Technology (information capital) (readiness, availability of system for easy access to LGU services and data, tech-linked services, smarter public services) Social (structural) (level of contribution for strengthening collective/transparent decision-making processes) Social (cognitive) (facilitating levels of participation in policy/planning processes)
COMMUNITY ENGAGEMENT	People/Human capital (competency of developing effective community engagement plans, including public awareness raising activities) Institutional capital (readiness, availability of support for community-based awareness raising efforts (for building a better city)) External capital (planning community activities for strengthening community engagement in public events; benefits to stakeholders (citizens) for improving community engagement) Technology (information capital) (readiness of feasible technology and IT systems for elderly and vulnerable citizens for an inclusive society) Social (structural) (level of contribution to strengthening collective/transparent decision-making processes) Social (cognitive) (values (trust, solidarity, reciprocity))
QUALITY COMMUNICATIONS	People/Human capital (competency of capability to establish citizen–government communication channels) Institutional capital (creating streamlined coordinating mechanisms between LGU, the private sector and the community for effective communication) External capital (regularly conducting feedback on city service provision

	quality from citizens; benefits to stakeholders (citizens) for improving quality communications) Technology (information capital) (availability of feedback collecting systems and tools for citizen) Social (structural) (collective/transparent decision-making process, accountability of leaders, practices of collective action and responsibility) Social (cognitive) (level of decentralization, facilitating level of participation in policy process)
SECURITY	People/Human capital (competency of capability to improve city safety plans for better city risk management) Institutional capital (developing a framework for ensuring the welfare of citizens in times of crisis) External capital (developing community security services, availability of enabling police departments and law enforcement for safe cities; benefits to stakeholders (citizens) for improving security) Technology (information capital) (availability of quality of data management systems/frameworks for citizen to access, planning security measures, handling options) Social (structural) (local level organization, collective/transparent decision-making processes, accountability of leaders, practices of collective action and responsibility) Social (cognitive) (support for strengthening local values (trust, solidarity, reciprocity), social norms, behavior for improving local security)
RESILIENCE	People/Human capital (effectiveness of a zone's crisis management framework, knowledge dissemination and management, natural resource management) Institutional capital (mainstreaming of disaster risk reduction and climate change adaptation, good governance, land use plans, green icon-related planning, transport, clean energy) External capital (institutional collaboration with other organizations and stakeholders during a disaster) Technology (information capital) (effectiveness of early warning systems, access to the internet) Social (structural) (community preparedness during a disaster, education and awareness) Social (cognitive) (social capital, localism)

CHAPTER 4: INDIA SMART CITY MISSION PROGRAM

This chapter describes and reviews the unique approaches of the Smart City Mission program developed and implemented by India for urban renewal and retrofitting. Two cities from this program were selected as case studies – Bhubaneswar and Nagpur. This chapter also reviews the indicators used by the Government of India – "Ease of Living" (EOL) and "Municipal Performance Indicator (MPI) - to evaluate smart city effectiveness and performance.

4.1. Overview of the Smart City Mission Program

The India Smart City Mission program is a nationwide solution for urban sustainability launched by India in 2015 and supervised by the Ministry of Housing and Urban Affairs (MoHUA). The smart city solution provides a development plan for 100 cites across India. The Government of India's objective is to address two acute and long term challenges: providing basic infrastructure services and a critical response to mitigate climate risks and improving city resiliency against disasters.

The goal of India's smart city mission program is "to promote cities that provide core infrastructure, clean and sustainable environment and give a decent quality of life to their citizens through the application of 'smart solutions" (MoHUA, Government of India, About Smart Cities mission) with the following areas of focus: (i) creating a smart city by building basic infrastructure to support economic growth including physical, institutional, social, economic infrastructure; (ii) managing rapid urbanization; (iii) improving quality of life by providing effective access to health, education, and promoting economic prosperity; (iv) application of smart solutions for electrical supply, traffic congestion by severance; efficient water supply and solid waste management and (v) creating a clean and sustainable environment.

Table 10: The core infrastructure elements

The core infrastructure elements (= BASIC INFRASTRUCTURE)	Some of the core infrastructure elements: adequate water supply, assured electricity supply, sanitation, including solid waste management, efficient urban mobility and public transport, affordable housing, especially for the poor, robust IT connectivity and digitalization, good governance, especially e-Governance and citizen participation, sustainable environment, safety and security of citizens, particularly women, children and the elderly and health and education.

(Source: MoHUA, Government of India, Smart City Mission)

Although India confirms that there is no standard definition of or template for smart city development, there adopted six fundamental pillars in the India Smart City Mission (figure 15): (i) Community at the core; (ii) More from less (greater outcome with lesser/fewer resources); (iii) Corporative & competitive federalism; (iv) Integration, Innovation, sustainability; (v) Technology as a means, not the end; and (iv) Sectoral and financial convergence

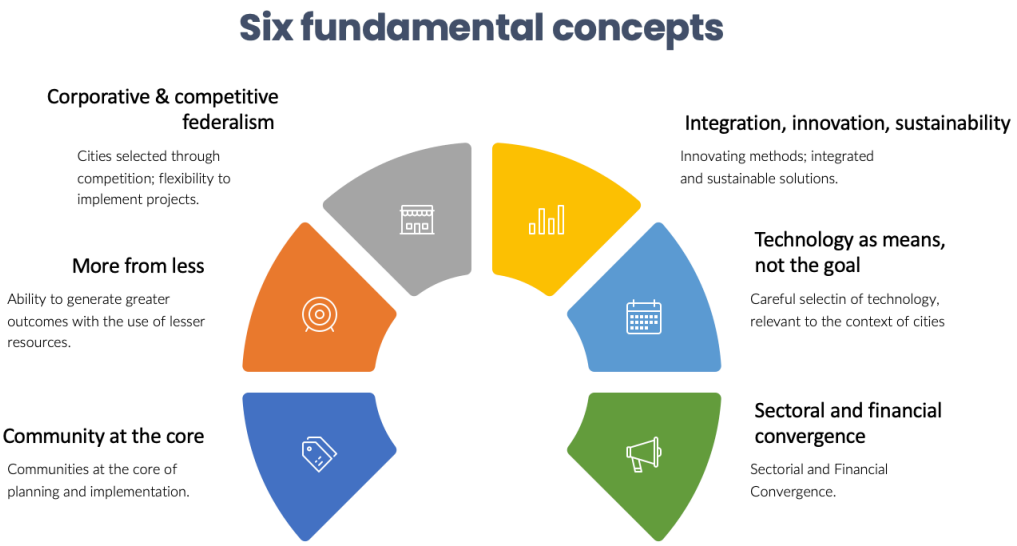


Figure 15: Six fundamental concepts

(Source: MoHUA, Government of India, About Smart Cities mission, https://smartcities.gov.in/about-the-mission)

Strategically important areas:

To achieve the above objectives, the Mission's primary strategic purpose is to develop a comprehensive city plan consisting of Area Based Development (ABD) and Pan City Development – ABD focuses "Redevelopment, Retrofitting, and Green field" development, and Pan City Development integrates smart solutions using a Command and Control Centre at the core of city wide smart solutions. Such comprehensive approaches endeavor to make an impact on driving economic growth and improving the quality of life. ('Strategy', Ministry of Housing and Urban Affairs, Government of India)

Implementation scheme:

The Smart City Mission operation: It is operated as a Centrally sponsored scheme or CSS and the Central Government provided financial support to the Mission of Rs. 48,000 crores over five years.

Key funding sources for the Smart City Mission are the Central Bank, State government, Urban Local Bodies or ULB, local public authorities, public-private partnerships and financial convergence with missions, programs, and schemes of the Indian Government, and others. (MoHUA, Government of India, Financing)

Converging Smart City Mission with central or state government schemes: In order to promote smart city projects, and promote greater benefits derived from synergies between existing schemes and projects, the Government of India requires merging of the Smart City Mission project into other existing government schemes e.g. AMRUT, HRIDY, SBM, IPDS, Shelter for All, Digital India, make in India, Skill India (Figure 16). Relevant external projects in human and financial resources and common activities were combined.

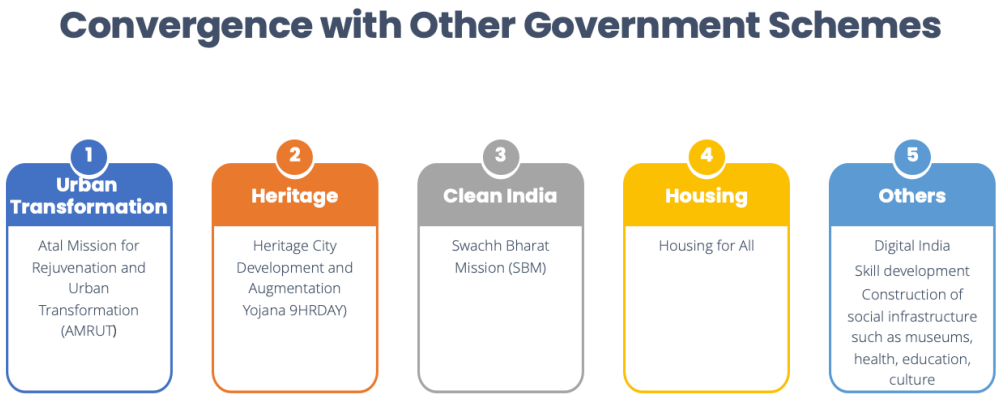


Figure 16: Convergence with other government schemes

(Source: MoHUA, Government of India, Convergence)

Monitoring: Each city selected in the program established a special purpose vehicle (SPV) to operationalize their Smart City Mission program. The SPV is led by an Apex Committee with a defined hierarchy of different groups (Figure 17, and Table 11).

There are different monitoring bodies at three levels. One at national level i.e. the Apex Committee (AC) and National Mission Directorates to national mission direction, activities monitoring and fund approval and release. The second is the state level i.e. High Powered Steering Committee to provide guidance and platform for exchanging ideas. Thirdly, the cities enable collaboration among stakeholders. The major roles of the monitoring bodies are summarized in Table 11.

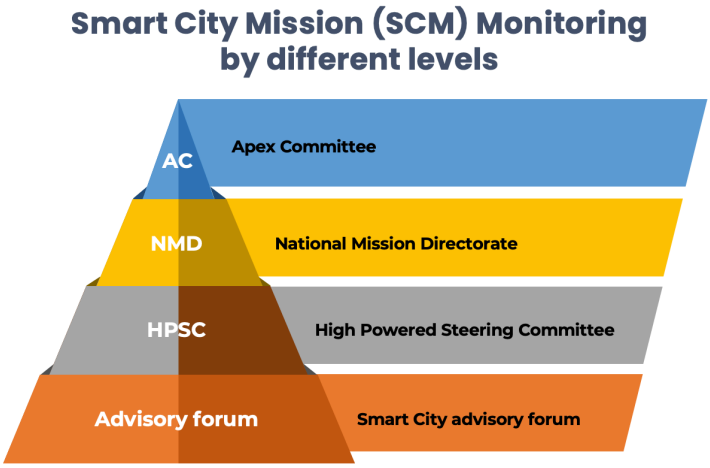


Figure 17: Smart City Mission (SCM) monitoring by different levels

(Source: MoHUA, Government of India, Monitoring)

Table 11 Smart City Mission (SCM) monitoring by different level, roles

Apex Committee (AC)	Headed by the Secretary, MoUD • Approve the Proposals for SCM, monitoring their progress, , release funds • Overall guidance and play an advisory role to the Mission
National Mission Directorate (NMD)	• Overall in-charge of all activities related to the Mission • Develop strategic blueprint and detailed implementation roadmap • Coordinate across Centre, States, ULBs and external stakeholders • Oversee Capacity building and assisting in handholding of SPVs, State and ULBs.
High Powered Steering Committee,	Chaired by the Chief Secretary • steer the Mission Programme in its entirety. • Provide guidance to the Mission • Oversee the process of first stage intra-State competition • Review the SCPs and send to the MoUD for participation in the Challenge
Smart City advisory forum	• Advise and enable collaboration among various stakeholders • District Collector, MP, MLA, Mayor, CEO of SPV, local youths, technical experts, and at least one member from the area • Residents Welfare Association, Taxpayers Association / Rate Payers Association, slum level federation, NGOs or • Mahila Mandali / Chamber of Commerce / Youth Associations • The Forum is called by CEO of SPV

(Source: MoHUA, Government of India, Monitoring

Role of SPV: As a centralized implementation mechanism, special purpose vehicles (SPV) have been established in each city. The SPVs are limited companies created by the states and municipal agencies to plan, appraise, approve, release funds, implement, manage, operate, monitor and evaluate the Smart City development projects (Source: MoHUA, Government of India, SPVs).

The SPV is headed by a full-time chief executive officer, and it's Board comprises nominees of the central, state and local governments. The SPV has the flexibility to implement and manage the Smart City Mission projects and empowered to take any necessary measures. The SPV can also use consulting firms and appoint project management consultants (PMCs). The India Smart City website explains that the state and local governments (ULBs) shall provide: (i) a substantial revenue stream to ensure financial viability of the SPV including sufficient credit worthiness to raise additional resources from the market, and (ii) a government contribution to provide infrastructure that has public benefit outcomes.

On execution, the SPV manages projects in the form of a joint venture or JV, public private partnership or PPP, turnkey contract, etc. that were formerly managed by the government of India/central government. The unique feature of the SPV which uses a private CEO model, is the ability to make quick decisions like the private sector approach. The SPV can also reach out to communities and various stakeholders beyond the jurisdiction of local authorities.

A unique feature of the government supported Smart City Mission is leadership by an SPV which can cover operational and financial areas not undertaken by local authorities.

However, there is also research undertaken about the operational capacity of SPVs. One of the findings is there is a shortage of adequate manpower or requisite legal jurisdiction to operate them. As a result, SPVs need to rely on state level agencies to fill the operational gaps (Praharaj, et al. 2017). Effectiveness requires a strong coordination capacity with sufficient human resources within the context of bureaucratic silo based political systems.

4.2. Disaster risk reduction

India is a seriously disaster prone country. It experienced about 430 major disasters and other hazard between 1991 and 2005 (UNDRR, Asian Disaster Preparedness Center, 2020). In the World Risk Index (WRI) that ranks the level of preparedness among 181 countries, India was ranked 89th in 2020 (jointly developed by the United Nations University Institute for Environment and Human Security (UNU-EHS), Bundnis Entwicklung Hilft and the University of Stuttgart in Germany).

Although smart city development aims to improve the quality of life of citizens and mitigate the impact of disasters, their damage and destruction nevertheless remains high according to the Disaster Risk Reduction Report. The Status Report 2020 (UNDRR, Asian Disaster Preparedness Center, 2020), highlighted some key implementation issues which strengthen DRR capacity – lack of comprehensive and contextualized disaster information leading to warning risks of DRR and climate change adaptation into sectoral development; poor coordination among key agencies, especially implementing agencies, ministries and other organizations; and lacking capacity required to prepare an implementation framework for risk reduction programs, activities and execution; funding, planning and management. It is clear there is a need to strengthen disaster risk management planning and operations in the Smart City Mission.

However, as UNDRR pointed out, 'climate resilience was not mentioned in a cross-section of India' Smart City Mission proposals (UNDRR, Prevention web, 2017). With increasing climate-induced disasters, it is important to address immediate disaster incidents critical to mitigate the risks of damage. But it is also important to consider future impacts, not only focus on taking preventive evaluation measures during the disaster incidents. India launched a climate smart cities assessment framework 2.0 in 2020, five years after the India Smart Mission was launched. It included more soft components such as communication aspects, awareness raising, behavioral change, holistic planning, using a climate assessment report. The addition of these soft assets would clearly complement the missing preventive and disaster mitigation elements of the India Smart City Mission. Closing these existing capacity gaps remain significant issues for Indian smart city development.

4.3. Selection of two cities as case studies

The major reason for selecting the India Smart Mission is its scalability to other Indian cities. Second, India is a disaster-prone country, with a large number of natural disasters involving different types of hazards across different climatic zones. The smart, resilient city plans provide potential solutions.

Two cities from the India Smart City Mission were selected as pilots for the application of the tool introduced in Chapter 3. The purpose was to drive economic growth and improve the quality of life of people by facilitating local area development and harnessing technology that lead to Smart Outcomes (MoHUA, Government of India, Smart City Mission). Another major reason for selecting the India Smart Mission program is its capacity to scale up to other Indian cities. Bhubaneswar (located in the eastern coastal plains) and Nagpur (in the center of the Indian subcontinent) were selected as case studies to represent different geographical locations.

BHUBANESWAR:

City Profile:

Bhubaneswar is a capital city of the State of Odisha, lies in its coastal region of Indian Ocean. It is located in the eastern part of the stage on the Kuakhai river. Bhubaneswar has many historical sites including ancient temples (known as city of temples) (Figure 18, Table 12). Ancient architecture spans 2,000 years from BC 3rd to AD 15th centuries. ('Know Bhubaneswar, Bhubaneswar Smart City Limited,; Britannica). The city consists of two areas – one is old Bhubaneswar and modern Bhubaneswar that developed from 1948, including government buildings, universities, and other public places such as parks and gardens.

The city plays an important role as a regional gateway to the tourist areas of Puri, Konar, and Chilika Lake. Because of its coastal location, it also a trading hub connecting other countries in Southeast Asia. The city also connects inland areas with the national highway to Kolkata in the north and Chennai, and is also linked to other major cities by subsidiary road networks.

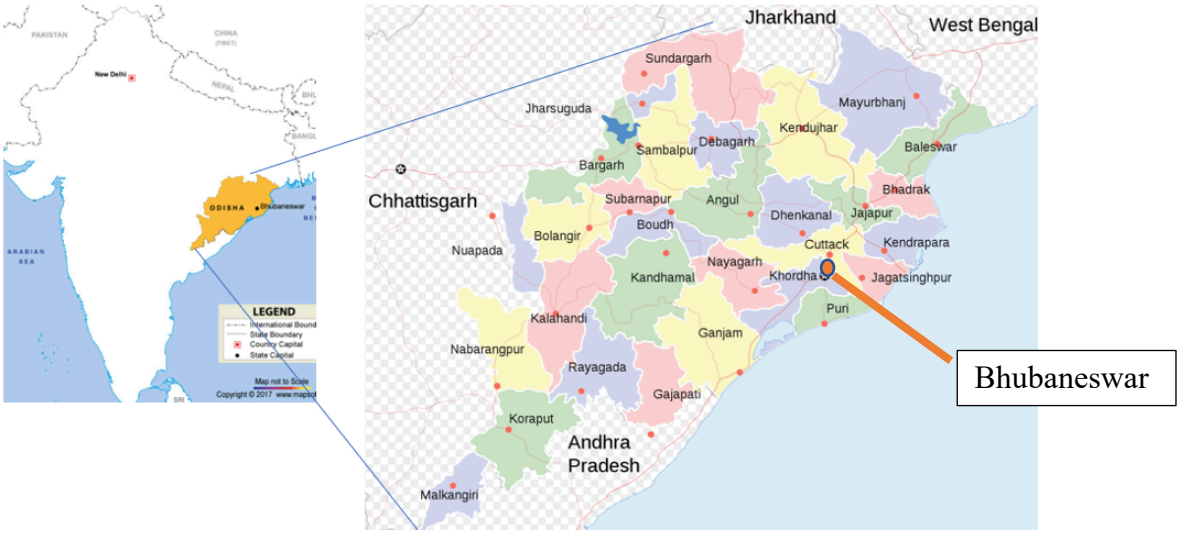


Figure 18: Location map (Bhubaneswar)

(Source: https://en.wikipedia.org/wiki/File:Orissa_State_map.svg, https://www.mapsofindia.com/maps/orissa/orissalocation.htm)

Table 12: City profile (Bhubaneswar)

City	Area	Government	Population (2011) ppl.	Climate geology	Type of disasters
Bhubaneswar (State of Odisha)	Metropolitan area: 186 sq. km (72 sq ml) Metro are: 1,110 sq. km (430 sq ml.)	Bhubaneswar Municipal Corporation (BMC)	Metropolis: 974,000 Metro: 1.3 Mill.	Tropical weather climatic conditions, Eastern coastal plains	Cyclone, floods, Tsunami Hear wave

(Source: Bhubaneswar Municipal Corporation; Bhubaneswar smart City Limited; Bhubaneswar India Local Governance Network)

Smart City Mission:

Bhubaneswar was selected as part of the Smart City Mission in 2016 and established a special purpose vehicle (SPV) called the Bhubaneswar Smart City Limited to implement the mission and its programs.

The Bhubaneswar Urban Development Authority developed its Urban plan 2030. It sets out the spatial strategy for the 14 planning sub-areas identified in the plan to meet the different needs of each region. Bhubaneswar has some major urban development challenges including: (i) urban sprawl and leapfrog development due to low density development and limited release of public lands for development in its core area; (ii) with a lack of a city core, no business district has evolved over the years in the city which has resulted in scattered development and lack of distinct city center to attract private sector investment; (iii) weak public transport system with the city bus service network covering limited areas of city and small number of busses compared with national average; (iv) 36% of city population live in unregulated informal settlements due to a shortage of affordable housing options; (v) encroachment of unhygienic natural drainage zones; (vi) uncontrolled tourist traffic; and (vii) multiplicity of agencies (Source: Bhubaneswar Smart City Mission Proposal, Stage II).

Based on these challenges, the city's 3-5 years strategic plan is as follows: (i) creating a sustainable model based on new urban principles that provide citizens with prosperity, safety, and equity; and (ii) an urban planning system with integrated land use and transport planning, infrastructure planning, and socio-economic planning. Underpinning these focus areas are five strategic pillars - responsive governance, transit-oriented development, financial sustainability, infrastructure, and socio-economic development.

With this background, the Bhubaneswar city vision is establishing the following:

- Transit oriented city with compact urban form that promote active, connected and sustainable mobility choices
- Livable city providing diverse range of housing, educational and recreational opportunities while enhancing its heritage, arts and traditional communities
- Child-friendly city providing accessible, safe, inclusive and vibrant public places
- Eco-city co-existing in harmony with natural for nurturing a resilient, clean, green, and healthy environment,
- Regional economic center attracting knowledge based enterprises and sustainable tourism activities by leveraging and empowering its institutions, local businesses and informal workforce.

Table 13: Bhubaneswar smart city key features

Bhubaneswar's vision	To be a regional economic center, livable, ecologically sustainable, efficient transport, child-friendly city with accessibility and safety, through participatory decision-making, responsible governance and open access to information and technology
Major interventions (ABD, Pan City Development)	• The town center district (985 acres) development for ABD (A walkable, well-connected mixed-use area; A model of low-impact carbon neutral development) • Social equality and capacity development in ABD development area. • Intelligent City Operations and City Management Center (ICOMC) development for Pan city; and
Smart city implementation body	Bhubaneswar Smart City Ltd. (BSCL)
Project financing approaches	Central government, Government of Odisha, Bhubaneswar city, Converge scheme (AMRUT、Swacch Bharat）, PPP, and others

(Source: The Smart City Challenge Stage 2 Bhubaneswar. 2016)

NAGPUR:

City Profile:

Nagpur is a city in the state of Maharashtra, located in western India. The city lies along the Nag river and is situated in the middle of the Indian. It is a fast growing metropolis, the third largest city in Maharashtra and a major commercial and political center of the Vidarbha region of Maharashtra. The city is also known as "Orange City" because it is a major orange growing region (https://nagpur.gov.in/history/) (Figure 19, Table 14)

The city is managed by the Nagpur Municipal Corporation or NMC led by a Mayor supported by several committees, including the standing committees on health and sanitation, education, water works, public works and others. The Nagpur Metropolitan Regional Development Authority (NMRDA) supervises metropolitan development comprising 721 villages across local administrative units or nine tehsils in the district. The city is also an educational and cultural center for the region.

On transport, Nagpur has a good connectivity with all the important domestic cities. All major highways (national highway 6, 7) and railway routes to Mumbai, Chennai, Delhi pass through the city. An electrified broad gauge railway (a commuter rail) track connects Nagpur to the four major metropolitan areas. Its international airport is one of the busiest in the country (NMC).

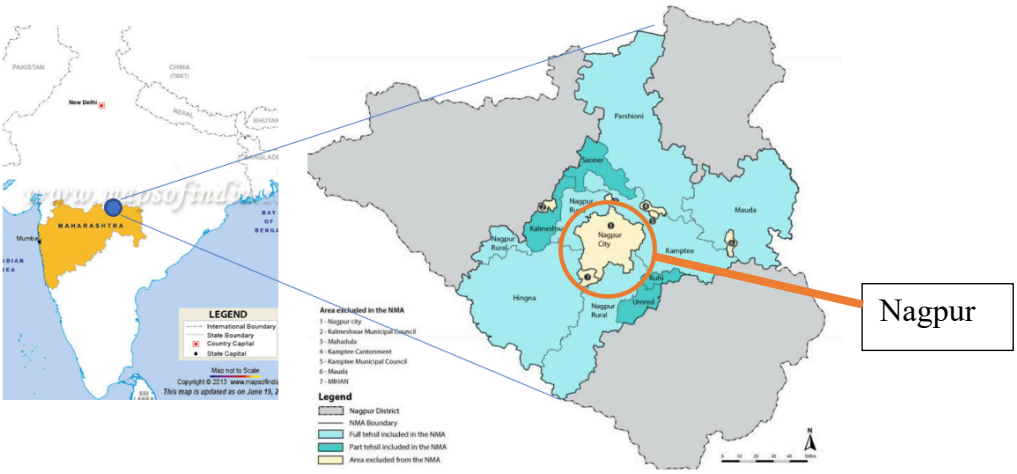


Figure 19: Location map (Nagpur)

(Source: https://www.mapsofindia.com/maps/maharashtra/maharashtralocation.htm
NMA (Nagpur Metropolitan Region Development Authority)
http://www.nmrda.org/aboutNMR.aspx?lang=mr-IN

Table 14: City profile (Nagpur)

City	Area	Government	Population (2011) ppl.	Climate geology	Type of disasters
Nagpur (State of Maharashtra)	Nagpur city area: 217.65 sq km . Nagpur district area (9,897 sq km)	Nagpur Municipal Corporation Nagpur Metropolitan Regional Development Authority	Metro area: 24,05,421	Dry	Flood, Landslide, drought, heat wave

(Source: Nagpur Municipal Corporation; District Nagpur, Government of Maharashtra; District Disaster Management Authority Nagpur)

Smart City Mission:

Smart city vision and strategic focus :

Nagpur Municipal Corporation's vision for smart city is contained in its development plan.

Nagpur's major city development challenges are: (i) Multiple and duplicative planning institutions and dichotomy in growth causes uncoordinated and ineffective planning that affects quality of life; (ii) unplanned and haphazard development due to inconsistent development plan and land use planning; (iii) inequitable distribution of civic services due to unplanned layout and provision of adequate water supply, sanitation, sewerage, public transport and street lighting, and others; (iv) inadequate public transport system including bus services the only available city public transport; (v) administrative and operational inefficiencies which lower the quality of public service delivery; and (vi) lack of employment opportunities due to the pace of economic growth over the year and educated people could not find adequate employment opportunities and qualified employees (India Smart City Mission. The Smart City Challenge Stage 2 - Nagpur, 2018).

With this background Nagpur's city vision is as follows:

Nagpur seeks to transform the city into the most livable 'eco-friendly edu-city', that connects citizens virtually with the government to create an inclusive ecosystem loop. The city has a transformative agenda with four key features in its action plan, i.e., smart living, smart mobility, smart environment, and smart governance, for enhancing the quality of life in Nagpur. It is supported by 12 areas of focus for action (inclusive living, policy-centric city, safe and walkable streets, economic vitality, TOD, connect places and effectively move people, carbon neutral and

sustainable habitat, Swachh Nagpur, urban greening, digital efficiency and good governance, revive Nagpur's image as regional economic center, and boost job creation) (India Smart City Mission. The Smart City Challenge Stage 2 - Nagpur, 2018).

Table 15 (a): City vision and strategic blueprint area

1. Smart Living	2. Smart Mobility	3. Samrat Environment	4. Smart Governance
Inclusive living	Transit Oriented Development	Carbon Neutral & Sustainable Habitat	Digital Efficient and Transparent Governance
Poly-centric city	Connect Places and Move People	Swachh Nagpur	Revive Nagpur's image as the regional economic center and boost job creation
Safe and walkable streets	Urban Regeneration with walk-to-work	Urban Greens	
Economic vitality			

(Source: Nagpur Smart City Mission Proposal, Stage 2 - Nagpur, 2018)

Table 15 (b): Nagpur smart city key areas

Nagpur's vision	To transform India's heart-Nagpur into the most livable eco-friendly, edu-city that electronically connects people with the government to co-create an inclusive ecosystem"
3 major interventions (ABD, Pan City Development)	• Retrofitting of Pardi-Bharatwada-Punapur in the eastern periphery (951 acres) to make the city inclusive growth and enhance the city's profile by improving the quality of life in vulnerable areas • Invest in a customized ICT based Smart Swachh City Solution to streamline city's garbage management based on the vision for a 'Clean' city • 'Safe City' by the Nagpur City Community Network (NCCN) and & a Unified Operations Command and Control Center (UOCCC) to operationalize ICT based solutions. • Satellite imagery based monitoring of city expansion to check unplanned development
Smart city implementation body	Nagpur Smart and Sustainable Development Corporation Limited (NSSCDCL)

(Source: Nagpur Smart City Mission Proposal, Stage 2 - Nagpur, 2018)

4.4. Ease of Living Index and Municipal Performance Index

The Government of India published two performance indicators in 2020. One is the Ease of Living (EOL) Index 2020 and the other is the Municipal Performance Index (MPI). The EOL and the MPI provide a measure of performance about the well-being of citizens and the effectiveness and quality of urban governance respectively.

The EOL index was launched in 2018 to assess India's flagship programs in operation i.e. Smart Cities Mission, Swachh Bharat Mission (SBM), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), Pradhan Mantri Awas Yojana-Urban (PMAY-U), Deen Dayal Antyodaya Yojana-National Urban Livelihood Mission (Day-Nulm), and Heritage City Development and Augmentation Yojana (HRIDAY). Most of them are listed as convergence programs in the Smart City Missions. EOL aims to contribute to evidence-based planning resulting in a better quality of life for its citizens MPI 2022. MPI was developed in the EOL index reform process. A clear distinction was drawn in the EOL to emphasize the outcomes of development, with key three pillars: quality of life, economic ability, and sustainability. In addition there is a further division into 14 categories and a total of 50 indicators. Also the EOL is closely linked to the UN Sustainable Development Goals (SDGs) (Ease of Living Index 2020, Assessment Report, https://smartnet.niua.org/content/f3fe50c5-70f1-4830-bdda-6d9a2b565842)

The MPI represents the inputs or enabling factors (municipalities administration working, governance of cities) were to be separated assessed under MPI (MPI 2020, https://livabilitystore175634-prod.s3.amazonaws.com/public/docs/MPI_Report.pdf). This tool identifies the gaps in policies and implementation reflected in the outcomes. There are five key pillars: service, finance, planning, technology, and governance and breaks 20 sectors and into total 100 indicators.

Table 16 compares each index that supports the Smart City Mission by providing measurements of service quality and enhancement of citizens' well-being. Each index can assess how soft assets are considered in the planning stage and utilized in the implementation stage.

The EOL index addresses outcomes. MPI's performance of urban governance is also important to measure project effectiveness. In this chapter, the selected EOL indicators and methodologies will be examined to analyze and extrapolate the relation between soft asset consideration and performance.

Table 16: Comparison between Ease of Living (EOL) Index and Municipal Performance (MPI) Index

	Formulated by	**Cities**	**> 1 mil.**	**< 1 mil.**	**basis of data**	**4 broad city capacity pillard (Indicators)**	**Characteristics selected indicate**
Ease of Living Index (EOL) 2020 https://livabilitystore175634-prod.s3.amazonaws.com/public/docs/Ease_of_Living_Report.pdf	MoHUA with the support of their knowledge partner—Institute of Competitiveness. Other partners in this venture are Smart Cities Mission Directorate, Karvy Data Management Services, National Informatics Centre, City Data Officers, Smart City Consultants, and Smart City Fellows	111	49	62	50 indicators	- Quality of life (education, health, housing and shelter, water, sanitation, hygiene, solid waste management, mobility, safety and security, and recreation); - Economic ability (level of development, economic opportunities); - Sustainability (environment, green space and buildings, energy consumption, and resilience) - Citizen perception survey (conducted between February and March 2020 to confirm results of data).	Helps in knowing **about the well-being of the citizens**. It informs city governments about the gaps in urban policies, planning, and implementation initiatives, and offers an opportunity to improve the lives of citizens, as well as track the status of the sustainable development goals (SDGs)
Municipal Performance Index (MPI) 2020 https://livabilitystore175634-prod.s3.amazonaws.com/public/docs/MPI_Report.pdf		111	51	60	20 sectors, 100 indicators	- Governance (transparency and accountability, - Human resources, participation, and effectiveness); - Technology (digital governance, access, and literacy); - Planning (plan preparation, implementation, and enforcement); - Services (education, health, water and wastewater, solid waste management and sanitation, registration and permits, and infrastructure); and Finance (revenue and expenditure management, fiscal responsibility, and decentralisation).	**Describe the quality of urban governance** (or performance of municipalities) in select cities. The data and analysis provided in the report will help municipalities in knowing the planning and management practices that require strengthening/reform

(Source: MoHUA, Government of India, https://smartcities.gov.in/Ease_of_Living_Index_and_Municipal_Performance_Index)

4.5. Ease of Living Index Indicator overview

4.5.1. Framework

The Ease of Living Index has four pillars with different levels and each pillar has indicators shown in table 16 in the previous section. The percentage allocation is 35% is for Quality of Life, 15% is for Economic ability, 20% is for Sustainability, and 30% is for Citizen's perception survey. According to EOL 2020, each pillar embraces the following areas (Table 17):

Table 17: Index framework and weight

Pillars	**Quality of Life (35%)**	**Economic ability (15%)**	**Sustainability (20%)**	**Citizen's perception survey (30%)**
Capture/ evaluate	Understand the different aspects contributing to a decent urban life. The goal is to assess a holistic impression of the quality of life in India's urban cities.	Economic well-being of citizens by evaluation the level of economic development and inequalities that they encounter in a particular city.	Along the lines of availability of green spaces, promotion of green buildings level of energy consumption, the quality of natural resources such as air and water and the city's ability to withstand natural disasters.	Perception of the city residents and allows them to evaluate the level and quality of development
Approac h	Examining provisions for necessities (urban services)		Data provided by the cities and validated by secondary sources	Survey Results were used for validation of data provided by cities

(Source: MoHUA, Government of India, Ease of Living Index 2020)

4.5.2. Methodology

The examination used several approaches to capture optimal results taking into consideration diverse development stages of different municipalities. Two groups of cities were classified by population greater than 1 million and less than 1 million. 111 cities were selected and include all cities under the Smart City Mission.

Different scoring methods were applied to each indicator. At the stage of Category Scores, each indicator under the category has been given the same weight. The weights for the separate pillars were assigned based on inputs from experts and set proportionally across pillars. The category values are calculated by adding up the weighted scores with specific formulae for the Ease of

Living Index. Capacity pillars and key index sectors are shown below (Figure 20 (a), (b), Figure 21 (a), (b)).

Figure 20 (a): Ease of Living Index 2020: Bhubaneswar (Source: MoHUA, 'Ease of Living Index (EOL), https://smartnet.niua.org/content/f3fe50c5-70f1-4830-bdda-6d9a2b565842)

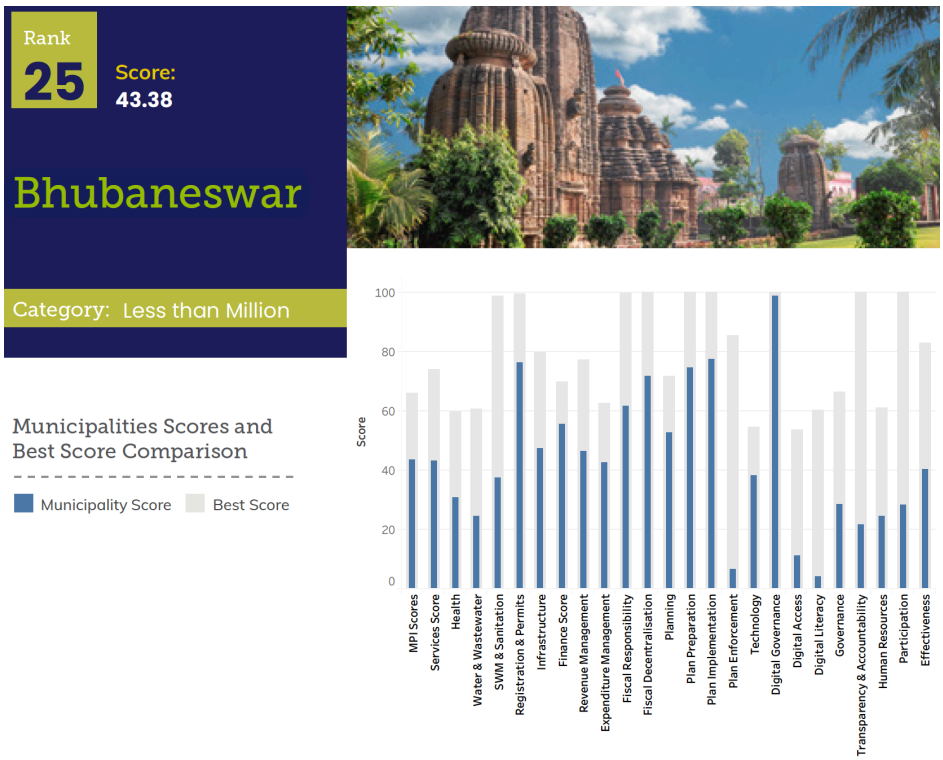


Figure 20 (b): Municipal Performance Index 2020: Bhubaneswar (Source: MoHUA, Municipal Performance Index (MPI), https://livabilitystore175634-prod.s3.amazonaws.com/public/docs/MPI_Report.pdf)

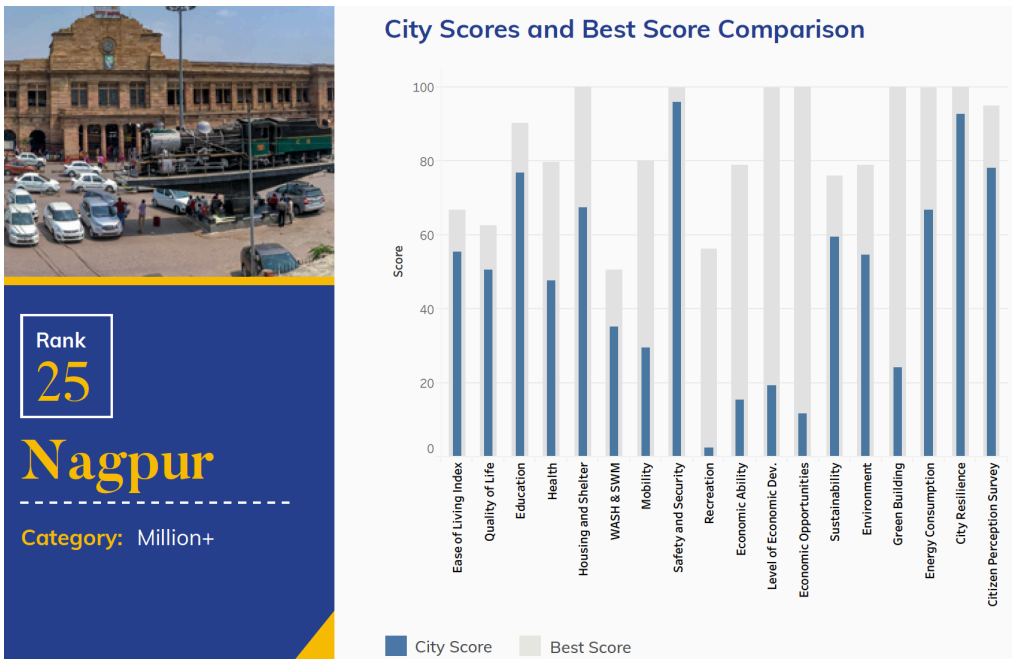


Figure 21 (a): Ease of Living Index 2020: Nagpur (Source: MoHUA, 'Ease of Living Index (EOL), https://smartnet.niua.org/content/f3fe50c5-70f1-4830-bdda-6d9a2b565842)

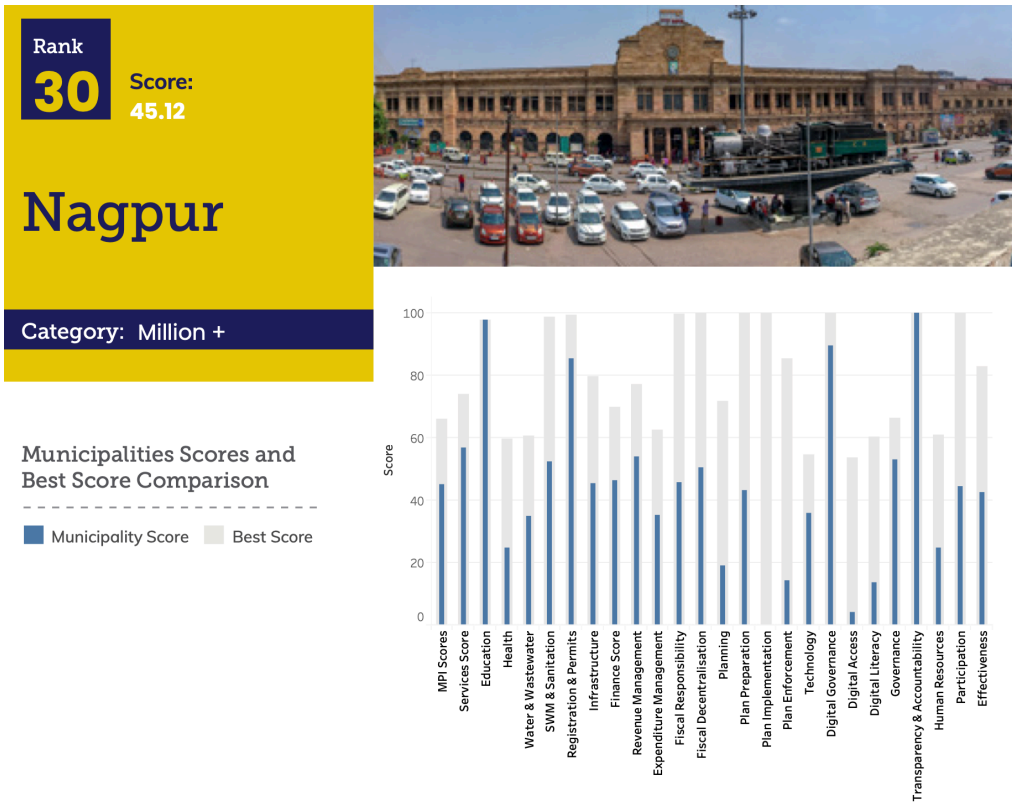


Figure 21 (b): Municipal Performance Index 2020: Nagpur (Source: MoHUA, Municipal Performance Index (MPI), https://livabilitystore175634-prod.s3.amazonaws.com/public/docs/MPI_Report.pdf)

4.5.3. Ease of living – Citizen's perception

The citizen perception of their environment was an important component of the Ease of Living Index to directly capture citizen's view about the quality of life in their cities. As included in Table 17, index framework and weight in section 4.5.1., the Citizen Perception Survey is a very useful indicator to validate the data provided the local authority uses it as a tool to identify gaps from the citizen's experiences and assessments of city service delivery, and the effectiveness of the prevailing public administration. The survey called "#MyCityMyPride" was conducted by MoHUA, the National Institution of Urban Affairs and other partners (The National Institution of Urban Affairs, EASE of LIVING 2020, Citizen Perception Survey).

Methods and approaches:

The survey method combined online and offline inputs: from January to February 2020 online and to March by in-person survey (Citizen Perception Survey in The Ease of Living 2020). Various modes of communication (newspaper, social media, billboard, outdoor advertising, campaign, etc.) were introduced to promote the survey among citizens, including 'MyGov.in.' a citizen engagement platform funded by the Government of India that involves citizen participation in assessing the status of city governance and development. Also some incentivized mechanisms to boost the level of participation were introduced by the government.

Questionnaires:

The survey questions were simple and focused on 'service provision' to evaluate how citizens perceive their satisfaction with service delivery: (i) Quality of lives: housing, cleanness, water supply, commuting, mobility, safe for women, culture, amusement facilities; (ii) Economic ability: Job opportunities, cost of living, accessibility to financial services; and (iii) Sustainability: air quality, green places, and electricity supplies related.

Number of respondents and groups:

On the online part both 'MyGov.in.' and on other online part, more than 2.5millions people participated. The in-person or face-to-face citizen interviews were conducted by experienced field enumerators and involved more than 95,000 samples in total. Hence the government received 2.65million responses. In terms of the demography of respondents, males between age 18-35 was the largest group (41.4%) followed by male over age 35 groups (31.9%), females between age 18-35 group (15.7%), then females over age 35 group (11%).

Table 18 (a), (b) below show the results of the indexes of two case study cities selected for this research.

Table 18 (a): Ranking of Ease of Living Index 2020

Population category	National average	Bhubaneswar		Nagpur	
		Less than million	Score	Million +	Score
Ranking: **Ease of Living Index (EOL) 2022**					
Ease of Living Index		2	59.85	25	55.33
QUALITY OF LIFE	51.38	21	51.79	38	50.59
ECONOMIC ABILITY	13.17	19	11.57	20	15.35
SUSTAINABILITY	53.65	11	57.77	16	59.43
Ease of Living Index (w/o CPS)*	30.69		31.42		31.90
CITIZEN PERCEPTION SURVEY*	76.08	1	94.80	40	78.10
Ease of Living Index	53.1	2	59.85	25	55.33

(* Ranking under all cities)

Table 18 (b): Ranking of Ease of Living Index 2020 and Municipal Performance Index 2020

Verticals	National average	Bhubaneswar		Nagpur	
		Less than million	Score	Million +	Score
Ranking: **Municipal Performance Index (MPI) 2020**					
National average	43.13				
GOVERNANCE	42.83	52	28.62	15	52.94
PLANNING	34.03	3	52.76	50	19.16
TECHNOLOGY	24.02	3	37.92	9	35.75
FINANCE	51.11	17	55.52	43	46.27
SERVICE	52.13	45	43.18	22	56.57

(Source: MoHUA, Government of India, Ease of Living 2020. Municipal Performance Index 2020)

Among all cities (111 cities), Bhubaneswar is ranked 1 (CPS score: 94.8; EOL Index without CPS: 31.42; Nagpur is ranked 40 (CPS score: 78.1; EOL Index without CPS: 31.90) (MoHUA, Government of India, Ease of Living Index 20201). Under the 'Quality of Life', category, the ranking was divided into two groups based on population size, i.e. more than million and less than million. As for Bhubaneswar, it is ranked 21 out of 69 cities (score: 51.79). Nagpur is ranked 38 out of 49 cities (score: 50.59). Among other index score of the LOE, the CPS is relatively higher than other cities at least both are in first 35% of total cities whereas the quality of life are relatively lower than CPS.

Each city made efforts to increase the response rate of the Citizen Perception Survey. For example, Bhubaneswar Smart City Limited in collaboration with Bhubaneswar Municipal Corporation (BMC) and BDA carried out a massive publicity campaign through many available communication channels to motivate citizens to participate the survey (Odisha Bytes, 2021). Strong and widespread campaigns can motivate its citizens to participate more resulting in higher ranking. But the results reflect their perception with a relatively high degree of accuracy based on the results of other pillars such as Quality of Live, Sustainability, resulted in higher 'Ease of Living Index' results.

Interestingly, each city's top five City Scores are similar – Bhubaneswar has 'City resilience'; 'Housing and shelter'; 'Safety and security'; 'Energy consumption'; 'Education'; and 'Security', while the lowest item was 'Level of economic development'. Nagpur has 'Safety and Security'; 'City resilience'; 'Education'; 'Housing and shelter'; and 'Energy consumption' in descending order according to the City Scores, while the lowest item was 'Recreation'.

The next chapter examines the modes and types of soft assets identified.

CHAPTER 5: HOW CAN SOFT ASSETS BE INCORPORATED - CASE EXAMINATIONS

This chapter presents a comparative case analysis of how soft assets are incorporated by cities between the proposal and implementation stages connecting the desktop analysis and data from in-person interviews. The influential nodes which create value and actual actions taken by cities are examined. This chapter also endeavors to illustrate examples of this value creation process using visual mapping. Community engagement and using consultations to improve the quality of communications are also reviewed based on the survey results.

5.1. Application of a qualitative framework tool to identify soft asset incorporation

This section reviews how soft assets are incorporated in both the planning and implementation stages of the Smart City Mission program proposal, including:

(i) Identify where soft assets are incorporated;
(ii) Examine findings of their features, tendency, and unique approaches to make the incorporation (integration) from two city cases; and
(iii) Explain the similarities and differences between the two cities.

As discussed in Chapter 3, due to the unique characteristics of soft assets and difficulties to establish clear linear relations between inputs and outputs, it is difficult to trace the origins of many soft assets used by cities. In addition, compared to the private sector, the ultimate goal of a city is to achieve effective service provision to citizens aligned with the city's mission, vision and objectives. Measuring results in monetary terms is not easy, and identifying the value of soft assets is complicated, but the objective is to accomplish the mission of the city (Chapter 3).

Using soft assets drives value creation in a city and understanding this process, it can be one of the entry points to improve the service performance of the city and how to better manage the ultimate outputs of soft assets.

This chapter endeavors to identify the level of soft assets incorporation, although the approaches discussed in this chapter are limited and specific to this research. However, findings can be positively analyzed using the Ease of living index discussed in chapter 4. These assessments are also related to chapter 6 describing the analysis of the findings to support the positive assumption

in chapter 1 Figure 2. that soft assets in smart and resilient cities create value and enhance capital performance..

5.1.1. Survey Approaches

The survey conducted of respondents from the two Indian smart city case studies examined how city authorities incorporated soft assets into planning and implementation processes to develop smart, resilient cities.

a. Desk top research methods (Proposal stage):

Objective:

The desk top research aimed to examine how soft assets consideration and decision making work in actual cases on the ground. The qualitative framework used to identify soft assets utilization (Table 9, Chapter 3) was applied to examine the Smart City Mission proposal. The data collected was then collated and organized using an analytical tool such as the Cytoscape (https://cytoscape.org) to identify influential nodes that produced influencing factors to create value over time.

Using the network analysis tool, the degree of soft asset consideration was examined from two aspects: First is to discover the relationships between core elements ("large node") from the key nine elements, and their connectivity structures with actions/initiatives ("small node") linked by soft asset capital components (in the 'Cystoscope', it is 'relation' or 'edge'). This demonstrated which areas the city emphasized more than others, which elements were more influential over the entire connectivity, and also potential synergetic effects interacting to create additional value in the future. Second is to identify the level of consideration of soft asset capitals and observe the degree of alignment with and potential gaps in the city's vision and objectives. In addition, surveys were conducted to: (i) understanding city administrators and key stakeholders' experiences, observations, insights; and (ii) examining whether the survey results can verify the desk top research and analysis of the proposal stage.

For the research, the following methodology was used to review how city administrators consider, select and use soft assets:

Survey methods:

A desk top review of part (a) to (c) of the India Smart Mission proposal (Stage II) was undertaken. The proposal was composed of: (a) City Profile; (b) Area Based Proposal; (c) Pan-City Proposal;

(d) Implementation Plan; and (e) Financial Plan. *A qualitative framework for identification of soft asset incorporated* (Table 9, Chapter 3) was used to analyze and categorize the results, including which soft asset elements and capital components were considered in which of the 45 items. Note that the City Profile section includes past efforts and current status, so the information reviewed concentrated on the present and future planning.

Limitations of the Survey:

Due to the intrinsic nature of soft assets, broader categorization of indicators that are used in *the qualitative framew*ork, the review and identification of soft asset consideration in the Smart City Proposal involve the author's subjective judgement. To make appropriate adjustments to identify initiatives or activities in the proposal, the key words search function was also used with 45 items of indicators (Table 9, Chapter 3). The author also endeavored to apply five soft assets capital components to initiatives or activities under the nine key value elements from every conceivable angle.

b. <u>In-person interview (implementation stage)</u>

This research also used in-person interviews with targeted influential decision makers and stakeholders in the two city studies - Bhubaneswar and Nagpur. Since some topics were difficult and esoteric are some questions not straightforward, additional explanations to respondents were required to meet each individual's level of understanding. Also, the survey was conducted by a native speaker (interviewer) with whom the author of this research closely communicated and discussed to customize interview questions appropriately for each type of city respondent.

Objectives:

The objectives of the survey were to understand: (i) how you (or your city) as a senior city official, implementer, academia, NGO staff, private sector, etc. make decisions about using soft assets during the planning and implementation of the Smart City Mission; (ii) if you are not a central decision maker, what were your observations and insights; (iii) how a balance between soft and hard assets is achieved within the decision making process; and (iii) how the soft assets created value and impact to enhance the functioning of the Smart City Mission.

Survey methods:

Both structured and unstructured interviews were used to obtain optimal responses from target respondents.

- In Nagpur, the respondents reviewed and checked the questionnaires prepared and shared prior to the meetings. The local interviewer ensured that the respondents fully understood the context and nature of the questions.
- In Bhubaneswar, the city public relations officer met the interviewer first to discuss the questions then collected inputs and feedback from appropriate departments to ensure better responsiveness.

Target groups:

The following target groups were selected. The interviews were conducted for 5 days in each city.

Table 19: Affiliations of the interviewees

City	Target interviewee/responded	Type of affiliation
Bhubaneswar	Director	Technology Consultant to BSCL
	Youth Specialist cum Programme Coordinator	BSCL (Supported by UNPFA)
	Urban Planner and Social Media Manger (Respectively)	Bhubaneswar Urban Knowledge Centre (BUKC)
	Technical Advisor- Climate Smart Cities	GIZ
	Program Manager	Private sector
	Associate- General Manager	Private sector
	Assistant Professor	Academia
	Assistant Professor	Academia
Nagpur	Project executive	Nagpur Smart City CDCL (SPV)
	Technical officer (Engineer)	Nagpur Smart City CDCL (SPV)
	Additional Commissioner (General)	Nagpur Municipal Corporation (NMC)
	Assistant manager (energy & climate)	Non-Profit Organization
	Manager	Private sector
	Director	Civil society
	Regional director	Civil society

5.1.2. Survey questionnaires and limitations of the interview survey

The survey interview questionnaire form used for the interview consisted of the following key areas:

The survey consisted of open-ended questions within the scope of Bhubaneswar Smart City Mission and Nagpur Smart City Mission. The survey conducted in each city endeavored to capture

an overall picture of how city officials perceived soft assets and how they evaluated their utility in the Smart City Mission implementation stage, including performance issues and creating value. The author understands that tracing each activity identified at the proposal stage analysis is not feasible. It is furthermore difficult to trace and identify actual occurrences of synergetic, spillover, and scaling up effects. However, it is feasible to compare the proposal stage and interview stage (implementation stage) to evaluate soft assets performance and how values are created.

Although, as mentioned earlier, soft assets values are created with synergetic, spill-over, and scaling-up effect, the reality can be mapped through actual experiences, observations, implementation, and executions from key stakeholders. This was the basis on which the questionnaires were developed which highlighted city level priority and approaches and real assets, impact, and actual cases of value creation.

1. ***Maintaining a balance between physical infrastructure and soft (or intangible) assets in smart city development.*** The series of questions under this pillar sought to understand the views of city officials and other key stakeholders in considering using soft assets, including 'successful action/benefit practice', 'how soft assets were conceived during planning and how they were used during actual implementation, and the challenges and benefits, and the results of using soft assets.
2. ***'Resilience' and 'Covid-19 pandemic effect on incorporation of soft assets'*** were also included to understand ways the city handled decisions and actions for preventing and preparing for the health pandemic during the Covid period.
3. ***Value creation action and impact cases.*** Provide examples or cases of actual soft asset value creation and mapping (i.e. understand the decision making authority, what was created by what and how they will be used).
4. ***Consultation process, quality of communications, and community engagement.*** The responses in this area linked closely to the India's Ease of Living Index.
5. ***Review, feedback, learning and sharing process.*** The series of questions under this pillar were designed to examine any modeling or feedback loops, or any systematic arrangement or process of how the Smart City Mission implementation results are evaluated by city officials in the context of their urban development strategies.

Limitations of the interview survey:

The final number of survey results of the in-person interview were lower than originally anticipated due to various scheduling conflicts of respondents. Local experts ensured that an adequate range of target interviewees participated and responded, but there were certain limitations.

Number of interviewees/respondents: Due to the technical nature of the research topic and objectives, the survey was not designed to collect a large number of respondents, rather more detailed in-depth responses from knowledgeable city decision-makers and stakeholders to gain granular understanding of how decisions are made to incorporate soft assets into planning and implement and their observations and insights on all levels and angles of their actions.

Level of follow up the details of the (first) desktop review and the (second) in-person interviews: Compared to the level of detailed data obtained from the desktop review, the results of the in-person interviews were different. It was not possible to follow all activities reviewed in the proposal stages. Because of the many stakeholders involved, it was not realistic to cover all initiatives and projects undertaken. The in-person interviews focused more on personal observations, experiences, analyses, and impressions of the respondents with different roles in the Smart City Mission. The survey results capture the major trends and they are compared to the proposal stage results. The results were able to be measured and evaluated against the material discussed in the desktop review in terms of the 'nine value elements in smart, resilient city' and 'five soft asset capitals".

Subjective responses to the survey questionnaires: Their responses generally related to the respondents own specific experience within the city administration. Secondly, many of the interviewers were busy senior officials and often unable to spend the time necessary for in-depth interviews, discussing broad approaches and overviews of strategic approaches,

There were other challenges identified at the interview stage in the survey, but certain countermeasures were undertaken to ensure the quality of responses.

- The technical terminology of soft assets were often difficult for some officials as different terminology is sometimes used in their local context. At the time of interviews the interviewer ensured that the interviewees/respondents fully understood the survey terminology.
- Some questions were not appropriate for different types of respondents not allowing them to fully share their insights. Also some answers required translation to their own local contexts. The author and the interviewer carefully designed the questions to suit each interviewee/respondent.
- Notion/recognition of soft assets were often associated by respondents with public affairs or human resources. It seemed to be relatively easy for them to understand and contextualized. The interviewer asked unstructured interview questions to cover other soft asset capitals as appropriate during the course of respective interview and survey results analysis stage.

5.2. CASE 1: Bhubaneswar

5.2.1. Desk top research (Proposal stage)

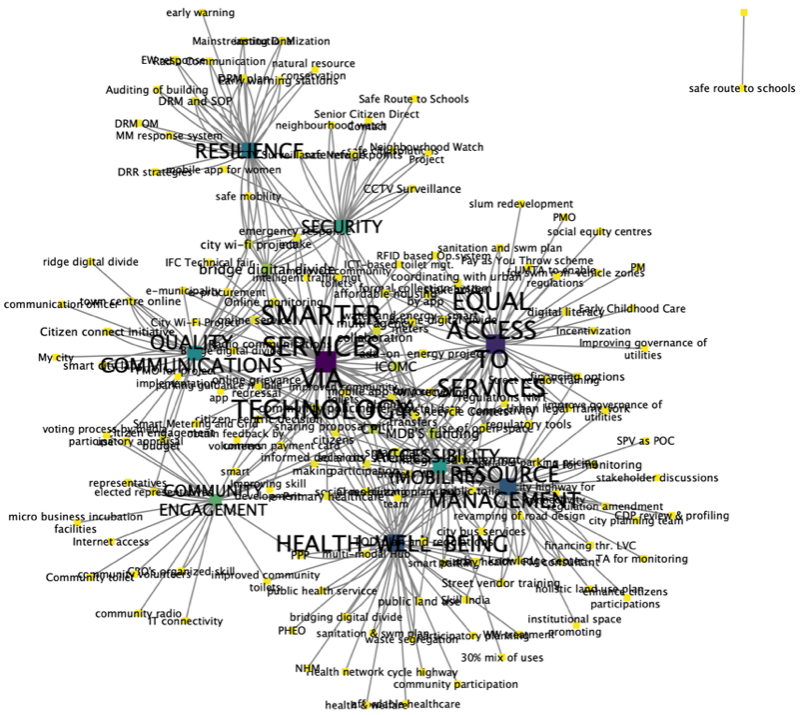
Initial findings (Connectivity):

Using the qualitative identification framework tool, Table 20 below sets out a series of actions and/or initiatives categorized under each soft asset capital element (the top row) and the nine value elements (the left column).

Table 20: Number of actions/initiatives (soft asset consideration): Bhubaneswar (proposal stage)

	People/Human capital	Institutional capital	External capital	Technology (Information) capital	Social capital	Total	%
Resource Management	14	18	7	2	7	48	12.3
Accessibility (Mobility)	8	12	6	6	1	33	8.4
Health Well-being	16	18	7	4	5	50	12.8
Equal Access to Services	16	21	10	6	5	58	14.8
Smarter Services via Technology	9	19	11	22	6	67	17.1
Commuity Engagement	4	7	2	2	10	25	6.4
Quality Communications	5	9	4	9	10	37	9.5
Security	7	13	3	5	3	31	7.9
Resilience	14	15	5	4	4	42	10.7
Total	93	132	55	60	51	391	100.0
%	23.8	33.8	14.1	15.3	13.0	100.0	

Figure 22 (a). Figure 22 (a) shows the interconnection based on each value element (larger nodes are shown in purple and green) and actions and/or initiatives (in yellow, smaller nodes). Each line (edge) represents five relevant soft asset capital elements. This also demonstrated by the linked parameters in Figure 22 (b), (c).



Bhubaneswarr	Betweeness Centrality
SMARTER SERVICES VIA TECHNOLOGY	0.32951008
EQUAL ACCESS TO SERVICES	0.228870407
HEALTH-WELL-BEING	0.224834217
RESOURCE MANAGEMENT	0.222476692
RESILIENCE	0.162294326
QUALITY COMMUNICATIONS	0.135301145
COMMUNITY ENGAGEMENT	0.134712723
SECURITY	0.129385676
ACCESSIBILITY (MOBILITY)	0.125834117

Figure 22 (a): Bhubaneswar – Soft asset value elements, soft asset capitals, activities / initiative, and Betweenness Centrality (image and data via Cytoscape, https://cytoscape.org (accessed on 4 January 2022))

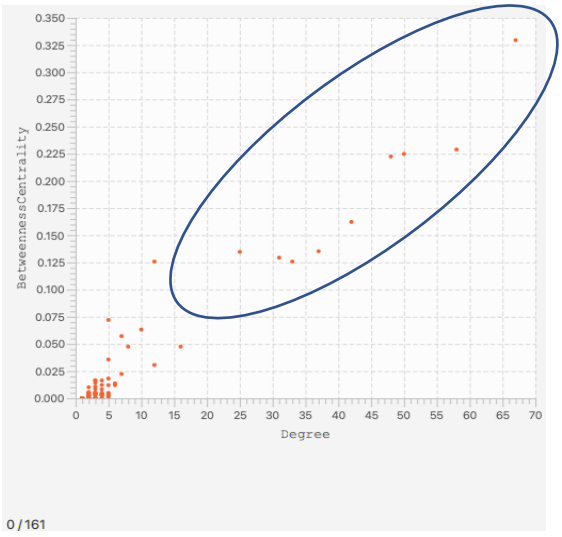


Figure 22 (b): Node degree distribution

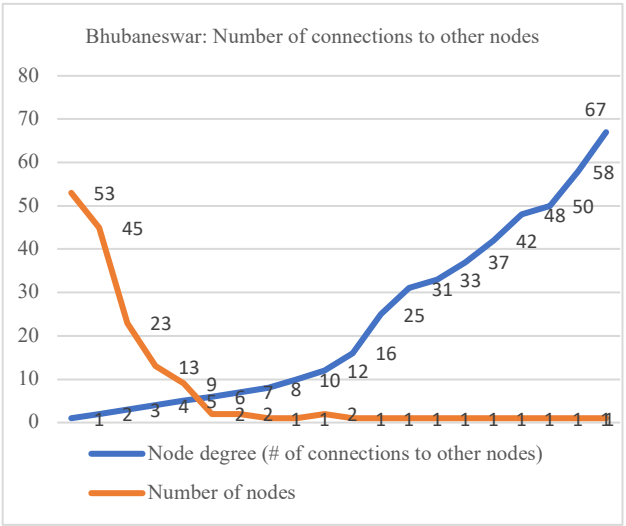


Figure 22 (c): Number of connections to other nodes

Figure 22 (a) shows the interconnection based on each value element (larger nodes in purple and green) and actions and/or initiatives.

A total of 391 actions/initiatives are identified and distributed across the nine value elements and five soft asset capital elements. But many of them are linked with same nine value elements and soft asset capital components. So the non-cumulative number of nodes became 161 (= final numbers of nodes). Each line (edge) in the left hand column represents five (main) soft asset capitals. Smarter service via technology, equal access to services, and health well-being are major areas where soft asset components are actively considered at the proposal stage.

Referring to Figure 22 (a), these larger, center nodes represented with purple squares and green nodes are supported by many nodes represented in small yellow nodes. In the context of this network, they are more significant and influential to create values than the larger nodes as they receive support from many each smaller node than others. But in the actual process, these small nodes are more important than the larger nodes as they receive cross support from each smaller node. This was indicated by the Scaling law discussed in Chapter 1. This is also demonstrated in the matrices and linkages in Figure 22 (b), (c) by different parameters.

Figure 22 (b) shows the degree of node distribution of the network presented in Figure 22 (c). The concept is to observe the correlation of two parameters. The degree of distribution is the number of connections with other nodes. 'Betweenness Centrality' of a node reflects the amount of control that this node exerts over the interactions of other nodes in the network (Network analyze online help, https://med.bioinf.mpi-inf.mpg.de/netanalyzer/help/2.7/).

Here, a larger number represents a hub (large) node. The nine dots inside the blue oval circle represent a hub (large) node, each of which is a nine-value element. Figure 22 (c) shows similar information but presented in a different format, highlighting in a number of connections to other nodes. The figure at the extreme right with blue (67) and orange (1) lines represents: '1 large node (Smarter services via technology) with 67 small (yellow) node connections'. The figure on the left with blue and orange lines represents '53 small (yellow) nodes have only 1 node connection'. Including the 53 nodes, all are related, but near nodes are more related than distant ones. In this network context, all 53 nodes related to one large node, and they are considered as closer and more related to others as demonstrated by Tobler's law.

The concept of betweenness centrality describes the importance of nodes and level of soft assets consideration in this specific network picture. It is important to understand that these larger nodes represent influential nodes. But this 'importance' or 'influence' is purely limited to 'the network context pictured in Figure 22 (a)'.In short, the influential node in 'the network' was generated by computation not based on actual performance, quality of actions or value creation. This needs to be validated by research data, including the survey results and feedback from this research.

Having said that, analyzing with the network is useful because:

(i) The network analysis involves the results of the desk top research, including which elements and soft assets capital components were incorporated and the intensity.

(ii) Small nodes are more important as they may be able to make larger nodes influential with better performance and quality

(iii) The network analysis of the 'proposal analysis stage' and 'implementation stage (interview stage') can demonstrate: (i) how soft assets are interconnected; (ii) inability to trace each soft asset in the value creation process; and (iii) the importance of assessing value creation at the citywide level.

Some findings from Figure 22 (a), (b) are as follows: 'Smarter services via technology' (67), 'Equal access to services' (58) 'Health well-being' (50) and 'Resource management' (48) is more influential in the interaction of other nodes) than the other five elements, namely Accessibility (mobility) (33), 'Security' (31), quality of communications (37), resilience (42), and 'Community engagement' (25). Again, they are the results from the network analysis and do not reflect actual actions, results, quality, assessment or judgement of stakeholders on the ground. They may not be consistent with actual cases. Nevertheless, the network analysis remains a good entry point to understand and manage assets for value creation over the course of time.

5.2.2. Survey and in-person interviews (implementation stage)

This section briefly explains the results of the Survey Questionnaires. Since the questionnaires used open questions, the author carefully read the responses, and categorized them with the relevant key value element and the soft asset capital if not clearly stated.

Table 21: Number of actions/initiatives (soft asset consideration): Bhubaneswar from survey results

	People/Human capital	Institutional capital	External capital	Technology (Information) capital	Social capital	Total	%
Resource Management	8	8	4	2	4	26	6.3
Accessibility (Mobility)	5	5	2	3	2	17	4.1
Health Well-being	11	11	2	6	4	34	8.2
Equal Access to Services	19	22	4	18	5	68	16.5
Smarter Services via Technology	18	19	2	19	5	63	15.3
Commuity Engagement	14	16	8	7	9	54	13.1
Quality Communications	21	24	9	14	9	77	18.6
Security	7	8	1	8	1	25	6.1
Resilience	14	17	3	11	4	49	11.9
Total	117	130	35	88	43	413	100.0
%	28.3	31.5	8.5	21.3	10.4	100.0	

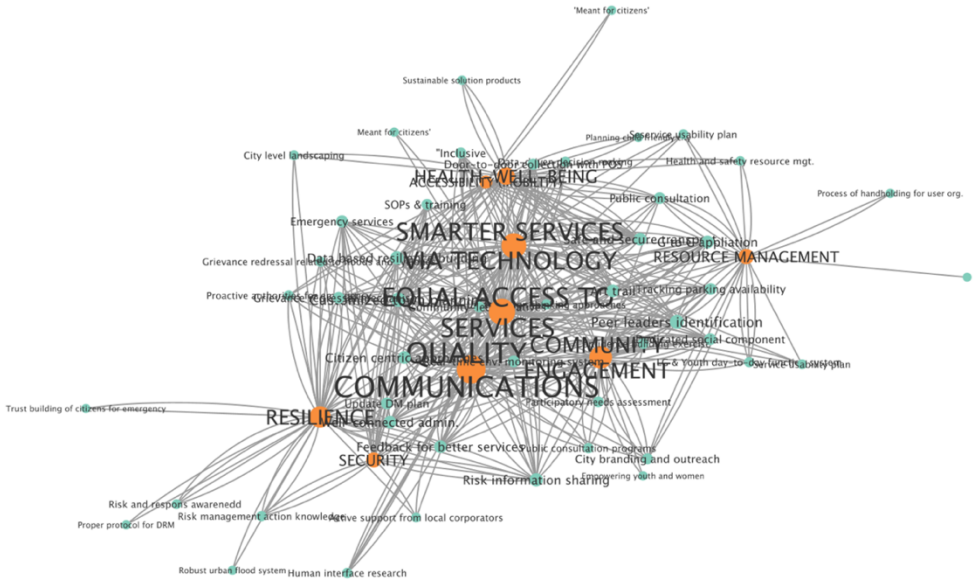
Overall (Summary):

Although the sample size of respondents in Table 21 is quite small, the city officials interviewed provided valuable insights about their rationale for utilizing soft assets in infrastructure planning. Also the responses clearly show the hierarchy of importance among the nine key value elements and the connections among the nodes or sub-components which influenced the city decision makers.

The results shows that two related major nodes i.e. 'Equal Access to Services' and 'Smarter Services via Technology' outweigh the others in influence in this network (connection) context. In contrast to the proposal stage, the 'Quality Communications' node was the largest and the 'Community engagement' node outweighed the 'Resilience' node. 'Equal Access to Services' also outweighed others at the proposal analysis stage. Since the Bhubaneswar Smart City Mission emphasizes citizen-centric aspects, these nodes support key value creation elements of soft assets. The respondents highly valued better government-community relation/communications.

The results also show the different levels of social attitudes about the importance of soft asset capital and the complexity of soft assets in city development. For example, 'People/Human capital' and 'Institutional capital 'tend to be viewed by city officials as a key 'enabler' for planning and executing smart city initiatives and projects, and play a larger role in decision making. However, actual use in practice depends on the skill level, knowledge and capacity of the city officials often outside the control of their institution. The body of knowledge belongs to individual and it is used as institutional capital only when they are in the system. Individual knowledge and capacity of officials are not necessarily uniform across the institution and often there is not systematic process to build cross institutional knowledge.

Many respondents placed a priority on the importance of people/human capital and institutional capital in considering the use of soft assets as they are a foundation or essential assets to deliver services. The degree to which social capital was taken into account by Bhubaneswar city can be contrasted with Nagpur. The importance of social capital was explicitly highlighted in some Bhubaneswar questionnaire responses. Long term development by helping citizens (females, youth, elderly, marginalized people) to build confidence, develop inclusive leadership skills was strongly underscored. This is one of the successful examples of integrating soft assets to create value over the time, not only for creating new actions, but also being valuable community assets to make people more self-reliant. Survey answers indicated that consultation and 'Community engagement' was one of the most successful examples of using soft assets to create value.



Bhubaneswar	Betweeness Centrality
Quality Communications	0.248263895
Resilience	0.215206789
Equal Access to Services	0.198547011
Smarter Services via Technology	0.145955146
Community Engagement	0.137339431
Health, Well-being	0.123240847
Resource Management	0.104050374
Accessibility (Mobility)	0.04284788
Security	0.024159017

Figure 23 (a): Bhubaneswar – Soft asset value elements, soft asset capitals, activities / initiative, and Betweenness Centrality (image and data via Cytoscape)

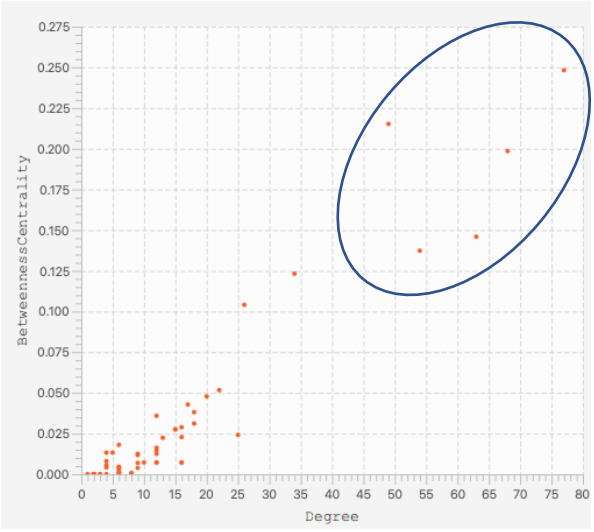


Figure 23 (b): Node degree distribution

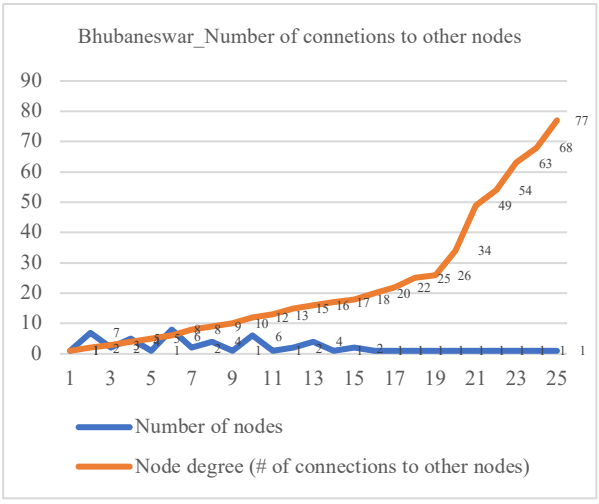


Figure 23 (c): Number of connections to other nodes

Influence of large nodes:

In the smart city proposal stage, there are three key nodes associated with soft assets consideration: Smarter service via technology, Equal access to services', and 'Health, well-being' with which many small nodes are linked. The results are presented in Figure 23 (a).

The data also shows that 'Quality communications' is a major node or influencing factor. As mentioned, the city places weight on 'Citizen-centric' factors, also related to other major nodes. One example is the 'Art trail' initiative that connects 'Resource allocation', 'Health, Well-being', 'Quality communications', and 'Smarter services via technology'. Some are directly and indirectly linked creating a new asset value now and in the future. These large nodes are supported by many small nodes as shown in Figure 23 (a).

From Table 22 and Figure 23 (a), 'Smarter services via Technology' and 'Equal services to all play a major role in the planning proposal stage. However, as pointed out earlier (section 5.2.1., Chapter 5) in regard to centrality, the performance of the larger nodes is different from the importance of the node in the network (connection).

In Figure 23 (b), there are 4 dots in the top right circle. They represent 'Quality communications' (Betweenness Centrality: 0.24826), Smarter services via technology (0.1985), 'Equal access to services' (0.1459) but the 2nd highest of Betweenness Centrality is 'Resilience' (0.2152). Although the total result for 'Resilience' is 49 (rank 5th among 9), it is the 2nd most influential node in this network (connection). It means more small nodes link soft asset capital through the 'Resilience' node.

The results of the network analysis can be verified by the EOL results of Bhubaneswar. It corresponds to the results where 'City resilience' and 'Housing and Shelter' outweigh the others. They correspond to 'Resilience'; and 'Equal Access to Services' in this research where soft assets incorporation was more important than other elements. Also, given that some items overweigh other items in the interview stage, the network analysis results remain valid in terms of the influential node.

Table 22: Proposal stage and interview stage comparison: Bhubaneswar

Bhubaneswar

Proposal stage ranking		Number of actions/initiatives	Betweenness centrality (BC)	Ranking (BC)
1	Smarter services via technology	67	0.329	1
2	Equal access to services	58	0.228	2
3	Health, Well-being	50	0.224	3

Totla number of actions/initiatives

In-person interveiw stage ranking		Number of actions/initiatives	Between centrality (BC)	Ranking (BC)
1	Quality communications	77	0.248	1
2	Equal access to services	68	0.198	3
3	Smarter services via technology	63	0.145	4
4	Community engagement	54	0.137	5
5	Reslience	49	0.215	2

Soft assets and resilience

Recent disasters in both cities, including floods in Nagpur in 2020 and 2021 and cyclone damage in Bhubaneswar in 2020, verify the conclusion of this research. Nagpur's approach to disaster management placed priority on using smarter technology, for example to share flooding information, while Bhubaneswar placed priority on local authority and community-collaboration preparedness and building resilience. The interview results showed broadly the same approach in using soft assets in each city currently and for the future.

Bhubaneswar is regularly impacted by cyclones due to its location on the coastal region of the Indian Ocean. The state of Odisha experienced more than 10 major cyclones since 1999. Recent cyclone Amphan devastated west Bengal and Odisha. The Bhubaneswar Municipal Corporation prepared its action plan focusing on preventing flooding and handling evacuations. The plan was to address road clearance, drainage and water supply, evacuation and rescue operations in coordination with various key city players such as engineers, field level officials, disaster response units, fire-fighting responders, and civic body. During the disaster, the civic body field officials and other word level officers were also requested to report causalities, areas of concern and issues that made it possible to closely monitor and take necessary actions in a timely manner (The New Indian Express).

Science based preparedness is very important to obtain accurate data. Odisha is also vulnerable to the effects of extreme weather such as drought, floods, heatwaves and storms. After the most severe heatwaves and devastating cyclones, the government shifted its strategy from response to prevention. Then, it was further aided by the central government making the approach more comprehensive, systemic and inclusive from the national to local level (Nature India)

Kawyitri, Shekhar (2021) assessed the vulnerability and capacity of Bhubaneswar with a case study of the impact of the Fani cyclone (2019) on the city. Sixty six vulnerability and capacity indicators were used to assess the overall capacity. The study found higher capacity to respond to the cyclone from the social & human dimension but less effective in the physical, smart-city, and financial dimensions. The city's improved preparedness is partly due to India's Smart Mission which developed better infrastructure. At the time of the disaster, important operational action was taken to mitigate the impact of the damage. Programs under the Smart City Mission greatly contributed to administrators being able to provide social and health services. Kwayitri and Shekhar argued this type of program empowered a strong community response with citizens becoming more self-dependent and adaptive (Kwayitri and Shekhar, 2021).

The improved preparedness of the cities is also supported by the interview results which demonstrated: (i) successful ways of incorporating soft assets to build resilience during smart city mission; and (ii) examples of soft assets being used to improve resilience. In Bhubaneswar, apart from the 'Resilience' indicators, the results also show 'Quality communications' are given more weight in building resilience.

Table 23 (a): Survey Q8-1: Successful way incorporating soft assets

Bhubaneswar (Q8-1)	People/Human capital	Institutional capital	External capital	Technology (Information) capital	Social capital	Total
Resource Management						0
Accessibility (Mobility)						0
Health Well-being	1	1				2
Equal Access to Services	7	8		8		23
Smarter Services via Technology	5	6		6		17
Commuity Engagement	4	5	1	4	1	15
Quality Communications	7	11	2	8	1	29
Security	4	5		4	1	14
Resilience	13	16	3	10	4	46
Total	41	52	6	40	7	

Table 23 (b): Survey Q8-2: 3 examples of soft (intangible) assets are required to improve resilience

Bhubaneswar (Q8-2)	People/Human capital	Institutional capital	External capital	Technology (Information) capital	Social capital	Total
Resource Management			2	1	2	5
Accessibility (Mobility)						0
Health Well-being	1	2	1	1	1	6
Equal Access to Services						0
Smarter Services via Technology						0
Commuity Engagement	1		8	7	7	23
Quality Communications	1	2	10	7	9	29
Security	1	2	2	2	4	11
Resilience	4	6	11	8	11	40
Total	8	12	34	26	34	

5.2.3 Value creation mapping

Identifying value creation cases

Although the network analysis itself does not provide qualitative aspect of linkage or meaning of performance, the qualitative part could be examined by the in-person questionnaire's responses. The questions about the successful cases of the impact of incorporating soft assets (Questionnaires 1, 2, 7 in Annex 2) shows a multilayered, and holistic contribution to value creation.

Table 24 shows the classification of the interviewees responses (Table 25) using the qualitative framework employed in the network analysis. The result of classification also demonstrated that 'Quality communications' and 'Community engagement' are influential nodes that verify the findings of the connection (network) analysis. It also suggests that Bhubaneswar's smart city vision and objectives effectively incorporated soft assets creating benefits for the citizens and the city.

Table 24: Classification of value creation actions: Bhubaneswar

	People/human	Insitutional	Tech/information	External	Social	Total
Resource mangement		1			1	2
Accessibility (mobility)						0
Health, Well-being	2	4	2	2	3	13
Equali access to services	3	6	2	4	3	18
Smarter services via technoloty	2	5	3	2	2	14
Quality communications	8	10	1	8	8	35
Community engagement	9	10	1	8	9	37
Security	1	4	3	1	2	11
Resilience		1	1			2

Table 25: Some responses from interviewees regarding positive action and its impact (Bhubaneswar)

Positive action (1)	Phase-wise implementation **[BS, QC, CE x INST, HR, EX, SOCIAL]**	Self-defense and leadership training helped in building the confidence of the girls from the communities. The girls who were earlier shy to even speak to other have developed leadership skills and actively participated and even led many programs in the community and their colleges. **[RM, CE, QC x SOCIAL, INST]**	During the planning of Art Trail, a 20-25 days long event envisaged at reviving the overlooked and undermaintained (filthy) parts of the old city with rich cultural heritage and art elements, initial reluctance was observed both in the government and also among the citizens. **H, WELL, EQ, QC, CE x HR, INST, EXT, SOCIAL]**	Insittutional mechanisms like that of BUKC supports **[QC, CE, ACCESS, SMARTER x HR, INST, EXT]**	Unified city platform, namely Bhubaneswar.me was envisaged to bring together variety of existing municipal services, information and approvals offered by different municipal departments and agencies onto a single portal. This was planned to promote e-governance and enhance transparency by reducing the dependance on paper work. **[SMART, H, WELL, QC, CE, SEC. x HR, INST, IT/INFO, SOCIAL]**	Similarly, initiatives such as street designing as people's space, bicycle sharing, art of city wherein visioning workshops were conducted with artists on what all can be done for enhancing artistic beauty and perception of the city gained popularity among the citizens and other stakeholders. **CE x HR, INST, EXT, SOCIAL]**	Integrating soft aspects (i.e. citizen centric approahces) **[H WELL, SEC, BS x PPL/HR, INST, SOCIAL, EXT]**	
Positive result/ Impact	Phase-wise implementation was found to be a very impactful strategy. It helped in prioritizing the resources for	Self-defense and leadership training of the girls was found to be a very positive and successful action both in terms of the cost-	After its launch the event was found to be a great success and attracted large participation of citizens which helped in transforming earlier	Bridging the communication and materialize horiozontal coordination among different smaller bodies and line departments	The portal was found to be very effective during the COVID-19 pandemic when the physical accessibility to many basic services	Bhubaneswar urban lectures involving best local and global professionals, key policy and decision makers, subject experts, etc. were conducted and were	Enouraging more eyes and life on streets and in the city which not only make the cities more lively but also provide a sense of security to	Strong bureaucracy of the state was found to be effective

	applications which are targeted at critical services first, as identified through public consultations and studies.	benefit analysis (financial implications) and the larger impacts it created in the community. Fulfilling the envisaged objectives but in igniting the thinking process among the girls of the communities.	neglected and filthy areas of old city into heritage areas; making them attractive and more usable	associated with urban planning, development and provisioning of diferent urban services at the city level	and municipal departments was restricted. The portal helped in supporting and linking the citizens with basic services including ration related services, recording of isolated persons, information dissemination on other micro services, etc.	found to be more successful than envisaged.	communiteis, change the coruse of conversation to positive and healthy choices, etc.	
Positive action (2)	Strong local support from the local corporators **[CE, QC, x HR, INST, EXT, SOCIAL]**	Addressing the minor needs of community of immediate nature **[CE, QC, SMART x HR, INST, EXT, SOCIAL]**	Involving directly with the community **[CE, QC, x HR, INST, EXT, SOCIAL]**	The telephone helpline 1929 was developed for grievance redressal of residents across the city. **[SMART, ES, SEC, H Well, QC x INST, IT,]**		Using the soft captial of data and technologies **[SMART, SEC, RES, ACCESS x IT, INST]**	Consideration of social aspects rigth at the porposal stage **[CE, QC, x HR, INST, EXT, SOCIAL]**	
Positive Impact (2)	Closely working with the community and better understanding their needs and local context	Engaging with them for desigining long term and sustainable solutions on aspects of urban development	Inculcating a sense of ownershops and initiatives varied community led and owned initatives which ensures monitoring and sustainability of these actions.	Beyond its envisaged role, the helpline was found to be very effective in providing tele-consultations and addressing the grievances of the patients, migrants, etc. during the COVID-19 pandemic.	Bhubaneswar Art Trail, an art excursion to regenerate infamous and unattended areas of the old city was also found to have higher positive impact and acceptance than anticipated.	Helping gather useful and large amount of environment related datas and information which were otherwise not available with authorities	Helping design solution most suited to the citizens instead of enforcing the readymade solution on to the communities	

Negative action		Some initiatives failed to trigger the expected results and outcomes.	It is observed that due to presence of overlapping authorities and prevailing inter-department coordination gaps and issues, it if often difficult to take sustain some initiatives to their logical end and envisaged impacts, especially in absence of a body like BUKC. BUKC currently is a body under BDA.	Around 1600 wifi routers were installed across the city in 2016 for providing better internet access to residents of the city.	Digital kiosk was planned and installed across the city to provide a digital access to residents not owning smart mobiles and other gadgets. These kiosks also have Emergency Call Button (ECB) which could be pressed by those in distress (for example, females facing any threat to their safety).	The child friendly space guidelines due to bureaucratic delay.	.	
Negative impact	Creation of dedicated parking slots was envisaged to make more usable space available to the residents of the city. The ideal and underutilized spaces thus created were then made available to the residents as clean and open access to parks, clear lanes, etc.	These primarily included less active engagement of boys in activities envisaged at linking them with job opportunities, Open Defecation Free community related initiatives in a few pockets of the community and some initiatives on aspects of nutrition due to weak response from the NSS group of the college.	However, it is perceived that it should be a permanent body at a state level or under an authority with bigger umbrella and powers of enforcements.	Again, due to reduced internet cost and increased concern for data security, it is learnt that most residents were using their personal internet packages, leaving most of the routers underutilized. A way ahead to better use these routers now is possibly broadcasting of exclusive content through them.	During planning stage, the growth in tele-density and heavy reduction in the internet costs could not be anticipated. This led to very lower usage and footfall in these installed digital kiosks making them redundant. Due to underutilization, this could be counted as wastage of existing resources.	It was found to be inactive and unutilized.		

How the five soft asset capitals are related to the process of value creation.

There are many projects planned and implemented in any time period and it is not realistic to trace all projects reviewed at the proposal stage. However, Table 25 sets out some specific examples of how the soft assets are considered and utilized in actual planning initiatives with inputs, outputs and outcome flows (Figure 24 (a)).

a) 'Value created' case (positive case)
   - Activity/project: Art trail
   - Objectives:
     - Reviving the overlooked and undermined parts of old city by leveraging the existing rich culture, heritage and art elements (links to 'Livable city' vision)
   - Inputs:
     - *Soft asset capital*: People/Human capital; Institutional capital; External capital; Social capital
     - *Value elements:* Health, Well-being; Quality communications, Community engagement; Equal access to services
   - Output:
     - A 3 week-long event is held with positive engagement by government and citizens; Attracting large participation of citizens
   - Outcome & future impact:
     - Transforming a neglected area into a heritage area that is aligned with Bhubaneswar's 'Livable city' vision; value added by 'Art trail'
     - *Soft asset capital*: People/Human capital; Institutional capital; External capital; Social capital
     - *Anticipated Value elements:* Health, Well-being; Quality communications, Community engagement; Resource management

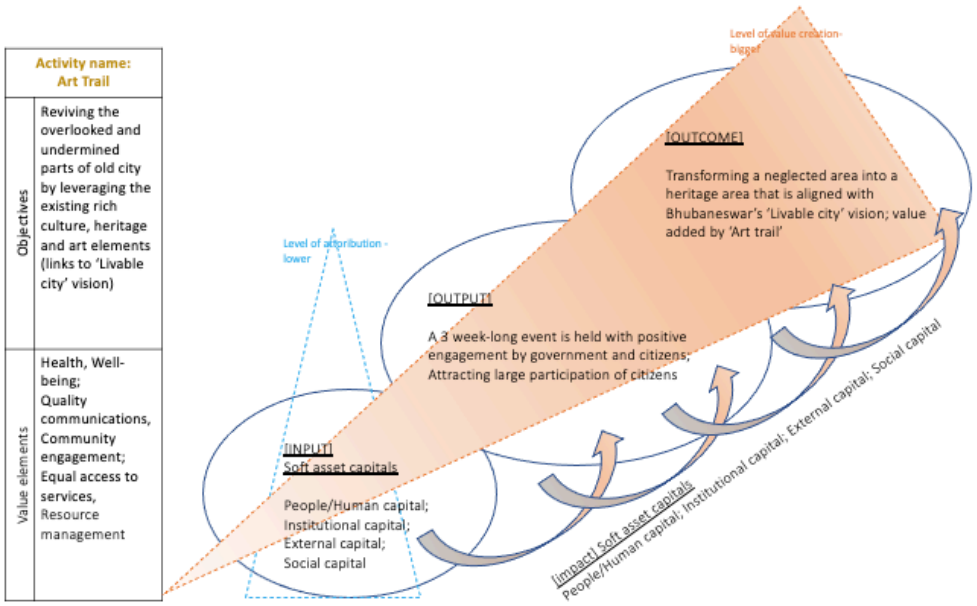


Figure 24 (a): 'Value created' case

‘Value not created’ can also provide inputs to determine how to achieve a positive impact if the causes of the negative results are analyzed and appropriately used to identify and strengthen enabling factors to incorporate soft assets. This requires a systematic monitoring, evaluation, and feedback process in planning and development stage (Figure 24 (b).

b) ‘Value not created’ case (negative case)

- Activity/project: Installation of Digital Kiosks
- Objectives:
  - As a digital access platform, it aims to provide digital access to citizens not owning smart mobile, equip the emergency call for citizen’s safety (i.e. female facing safety threat)
- Inputs:
  - *Soft asset capital*: People/Human capital; Institutional capital; Technology, information capital; External capital
  - *Value elements:* Health, Well-being; Quality communications, Community engagement; Safety; Equal access to services; Smarter services via technology
- Output:
  - Failure of anticipated demand and obtaining internet cost reduction leading to low utilization
- Consequences:
  - Wasting investment materials, budget, and existing facility; Lost opportunity for value creation
- Possible reasons for opportunity failure:
  - *Soft asset capital: weak external capital (with internet provider) with insufficient demand identification and planning people/human capital; institutional capital)*

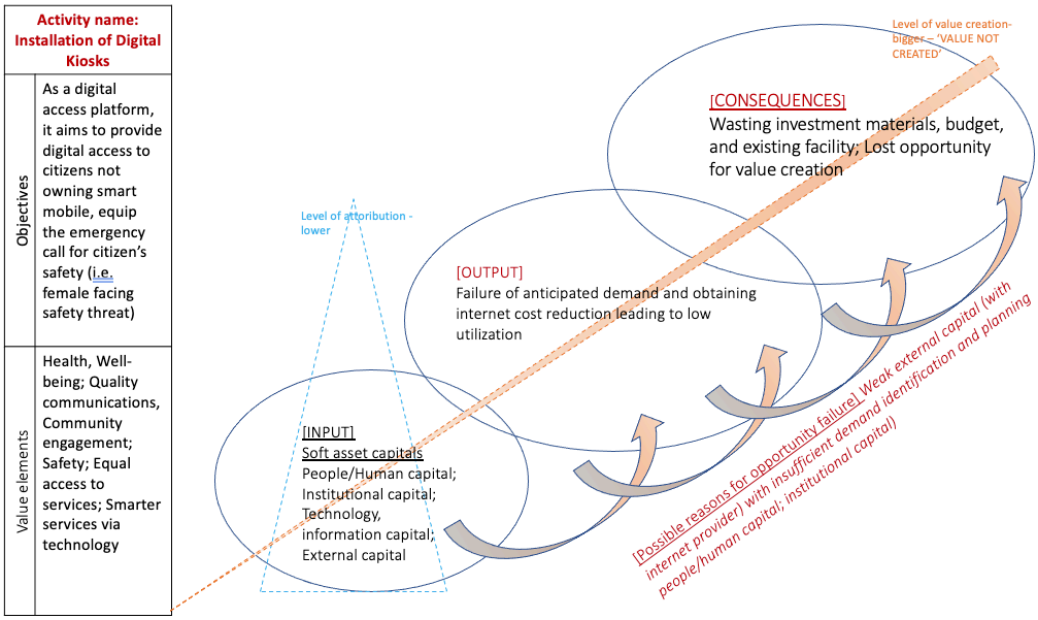


Figure 24 (b): ‘Value not created’ case

Value creation mapping

Although aspects of the value creation process remains a black box (Chapter 1), the survey responses provide some insights.

The visual creation map below (Figure 25) was referred to in the similar study by Pagano and Neubert (2015). This focused on shareholder value creation via offshoring and outsourcing in the context of worldwide supply chains. They use a term 'a fuzzy box' concept (equivalent to 'a blackbox' in this research) to describe processes used by stakeholders' processes to achieve objectives. To understand how companies create value through a multi-perspective and multi-stakeholder model, they develop the visual canvas approach. Below is a modified version of this approach: (i) the soft assets consideration value creation process mapping; and (ii) connection from current Smart City Mission's program to future programs or initiatives.

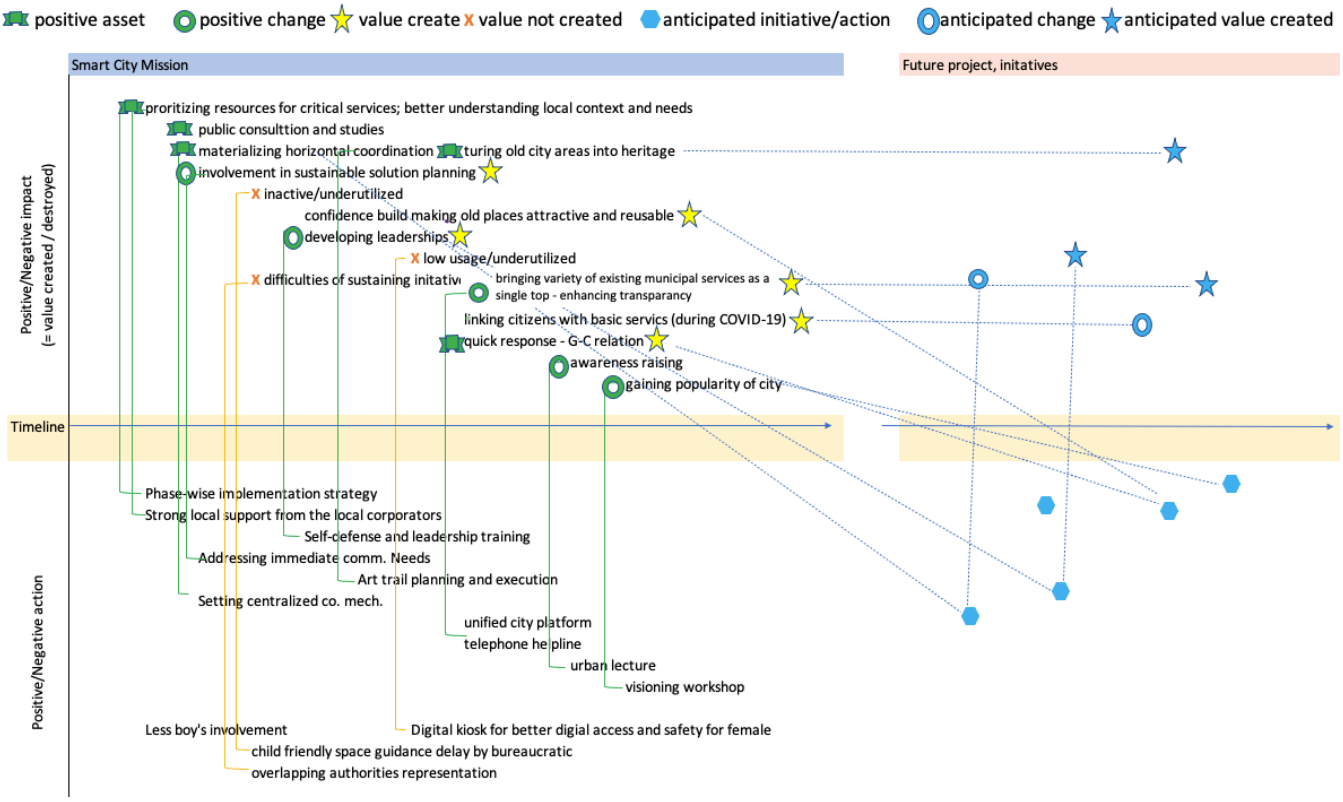
The map created based on the Table 25 shows both positive and negative actions taken in the smart city mission. The positive action made impacts on both or either: (i) created assets; (b) made positive change; and/or (c) create value.

Some 'created assets' are expected to produce new value creation in any future projects or initiatives, leading to new action taken or changes created. In the case of negative actions with negative results, the opportunity for value creation was destroyed.

Findings and conclusions from this visual canvas are as follow:

- Action, impact, asset creation, changes, and value creation occurs throughout the project timeline. Inputs (action) and outputs or results (impact) are sometimes linear in a very short term but are more complex in the longer term as the unique nature of soft assets can result in spill-over, scaling up, and synergetic effects.
- Although the information and linkage are already understood, the visualizing process can help key stakeholders understand the value creation process that may not explicitly be discussed and shared with other stakeholders and decision makers.
- The value mapping needs to be refined further with inputs from more stakeholders including focus group discussions for sharing their understanding to verify the value creation process and following up with action. By doing so, a more detailed timeline and other key factors can be incorporated. Such exercises will be useful for decision makers to identify and analyze key resource capital and manage soft assets holistically in a development strategy.

Figure 25: Value creation mapping (Bhubaneswar)



From these results, key points for decision makers and stakeholders are to reflect, review and analyze what assets, actions, values are created and how they can potentially be used in the next stages of development initiatives or projects. The value creation map (Figure 25) demonstrates: (i) various types of soft asset capitals, related actions are identified and link to positive actions/value creation process; and (ii) impacts are identified in the larger nodes that were examined previous section.

5.2.4. Consultation, Quality communications, Community engagement, and "Learning and Share'

In the 'Ease of Living Index'' (Chapter 4), the city' Citizen Perception Survey score is a key metric which measures the level of citizen's satisfaction with city services. Stakeholder consultation is one of the best ways to gauge a citizen's immediate needs and determine the long term engagement essential for optimizing the use of city services and for improving their living environment.

5.2.4.1. Consultation process, quality communications, and community engagement

In the survey responses, Bhubaneswar city interviewees highly valued the importance of consultation to ensure inclusive approaches from planning, implementation and feedback review. Consultation is one of the most widely recognized approaches in deciding to use and apply soft assets and strongly contributes to all nine key soft asset value creation elements. Also the interview data showed that both basic infrastructure services and some critical social issues were addressed by city administrators through detailed and well-targeted consultations.

(a) **Entry points:** First question is to understand the types of consultations the city conducted. Different types and levels of consultation were provided with different entry points/ stakeholders. Table 26 below represents a snapshot of these approaches. Establishing relationships with NGOs and grass root community groups are key and here soft asset 'external capital' is fully utilized to obtain inputs from communities (Table 26).

In addition, there are community level exercises that seek citizen feedback and suggestions, as well as sensitizing them to the community level outreach. Such engagement and consultations are crucial for building ownership of local projects among the local communities.

Table 26: Process of consultation (implementation)

Purpose	Description	Entry point
Specific project focused	Varied consultations and human-centric studies were undertaken to better understand the needs and contexts of the local areas and communities and design tailor-made and inclusive technological interventions for them. Some examples: - Analysis of demographics on mobility (bus) for planning number of seats - Smart Parking - Used technology to reach out to the communities on sensitizing them necessary government schemes and services and also using social media for connecting with communities	
Consultation, monitoring and follow-up	Local NGOs (on Youth and gender) such as Humara Bachpan Trust (HBT) were engaged with to make an entry to the community. This was followed by varied rapport building activities including regular visits to the community, meeting with community leaders, informal meeting with community members to identify issues including the minor ones requiring immediate attention	NGOS
Strengthened G to C relation	Meeting with local government functionaries from the community such as ward officers, grass root ANMs, ASHA, Aaganwadi workers, etc. were undertaken to understand and strengthen the community-government linkage. Also it is effective to enter, understand work closely with the community.	Ward officers, grass root group, Area leaders/representatives
Community engagement for long term urban solutions	Community advisory meetings were conducted to address the minor issues of immediate nature. This also helped in rapport building and winning confidence of the community which is required for engaging with them for bringing long term urban development solutions	Community advisory group
Engagement in social community mapping	The local youth groups. From among these groups, peer leaders were identified and were further engaged with for social and community mapping. The social and community mapping help understand the key issues faced by the community in detail and in also priortising them to suits the community's need	Local youth groups

(b) **Effectiveness of Consultations**.

Effectiveness of the consultation process is achieved by encouraging inclusiveness and empowering marginalized groups; and nurturing local ownerships. Some examples were shared by respondents about how these consultations were used to address communities' immediate needs. Consultations and engagement also helped to facilitate more effective integration of technology, policy and planning and dissemination of information and support through the community network. Specific examples provided by the respondents on how consultations were effective are as follows (Table 27);

Table 27: Effectiveness of various approaches

Approaches	Effectiveness
Engagement and informal meetings	The existing issue of open defecation was addressed. The existing scheme of Open Defecation Free (ODF) was linked to aspects of women dignity and health and wellbeing of children and family members with help of identified peer leaders and community volunteers
Digital support to community	Provided to generate awareness of local difficulties and challenges.
Skill development and livelihood linkages	In support of UNICEF and UNFPA, training modules were delivered to youth groups. The trained youth were also linked to the Skill Development Institute and teams of relevant service providers. They were provided orientation on existing schemes and programmes targeted for youth groups.
Self-defence training were provided to youth groups and young girls	Boosted self-confidence of girls of the community for participating in other ongoing activities and meetings in the community.
Youth groups were also sensitized on aspects of substance abuse	Gender-based equality and violence, environment protection. The relationship so nurtured with the youth groups also helped in organising different college-led initiatives such as Youth for Smart City.
Different days of importance were also observed in the community along with active participation of the community members	Youth groups, peer leaders, etc. to generate awareness on these crucial topics. Efforts were also made to mainstream the sanitary workers in the community.

(C): **Successes and Challenges:** Major lessons and successes of consultations were listed by respondents are as follows (Table 28):

Table 28: Successes and Challenges

Factors	Actions	Comments
Frequency	Large number of events for engaging with communitie	
Conscious effort to engage community	Strong community engagement	Active involvement of citizens and their representatives in the implementation of projects. This ensures that citizens are aware of reasons why the project is planned and how it is being implemented and how it would benefit the citizens
Diverse communications channels – mobile applications	Mobile-based application for linking the community with existing government services and community engagement. High reach out to schools and colleges for ensuring higher participation of students, teachers, and communities	There is a strong presence of local authorities on social media due to which they are easily accessible and also very responsive to citizens needs and feedback. It was also monitored by recording the number of respondents and number of viewers/responses on audio-visual materials Support by the BMC and BSCL during the COVID-19 pandemic
Feedback, Grievance redressal mechanisms	Strong mechanisms for seeking feedback of the citizens and using them to improve the initiatives and their implementation Responsiveness of officials to complaints and grievances.	The communities are aware of and have witnessed local authorities promptly responding to their grievances, even the post-disaster restoration of basic services is prompt which increase the confidence of the communities in the local administration and authorities
	Strong two-way communication between citizens and authorities	
Incentivizing citizens	Provisions such as perks to travel abroad, exposure to learning programs, etc. were also planned and conceptualized to enhance performance of officials and motivate them	

Respondents also referred to challenges. Effective outreach, social media and technology is key, but not all citizens have access to these options. Often communities are reluctant to support the city's interventions. Also engaging communities can be time consuming for building trust and considerable effort is required by cities to build awareness of the issues and suggesting relevant solutions.

5.2.4.2. Learn and share

The ‘Making a City Smart’ report (MoHUA, 2021), sets out a recommended roadmap to establish a smart city. In the diagram of the step by step approach, ‘Learn and Share’ (which is a comprehensive monitoring and evaluation process) is emphasized as an important part of the process to establish a smart city.

The ‘Learn and Share’ process can be applicable, not only to planning stage, but also a whole development cycle. It is an effective way to incorporate soft assets at different levels, from policy, strategy, and project operations. To better understand the different approaches in the city planning and implementing stage, four specific questions were asked at the survey as follows: (a) the process undertaken; (b) describing actual cases; (c) challenges to materialize “Lean and Share”; and (d) evaluation of vision, goal, activities and the soft assets monitoring process.

These results closely relate to the different intangible asset management approaches explained in Chapter 3 about intangible assets and knowledge. Soft asset capital provides a unique contribution to city innovation and values. To understand these unique values, it is important to review how the ‘Learn and Share’ process is operationalized including, learning from experiences, successes, failures, and organizational internalization.

(a) Operation of the "Learn and Share" process

Bhubaneswar city uses the MOHUA’s system and other systems at national level. The SPV uses information (command and control center) to analyze cases for learn and share. In addition to SPV, there is also the Bhubaneswar Urban Knowledge Centre or BUCK (centralized coordinating function) – which plays a key role of central coordination role to implement the Smart City Mission processes. The BUKC also incorporates an internal learn and share mechanism producing key materials and documentation to build institutional capacity. Associated survey results are set out in Table 29.

When the SPV closes in Bhubaneswar, the user departments will assume responsibility and ownership. Currently, BUKC supports communication and coordination among key departments implementing smart city proposals. BUKC systematically strengthens soft capacity by providing knowledge, learning and capacity building extending the benefits of the Smart City Mission in the long-term.

Table 29: “Learn and Share” process undertaken

Level	Entity, process	
Central	Primarily data sharing and exchange is done using the MoHUA’s Data Exchange Unit (portal on data sharing)	It is learnt that the focus of this portal is more on quantity (numbers) while quality as a factor seems to be ignored a bit.
National	One of the BUKC's core function. Supporting coordination, knowledge and information sharing among the relevant authorities and consultants.	Internal knowelge session for learning and sharing
	BUKC undertakes extensive research on each of its verticals and study the existing and evolving trends, good practices, reasons for their success and how can they be best adopted in Bhubaneswar (from all possible lenses of finance, human resources, administration, etc.).	Followed by this process BUKC supports in development of informed and contextualised proposals for introducing new initiatives or projects in the city.
	Smart city was conceptualized to have a unified system, namely Command and Control Centre which was envisaged to bring together different departments, agencies and stakeholders for close coordination and information sharing.	
Learning network	Bhubaneswar is part of many national and international networks.	International Smart City Network (ISCN), World Urban Forum
	Besides, efforts are undertaken to study and learn how other cities are utilizing and validating the huge data and information collected through different tools and technologies such as CCTV, RFID, etc.	
	BSCL has been pioneer in effectively using data through scenario-based planning to study different cases,	
Dissemination	BUKC is development of the project brochures documenting key features of different planning and implementation initiatives undertaken by the BUKC.	This helps in developing administrative and institutional memory for years to come which helps in ensuring sustainability of initiatives despite change in administrative and technical heads and human resources.

(b) Case and challenges to materialize "Learn and Share"

Perhaps the most important challenge is how to maintain the centralized function at local city level after the end of the Smart City Mission program. Although the centralized organization like BUKC is key to do coordination across different departments, the roles and differences from the Command center is not clear. Clear roles and responsibilities are vital for an effective centralized system and it also provides a clear path to develop an exit strategy after the end of the Smart City Mission (Table 30).

One strong case is the grievance mechanisms fed by data and information through multiple sources collected at the Command and Control Centre along with the social media handled by BUKC and other relevant agencies such as BPCL. The grievance redress mechanism is backed by strong procedures (SOPs) to ensure timely response and action by relevant agencies. Such a mechanism helps to build trust with citizens. The robust grievance redress mechanism is also used to regularly capture the feedback from the end users and communities to improve service delivery.

Table 30: Cases and challenges of 'Learn and Share'

Good case	The Integrated Command and Control Centre which was envisaged to promote inter-department coordination and knowledge sharing needs to be effectively utilized for further improving the learn and share process
	A good practice followed in Bhubaneswar currently is that all BMC, BDA, BSCL is administratively led by a single official which makes it easier to integrate actions. This integration can further be leveraged in ensuring mutual learning and sharing with other line departments and stakeholders too.
Challenges	The administrative linkages and coordination among the three principal authorities, namely, Bhubaneswar Municipal Corporation (BMC), Bhubaneswar Smart City Limited (BSCL) and Bhubaneswar Development Authority (BDA) is strong. Often the same official is heading all three administratively. However, the linkages and integration with other line departments and stakeholders may further be improved for better learning and sharing.
	The challenges of duplicity in some initiatives of varied departments such as surveillance systems, etc. could be avoided or streamlined with better coordination and information sharing among different planning and implementation departments and agencies.
	Due to frequent changes in bureaucracy of different key departments and agencies associated with Smart City planning and implementation, communication often becomes challenging without having a robust mechanism of creating institutional memory.
	Absence of inter-operability of monitoring systems of different departments and agencies also act as a hindrance for integrated monitoring of different services of the city.

(c) Evaluation of vision, goals, activities and Soft assets monitoring process

The Smart City Mission monitoring explained in Chapter 4, comprises four levels, including a Monitoring Committee consisting of the Commissioner or Deputy Commissioner (BMC), CEO (BSCL), Vice-chairman (BDA) and other officials which monitors and evaluates monthly updates and progress of the mission.

A major challenge is the evaluation of vision and goals. Developing a baseline is crucial for evaluating the effectiveness and progress of the implementation and value impact of smart city mission initiatives. At the proposals stage, key performance indicators (KPIs) are developed. From the survey results, the KPIs are benchmarked against the good practices in India and abroad.

However, the city's evaluation remains internal and unpublished so details are hard to review. However, two indexes namely Ease of Living (EOL) and Municipal Performance Index (MPI) can provide some answers. As mentioned in Chapter 4, the citizen-based perspective survey assessing different phases of a project is also one of the useful resources for evaluating smart city development.

According to the survey results, these are no specific mechanisms for planning and monitoring soft assets. They are regularly monitored as part of the overall monitoring of different activities contained in the plans. These results are unavailable from the survey.

5.3. Case 2: Nagpur

5.3.1. Desk top research (Proposal stage)

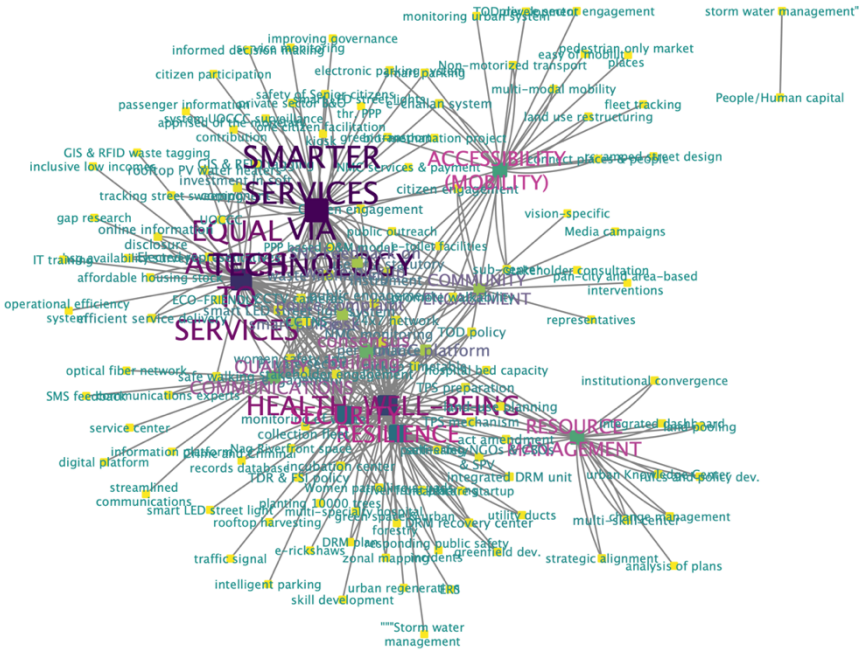
Initial findings (Connectivity):

As with Bhubaneswar, the following is a set of data demonstrating Nagpur's connectivity. Table 31 below shows that a total 356 actions/initiatives are identified but many are shared among nine value elements and five soft asset capitals. Hence, the final number of nodes became 136. To demonstrate their interlinked relationships, they are pictured in Figure 26 (a).

Table 31: Number of actions/initiatives (soft asset consideration): Nagpur (proposal stage)

	People/Human capital	Institutional capital	External capital	Technology (Information) capital	Social capital	Total	%
Resource Management	10	10	3	2	2	27	7.6
Accessibility (Mobility)	10	8	3	5	3	29	8.1
Health Well-being	15	20	4	5	8	52	14.6
Equal Access to Services	19	15	4	12	7	57	16.0
Smarter Services via Technology	19	18	4	18	8	67	18.8
Commuity Engagement	2	2	2	3	7	16	4.5
Quality Communications	3	4	2	7	6	22	6.2
Security	12	13	7	7	5	44	12.4
Resilience	12	19	4	4	3	42	11.8
	102	109	33	63	49	356	100.0
%	28.7	30.6	9.3	17.7	13.8	100.0	

The indicators are potentially exclusive, but as mentioned in Chapter 3, the qualitative tool has some limitations due to the objective of the tool and the classification level of the five soft assets capitals and the nine value elements. The 'Smarter services via technology' (under the nine value elements) and 'Technology and Information capitals' (under five soft asset capital) are differentiated by 'element' and '(soft asset) capitals' and there may be some overlap between them. Since the smart and resilient city is a desired model in this research, as with Bhubaneswar, the 'Smarter service via technology' should be included as one of the value creation elements. Therefore, the higher incidence of technology related items can still be reliably attributed to this element and the 'technology, information' capital.



Nagpur	Betweenness Centrality
SMARTER SERVICES VIA TECHNOLOGY	0.326852456
HEALTH-WELL-BEING	0.272815576
EQUAL ACCESS TO SERVICES	0.187625183
ACCESSIBILITY (MOBILITY)	0.17629082
SECURITY	0.164037804
RESILIENCE	0.144209377
RESOURCE MANAGEMENT	0.134545444
Cconsensus building	0.126544333
QUALITY COMMUNICATIONS	0.12293745
use of a statutory instrument	0.082073171
COMMUNITY ENGAGEMENT	0.080847656

Figure 26 (a): Nagpur - Soft asset value elements, soft asset capitals, activities / initiative, and Betweenness Centrality (image and data via Cytoscape)

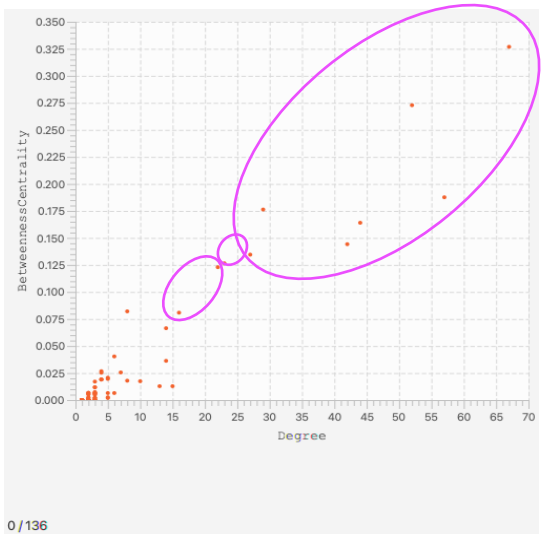


Figure 26 (b): Node degree distribution

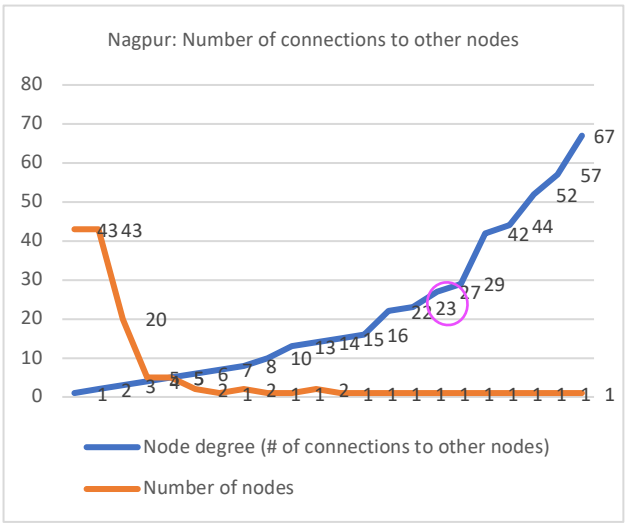


Figure 26 (c): Number of connections to other nodes

Nagpur's network visual image appears denser than that of Bhubaneswar. Based on the data that were used for this network visualization, the Cytoscape analyzer function computed that the network density analysis figures are 0.025 for Nagpur and 0.019 for Bhubaneswar. The figure range is 0 to 1 and 1 is the highest dense node connectivity and the highest velocity of spreading information in the network. In this context, Nagpur's case is slightly more influential among connected nodes than Bhubaneswar, but both density analysis figures are very low, thus how much difference there is, is unknown. Also this is the network analysis level but not reflecting real performance or results.

Same as Bhubaneswar, Figure 26 (b), (c) shows the top three large nodes of 'Smarter service via technology' (67), 'Equal access to services' (57), and 'Health well-being' (52), followed by 'Security' (44) and 'Resilience' (42), are influential in the proposal in terms of soft asset consideration. Nagpur also shows consideration in accessibility (29) and 'Resource management' (27) that are directly aligned to the city's vision.

Unlike Bhubaneswar, Figure 26 (b) also shows 'consensus building' as a relatively influential node (a dot with degree scale '23' in Figure 26 (b), (c). Its attribution is actions and/or initiatives, not the nine value elements group. However, 'consensus building' was frequently identified across the nine elements and the five soft asset capitals. That makes it a more influential node than other small yellow actions nodes. Additional research to observe changes could be a next valuable step.

5.3.2. Survey and in-person interview (implementation stage)

Same approaches for Table 31 was applied to prepare Table 32. Compared to Bhubaneswar, overall, there was less information from the interviewees. It may be difficult to understand some terminologies in the questionnaires so time was needed to ensure understanding. Or there may have been limited interview time due to competing priorities. The arrangements to reach out to relevant respondents was different from the Bhubaneswar interview process: the different affiliations including NSSCDCL (SPV) and others provided useful responses.

Table 32: Number of actions/initiatives (soft asset consideration): Nagpur (from survey)

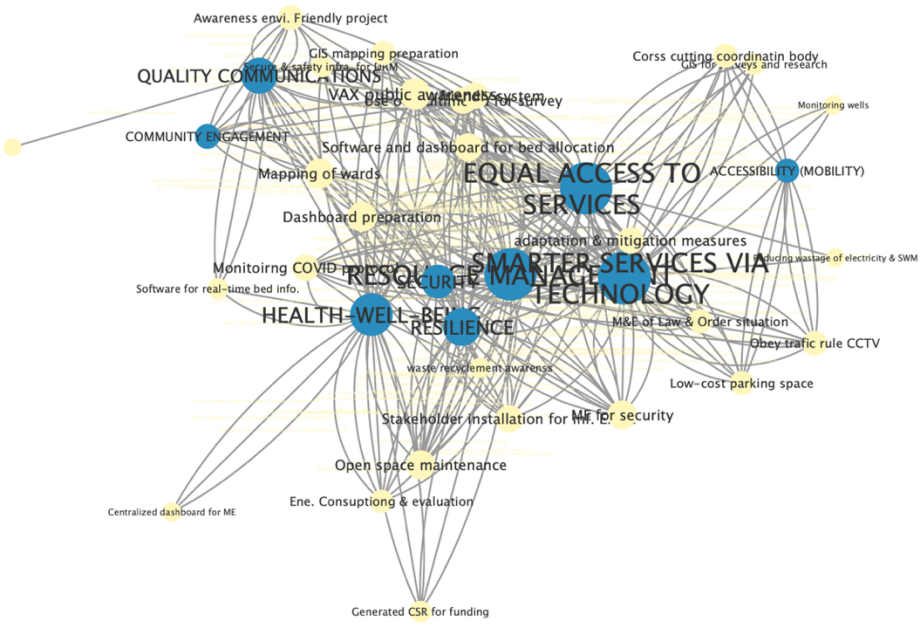
	People/Human capital	Institutional capital	External capital	Technology (Information) capital	Social capital	Total	%
Resource Management	14	14	3	12	1	44	17.1
Accessibility (Mobility)	3	3	0	3	0	9	3.5
Health Well-being	10	10	2	10	0	32	12.5
Equal Access to Services	13	13	1	15	2	44	17.1
Smarter Services via Technology	13	13	1	17	1	45	17.5
Commuity Engagement	3	3	2	1	1	10	3.9
Quality Communications	7	7	3	4	3	24	9.3
Security	7	5	1	7	1	21	8.2
Resilience	7	7	3	7	2	26	10.9
	77	75	16	76	11	255	100.0
%	30.2	29.4	6.3	29.8	4.3	100.0	

Overall:

The survey interviews were conducted selectively and targeted different respondents (SPV, local government unit, private, NGOs, academia). As mentioned in the Bhubaneswar section, the total number is a useful reference to understand the areas and types of soft asset incorporation and important nodes in this network (or connection). Also there is a hierarchy among the nine key soft assets key value elements.

The results show that the similar major nodes i.e. ‘Smarter Services via Technology’ and ‘Equal Access to Services’ are more significant in this network context. Since Nagpur’s smart city mission strategy electronically connects people with the government to create an inclusive eco-system, the efforts to utilize resources are aligned with the overall city vision. As for ‘Resource management’, it is a cross-cutting value creation area but still Technology/Information capital related is rated highest. The network (or connection) tables and the figures show that the soft assets consideration is effectively aligned with the city vision and objectives.

The level of consideration of soft assets is the same as the proposal stage. Although each item in the proposal were not traced, the interviewees’ responses are within the scope of India Smart Mission proposal and their survey responses were used to understand the actual implementation of the Mission.



Nagpur	Betweenness Centrality
Smarter Services via Technology	0.245867885
Equal Access to Services	0.233814169
Health, Well-being	0.181138548
Resource Management	0.121682687
Quality Communications	0.113916912
Resilience	0.084899216
Security	0.055609655
Community Engagement	0.005294467
Accessibility (Mobility)	0.003154613

Figure 27 (a): Nagpur - Soft asset value elements, soft asset capitals, activities / initiative, and Betweenness Centrality (image and data via Cytoscape)

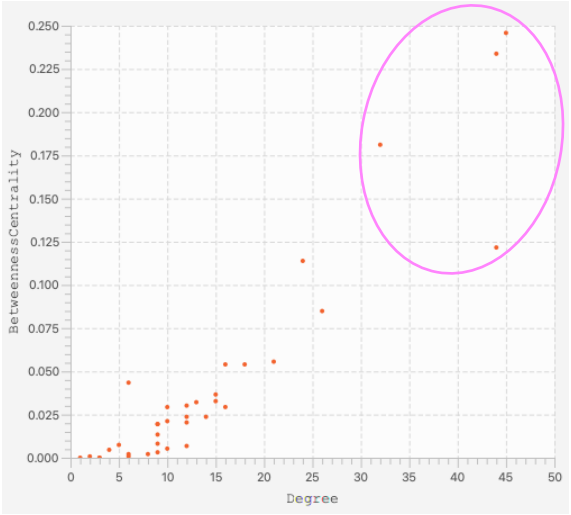


Figure 27 (b): Node degree distribution

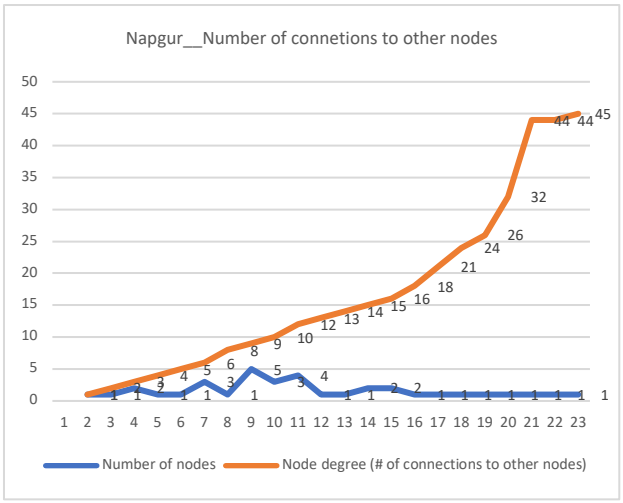


Figure 27 (c): Number of connections to other nodes

Influence of large node

Figure 27 (a) shows the influential nodes in this network (connection) - Smarter service via technology and 'Equal access to services'.

Figure 27 (b) shows that there are 4 dots in the top right circle. They represent 'Smart service via technology' (Betweenness Centrality: 0.2458), 'Equal access to services' (0.2338), 'Health, Well-being' (0.18113), followed by 'Resource management' (0.12168). Betweenness Centrality also shows the same results in the survey stage. So it is assumed that technology has higher significance in Nagpur in terms of proactive use of technology (information) capital which creates value over time.

The results of the network analysis can be verified by the results of EOL results of Nagpur. The results demonstrated that 'Safety and Security', City resilience' outweighed the others. They did not directly correspond to 'Resilience' and 'Security' but with understanding that Nagpur focuses on technology for better service environment, 'Smarter services via technology' closely corresponds to it. 'Education; and 'Housing and Shelter' correspond to 'Health, well-being' and 'Equal access to services' respectively. In the case of Nagpur, it can also be said that the network analysis results are verified. Also the contribution of soft assets can also be validated in terms of EOL.

Table 33: Proposal stage and interview stage comparison: Nagpur

Nagpur

	Proposal stage ranking		**Number of actions/initiatives**	**Betweenness centrality (BC)**	**Ranking (BC)**
Totla number of actions/initiatives	1	Smarter services via technology	67	0.326	1
	2	Equal access to services	57	0.187	3
	3	Health, Well-being	52	0.272	2
	In-person interveiw stage ranking		**Number of actions/initiatives**	**Betweenness centrality (BC)**	**Ranking (BC)**
	1	Smarter services via technology	45	0.245	1
	2	Equal access to services	44	0.233	2
	3	Resource management	44	0.121	3
	4	Health, Well-being	32	0.181	4
	5	Reslience	26	0.084	6
	6	Quality communications	24	0.113	5

Soft assets and resilience

Nagpur and its neighboring districts are located in a unique geographical location which causes serious floods on a regular basis (Vidarbha floods in 2020). The location of the river, the catchment area, and the dams cause the downstream areas of Maharashtra to become severely flooded. Heavy rain causes the catchment areas of the Waingang river basin to overflow into the many tributaries, and dams (The Times of India).

When the flooding reached the Nagpur and neighboring districts, more than 26,000 people from 4,500 families had to be evacuated to safer locations. The Central Water Commission (CWC), the central city organization responsible for monitoring dam storage and flood forecasting, is located in Nagpur (The Times of India).

The command and control centre (COC) at Nagpur Municipal Corporation (NMC) monitored the storm water and flooding events using CCTV surveillance cameras installed across the city and discharge storm water (The Times of India).

The storm water overflows and flooding can be attributed to several factors – blocked drains, clogging, lack of sewage or effective stormwater network, and the unique area geographic characteristics where flooding can escalate very rapidly. Given this vulnerable situation, it is appropriate for the city to prioritize improved monitoring systems, accurate weather data, collection and analysis, dam management and flood monitoring to effectively plan and prepare for and prevent these types of disasters (Table 34 (a), (b)).

Table 34 (a): Survey Q8-1: Successful way incorporating soft assets

Nagpur (Q8-1)	People/Human capital	Institutional capital	External capital	Technology (Information) capital	Social capital	Total
Resource Management	5	5	1	4	1	16
Accessibility (Mobility)						0
Health Well-being	1	1		2		4
Equal Access to Services	3	3	1	5	1	13
Smarter Services via Technology	2	2	1	4	1	10
Commuity Engagement	1	1	1			3
Quality Communications	1	1	2	1	1	6
Security	3	3		4	1	11
Resilience	5	5	2	6	2	20
Total	21	21	8	26	7	83

Table 34 (b): Survey Q8-2: 3 examples of soft (intangible) assets are required to improve resilience

	People/Human capital	Institutional capital	External capital	Technology (Information) capital	Social capital	Total
Resource Management						0
Accessibility (Mobility)						0
Health Well-being						0
Equal Access to Services	2	2				4
Smarter Services via Technology	1				1	2
Commuity Engagement	3				2	5
Quality Communications	2				2	4
Security						0
Resilience	6	4			2	12
Total	14	6	0	0	7	

5.3.3 Value creation mapping

Identifying value creation cases

As with Bhubaneswar, the value creation mapping was conducted in Nagpur. Identical questions were used for the analysis. Responses to questions about the successful cases, and incorporation of soft assets capitals and the impact (Questionnaires 1, 2, 7 in Annex 2) shows a compound, multilayered, and holistic contribution of soft assets.

Table 35 shows the classification of the respondents answers (Table 36) using the qualitative framework adopted in the network analysis. The results of the classification identified that ‘Smarter services via technology’ and ‘Equal access to services’ are also influential nodes in this mapping exercise. They are consistent with analysis from the proposal stage. The results also verify the findings of the connection (network) analysis at the proposal stage. Same as Bhubaneswar, the use of soft assets in these elements creates benefits and values for the citizens and the city.

Table 35: Classification of value creation actions: Nagpur

	People/human	Insitutional	Tech/information	External	Social	Total
Resource mangement	3	2		1	1	7
Accessibility (mobility)		1	1			2
Health, Well-being	1	4	1	1	1	8
Equal access to services	1	6	3	1	1	12
Smarter services via technoloty		7	6			13
Quality communications	2	3		2	2	9
Community engagement	2	2		2	2	8
Security	1	3	1	1	1	7
Resilience						0

At the proposal analysis stage, there was one influential node outside of the nine value elements, which was ‘consensus building’. This is categorized under ‘Quality communications’ and ‘Community engagement’ hence, this is another example of verification that the influential node identified at the proposal level contributes to value creation.

Table 36: Some responses from interviewees regarding positive action and its impact

Positive Impact (1)	Exploring their knowledge and working for new challenges and advance components that with definitely useful for them in future career.	Crime Detection and Prevention Monitoring and Maintenance of Law and Order Situation	These helped a lot in enforcing citizens to obey the traffic rule, resulting in people started wearing helmet, seat belt, non-jumping of signals, as now they know CCTV is looking to them. Also helped a lot in detection of crime.	Integrating soft aspects (i.e. citizen centric approahces)	Data collection from relevant stakeholders, pertaining to sectoral energy and fuel consumption and evaluation of GHGs following GPC protocol.	Will offer low-cost parking space, will support better mobility and accessibility in crowded areas	Required effective coordination among different line departments and organisations such as SPV, NMC, Electricity Board, etc.; Will support better and integrated service delivery to communities as the smart roads would not require regular digging (which is the current practice for putting pipelines of different utilities) till atleast next 10-20 years.	helping citizens as well as city administration in reducing wastage of electricity, proper garbage collection, short waiting time on traffic signals, etc.
Positive action (1)	Opportunities for Employees/Staff working under smart city **[RM x Ppl/HR]**	More than 3600 cameras were installed at 700 junctions along with Multiple ICT based components connected with 1030 Km of Optical fiber cable network installed by NSSCDCL **[SMART x IT/INFO]**	ANPR/RLVD and other analytics based software and related hardware's installed for Crime detection and challan generation **[SMART, SEC x IT/INFO, INSTIT]**	Enouraging more eyes and life on streets and in the city which not only make the cities more lively but also provide a sense of security to communiteis, change the coruse of conversation to positive and healthy choices, etc. **[SEC, QC x INST, SOCIAL]**	Preparation of city's GHG emissions inventory baseline **[H-Well b, x IT/INFO, INST]**	Multi-level parking systems in busy market areas **[Access, SMART x IT/INFO, INTST]**	Integrated Smart Road with underground utilities (water supply, power cables, sewerage pipes, etc.) **[ACCESS. SMART, EQ x IT'INFO, x INSTI]**	The use of this ICT enabled components **[SMART, EQ x IT'INFO, x INSTI]**

Positive Impact (2)	the citizens under the ULB's with best practices performed under Smart City.	Through monitoring wells (which measure different water parameters and level through out the year), mechanism has been put in place for real time remote monitoring which help in undertaking informed decision making.	helping the city administration better know the ground level bottlenecks and gaps.	Enabling scientific and informed decision making	Mapping of wards that are more vulnerable towards different climate risks and hazards, based on stakeholder consultation, secondary research and with use of GIS techniques.	Identification of potential areas for GWR using GIS techniques, primary surveys and secondary research. Use of vertical electrical sounding techniques to identify optimum depth below ground for recharge.	This will benefit the local communities which were earlier facing health and environment risks such as fire incidents, smell, leaching particularly during monsoon.	People were engaged for identification of cycling routes and areas. It has enhanced awareness and acceptance of such environmentally friendly cycling infrastructure among the public.
Positive action (2)	New, advance things to serve	Rainwater harvesting **[SMART, x it/INFO, INST]**	Consultation and feedback with beneficiaries/user **[QC, CE, BS x IST, HR, EST, SOCIAL]**	Enhanced capacities of ULB staff **[RM x PPL/HR, INST]**	Climate Risk and Vulnerability Assessment **[H, WELL, RES, SEC, QC, CE x PPL/HR, INST, EXT, SOCIAL]**	Implementation of Rain Water Harvesting (RWH) and ground water recharge (GWR) systems at 2 public schools **[SMART x INST, IT/INFO]**	Reclamation of land (waste landfills) **[H, WELL-B, BS x INST]**	Cycle for change **[H, WELL-B, CE x INST]**
Negative impact (1)	However, as not much of local consultations and need assessment were undertaken involving the local communities, the developed resources are not being utilized optimally or their impacts remain	Their effectiveness is not established yet as there is no result or data sharing on how the findings are being further used.	A major lacuna with them is that night mode is absent in the CCTVs which makes them not much effective during nighttime.	A major challenge in their utilisation is lack of proper planning and management of the useful content that should be displayed on these screens..	It is observed sensors of many of them are not fully functional, leading to spillage and piling of waste around the dustbins. Possibly, solutions installed in the city should be as per the city requirement and capacities to	However, the suggestions and feedback are not yet reflected and these kiosks are reportedly used by beggars.		

	unknow due to lack of active data and information sharing. For example,				effectively operate and utilize them.			
Negative action (1)	Under the pan city development, there have been some good initiatives undertaken.	The environmental sensors are installed which records different environmental parameters	CCTVs installed across the city are supporting constant monitoring of law & order and hazardous situations in the city,	Digital screens have been installed across the city,	Smart bins installed across the city are expected to send alert to the local waste management authorities when they are filled	Kiosks have been installed near the bus stop at various locations of the city		

How the five soft asset capitals are related to the process of value creation.

As with Bhubaneswar, these are some examples set out in the Table 36 and the Nagpur Smart City Mission proposal that demonstrates how soft asset capitals are inter-related in the process of value creation.

c) Value created case (positive case)

- Activity/project: Multilevel car parking system (Smart Parking Sub-system)
- Objectives:
  - To accommodate large number of difference makes of cars in busy areas
- Inputs:
  - *Soft asset capital*: Technology, information capital, Institutional capital
  - *Value elements:* Equal access to services
- Output:
  - Offering low-cost parking space, supporting better mobility and accessibility in crowded areas
- Outcome & future impact:
  - Improving technology and applications including enabling electric car parking system through a network of sensors, digital display boards at various junctions; information system for available parking places in the vicinity
  - *Soft asset capitals*: Technology, information capital, People/Human capital, Institutional capital; Community engagement, External capital
  - *Anticipated Value elements:* Equal access to services, Smarter services via technology, Community engagement; Resource management

d) Value not created case (negative case)

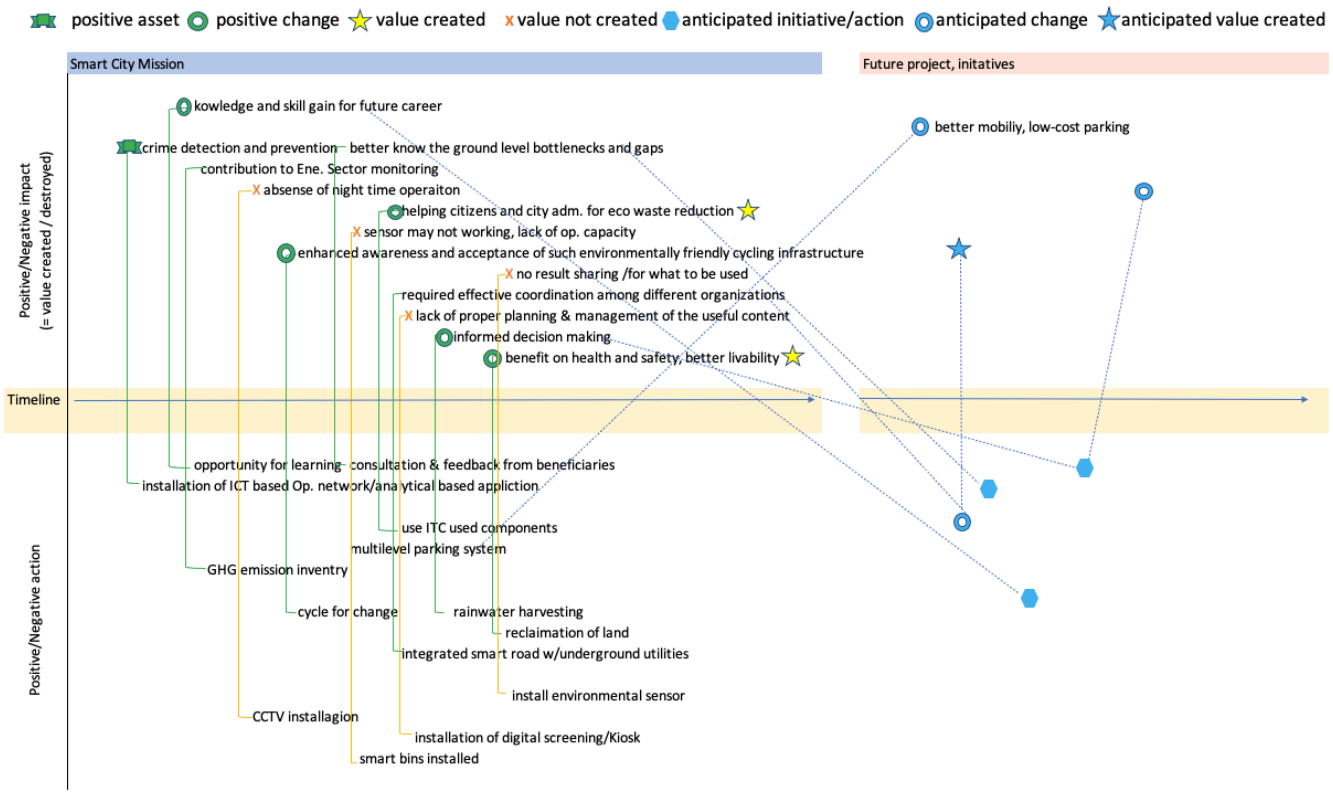
- Activity/project: Smart garbage management systems (Smart Swachh city solution)
- Objectives:
  - Smart refuse bins installed across the city with fixed sensors and wireless communication links that remotely send alerts to the local waste management authorities when they are filled are ready to be collected
- Inputs:
  - *Soft asset capital*: Technology, information capital, Institutional capital, People/Human capital,
  - *Value elements:* Equal access to services, Smarter services via technology,
- Output:
  - Failure of appropriately functional sensors leading to spillage and piling of waste around the bins
- Consequences:
  - Wasting investment materials, budget, and existing facility; Lost opportunity of value creation
  - Hygiene issues and public health concerns

- Possible reasons for opportunity failure:
  - *Soft asset capital: weak institutional capital and technical and information capital to set standard requirements of installed equipment, people/human capacity to operate and utilize the equipment*

Value creation mapping

As with Bhubaneswar, using Table 36 in the previous section, value creation mapping was created and shown below (Figure 28). The maps only capture a few aspects of the activities that are being implemented or executed. The development of a more accurate value creation map needs more information such as timing, classification of different stakeholder involvement, linkage of other initiatives and planning. This information could add more value to this creation map, including assumptions of scaling up, synergetic, and spillover effects. For this, it requires a series of stakeholder consultations and strategy and systems to integrate the result into the planning both at strategy and project levels. The value creation map below demonstrates the effects of soft assets consideration taken from the survey interview results. Major findings are listed in the Bhubaneswar value creation mapping section.

Figure 28: Value creation mapping (Nagpur)



5.3.4. Consultation, Quality communications, Community engagement, and "learning and Share'

Regarding consultations and communication, the same questions used in the Bhubaneswar survey were used for Nagpur city administrators, SPV staff, and other stakeholders. Nagpur also places importance on the consultations, but there are different findings from Bhubaneswar in terms of the approach and focus of consultations as well as institutional arrangements regarding learning and share activities.

5.3.4.1. Consultation process, quality communications, and community engagement

(a) Entry Points

From the survey responses, Nagpur also conducts various levels of consultations to promote inclusiveness and awareness of its smart city initiatives. Integrating community and different stakeholder's needs are crucial to Nagpur's smart city development. Some responses indicate that the most intensive consultations take place at the proposal stage, but comprised only briefings in later stages. While the survey only obtained limited responses on this issue, it is clear that there are expectation gaps on the roles of consultations between different respondents i.e. local officials and academia, NGOs. Nevertheless, there are explicit responses regarding institutionalized consultation and feedback, but not a Grievance Redress Mechanism (Table 37).

Table 37: Process of consultation (implementation)

Purpose	Description	Entry point
Demonstration of successful cases	Include the best practices from them in our Smart City.	All parts of the citizens
Enhance communicagitons and engagement of stakeholders	Citizen Advisory Forum supporting the consultation, communication and engagement with community and other stakeholders. The Forum meets every 3 months in this regard.	Members of NMC, local representatives with sectoral expertise (for example, education, commercial operations, NGOs, etc.).
Policy formulation, debriefing	Public consultations are mostly done at policy formulation level. At implementation level, there is no institutionalised mechanism of seeking consultations and feedback except for a Grievance Redressal Mechanism.	Draft versions are open to diverse stakeholders for comments and feedback
Project design	Primary surveys through web and physical toassess citizens' perspectives and expectations to design and implement projects.	Academia, local CSOs, NGOs, etc.

	At the project planning phase, the consultation promotes participatory governance.	
Liveability, KPI	Liveability Index, Cycle for Change, Streets for People, etc	Extensive stakeholder consultations, field surveys, citizens dialogues, etc.
Benchmarking and assessement	Research/survey to benchmark and assess the existing urban services zone wise	Under NMC coordinated
Consensus building and seeking commitment	Undertake (or atleast commit to undertake) stakeholder/community consultations during proposal stage. But similar consultations are hardly seen during implementation stage.	
Gaining suport re. smart city planning and activity	Support consultations and seek advices/feedback from different stakeholders on different planning and activities under the Smart City Mission. The forum is expected to meet quarterly, however, sometimes, the meetings are held once in six months	Government representatives and political representatives such as Member of Legislative Assembly/Council (MLA/MLC), Mayor, etc. of the respective area , the non-governmental members of the forum include representative of NGO, Residential Welfare Association (RWA) and that of local hotel associations
	The consultations are more visible during the proposal stage, the organisations bidding also commit to undertaking consultations with local communities and other stakeholders, etc. However, the same are not much visible during implementation stage.	
Awaremess raising	Supports the programmes and activities of the Nagpur Municipal Corporation where they are regularly invited and engaged with in awareness programmes, workshops, etc.	AIILSG

(b) Effectiveness of Consultations

Major points contained in the responses are awareness raising, understanding of project impact, consensus building for new plans and an institutionalized grievances mechanism for citizens. Consultations are more common in the project planning stage to seek early citizen buy in and support for local projects and activities. Stronger aspects of inclusiveness are not confirmed from the limited survey responses (Table 38).

Table 38: Effectiveness of Consultations

Effectiveness	* Yes, definitely these consultation and feedbacks are effective. Citizens helps to implement the project on ground as they were aware of the output and outcomes of these projects. * Feedback received help identify the local needs for example, in the initiative Cycle for Change, the consultations and feedback from the Forum helped identify suitable locations for cycle stands, etc. to suit the needs of the local communities. * Grievances received are used to address the identified gap in the respective initiatives. For example, based on grievances received recently, it came to the light that in the name of trimming of old/broken branches/trees during pre-monsoon season, cases of felling of trees were observed in a few areas to fulfil personal motives. Accordingly, the relevant directive by the City Administration was modified adequately to curb such practices. * They are effective. For instance, local cyclists were consulted extensively, to design and implement pilot project of implementing dedicated cycle track within city's jurisdiction. * However, it is felt that rather than consultations, the members are informed of the planned activities of the Smart City. * It is also felt that suggestions provided are not adequately incorporated in the planned activities. * However, there were hardly any similar engagements with Smart City Mission which involved AIILSG.

(c) **Successes and Challenges:**

Major lessons and successes of consultations were listed by respondents as follows (Table 39):

Table 39: Successes and Challenges

Factor	Actions
Technology, applications	* College Students, parents, Government Organizations, Citizens, etc. were installed and individuals get communicated to get the success.
	* Secure and safety infrastructure with CCTV, Green Environment and good disasters management facilities available helps to get success.
	Citizen and communities are well connected by: (i) wide information sharing: (ii) active communication by Nagpur Municipal Corporation using social and other forms of media;
	CPS through web-based forms, easily shared using social media tools: (i) use of local outreach channels such as Radios, TV channels, etc.; (ii) outreach through local newspapers
Reaching out broader targets	Reaching out (in person) to stakeholders such as schools
City Level Advisory Forum	The forum such City Level Advisory Forum (Consisting of local politicians, students, social and environmental activists, professors, etc.) might have been helpful in enhancing community engagements.

In Nagpur city, there were several factors identified from the survey results, including technology applications which were found to be more important for Nagpur than Bhubaneswar. Some key points from the survey are also listed below. Again, the survey results did not capture every aspect, but difficult cases were identified such as relocation and compensation issues. This seems to relate to identified soft asset capitals i.e. 'Quality communications' and 'Community engagement' and remain challenges in Nagpur.

- Community engagement is inadequate, without detail or institutionalization.
- A few community-based surveys were undertaken, but not sufficient to gauge the views of the wider (local) communities.
- Concerning the Smart City Planning in the area where Area Based Development (ABD) is proposed and would result in removal of around 400 people due to development of road infrastructure, it appears that the affected people inadequately informed or engaged with the effect of the planned development.
- There also appears to be an inadequate relief and rehabilitation (R&R) policy for the ABD area, in particular, information gaps on criteria used for affected people allotted alternate housing, entitlements, etc.

5.3.4.2. Learn and share process

(a) Operation of "Learn and Share" process

Many survey responses confirmed that the focus of city authorities is primarily delivering physical and hard infrastructure. Responses also underline that soft assets such as human resources and skills development are accomplished mainly through training programs. The biggest differences from the survey responses of Bhubaneswar, is there is no separate mechanisms of learn and share like BUKC in Bhubaneswar or at least there was no feedback regarding such mechanisms except the Command and Control Centre. However in Nagpur, some documentation on lessons learnt for future projects and initiatives show it is conducted at project level. However, mechanisms to sustain these approaches could not be identified from the survey results (Table 40).

Table 40: “Learn and Share” process in operation (in practice)

Level	Entry. Process
Central	Respective divisions share their data and information on the designated portals of GoI. Learning and sharing are also supported by different initiatives of GoI on publication of good practices, conferences, etc.
	Learning and sharing is supported by different Advisory Notes by GoI along with a unified GoI’s portal which supports cross-sectoral updates and learning.
National, SPV	There is no separate mechanism of learning and sharing at SPV level.
	Requirement, availability of ICT components to fulfill the requirement of citizens submitted as per survey.
	The role of the department is mainly in Integration and implementation of the ideas.
Project level	* Technical assessments and pilot projects were undertaken based on stakeholder consultations and thereby following the city’s priorities. * Lessons learnt were documented and shared with relevant city departments in form of trainings, fact-sheets, case studies, etc. * Project outcomes and best-practices were published on official websites and national institutions and think tanks for better outreach.
Citizen,	* Citizens are involved for taking their reviews * Consultants were perform the survey and process the requirement

(b) Cases and challenges to establish the “Learn and Share” process

From the survey results, challenges are not specifically mentioned or shared, but some cases indicate that there are some initiatives to facilitate learning and sharing, at organizational/institutional, and project levels. Using the SMARTNET portal, existing knowledge is able to be disseminated. The effectiveness of “Learn and Share” with or without national or local level functions requires a systemic and not a fragmented approach to accumulate and nurture knowledge, cases, experiences, and other key information (Table 41).

Table 41: Cases and challenges of “Learn and Share”

Good case	* To add with the incentives available with the organization are different challenges undertaken by Smart City Mission * Cities must effectively leverage expertise and assistance provided by external institutions to undertake climate actions * Conduct workshops within cities of similar demographics to enable further facilitate learn and share process * Effective/focused dissemination of existing knowledge products such as SMARTNET portal, outcomes of programmes such as Climate Smart Cities Assessment Framework, etc. considering cities limitations, interests, priorities.

(c) Evaluation of vision, goals, activities and Soft assets monitoring process

The limits of the survey responses meant they could not be used to accurately assess the vision, goals, activities of smart city development. However, monitoring and evaluation of India's Smart City Mission is reported using India's MIS (Management Information System). Also the Ministry responsible for Smart Cities Missions has set up monitoring and evaluation mechanisms to monitor and track fund flows, project planning and execution. The results are shared and cities are ranked along with recommendations for further improvement.

Like Bhubaneswar, respondents from Nagpur also referred to the Livability Index. The Ministry has intervened to monitor programs on a monthly, quarterly and annual basis depending on the assignment. For instance, the Livability Index, Climate Smart Cities Assessment Framework are used in which cities are assessed using different indicators of performance and ranked accordingly. Recommendations were made to each city and capacity building workshops organized to provide further assistance. Soft (intangible) assets are also monitored and evaluated including citizens engagement, building community relationships, and working with NGO's, stakeholders, and monitoring physical and financial progress, fund utilization, etc.

Internally, there are various mechanisms such as regular internal meetings headed by the CEO, SPV, quarterly City Level Advisory Forum meetings with Board Members, etc. These mechanisms can also conduct monitoring and evaluation that is examined in Chapter 4. From the survey results, there are project bases monitoring reports, but the overall Smart City Mission implementation monitoring and evaluation reports were not found, not published or at least identified by respondents in the survey.

On soft assets monitoring, similar to the case of Bhubaneswar, there is no dedicated process or a centralized function in Nagpur city for monitoring and evaluation, but certain activities at the local level are evaluated. Mechanisms like performance-based pay for human resources are used as monitoring and evaluation. Although this limited process helps to assign accountability, it also adds to a sense of insecurity among the city staff in terms of human resources management.

CHAPTER 6: DISCUSSION

Based on the findings in the previous chapters, this chapter discusses the timing and approaches for effective integration of soft assets in smart, resilient city development and examines some appropriate cases from the interview responses from two city case studies addressing soft assets, then proposes several options, including institutional arrangements to achieve long term sustainability. This chapter also raises the importance of "wholeness" in addressing citywide level appraisal and propose a model for co-value creation model.

This research starts with an examination of the global urban trend of building smart, resilient cities as a solution for sustainable development. In particular developing countries have major disadvantages compared to developed countries building enabling environment for smart, resilient cities and access to finance. In this context, soft assets can play a key role to establish an enabling environment and creating value to make cities smarter and more resilient. However, the unique features of soft assets can hinder proactive support and investment. To understand which soft assets are incorporated into projects or activities, five soft assets capitals and nine value elements or components are described and used to develop a qualitative framework to identify soft asset consideration or utilization. To examine the level of soft asset consideration, the Indian cities of Bhubaneswar and Nagpur were selected as a relevant case studies.

Based on network analysis and a value creation mapping exercise, a link between influential nodes and actual value or impact creation is broadly observed. The major influential nodes also correspond to the result of the EOL score where levels of soft asset consideration broadly contribute to an improvement of livability. The aspect of resilience is also verified by the different approaches of each city and the different value elements. Value creation mapping is a useful simplified process that can be developed from the survey results. Through approaches to disaster prevention and management, integration of consultation process, the level of EOL, and value creation mapping results, the significant influential nodes which make impact can be validated.

Based on the findings in the previous chapters, this chapter discusses; (i) the results from the Indian city case studies, including comparison between the planning and implementation stages, linking soft assets incorporation to government issued indexes – the EOL and the MPI, and challenges in incorporating soft assets; (ii) a review of value creation mapping and the 'Blackbox' concept; (iii) challenges in smart, resilient city development, including the importance of central coordination

mechanisms; (iv) the timing of and the effective approaches to incorporate soft assets in smart, resilient city development.

This chapter also emphasizes the importance of "comprehensiveness " within the value creation process for an holistic perspective. The results demonstrate that the process of soft asset value creation evolves organically. Therefore, the process of urban soft assets integration should be reviewed and analyzed both at the project level and the citywide level as a whole to determine the effectiveness of resilience and long term sustainability. Finally, the survey findings and analysis postulates a "co-value creation" model.

6.1. Key findings from case studies of two Indian cities

Comparison between planning and implementation stages

Identification of influential nodes are valuable for facilitating strategic incorporation of soft assets and understanding how the process works in practice.

In each city, the influential nodes or value creation areas that were identified in the proposal stage were also identified in the implementation stage, but differ slightly. Although both cities were strongly aligned overall with smart city objectives, the two stages in Nagpur were more consistent while in Bhubaneswar they were different.

Overall, a range of responses provided by respondents demonstrates a snapshot of soft assets integration in each city. The different results identified by greater or lesser extent between planning and implementation stages can be attributed to several factors.

The responses about these elusive concepts and topics are subjective. Different influential nodes referred to in the proposal stage applied to soft assets. Soft assets incorporation assessment and responses depended on the city administrators' and other key stakeholders' professional perspectives, experiences, observations, and insights. Despite the different roles of respondents in the Smart City Mission, included in the interview and the survey, some of the responses provided were more detailed than others. The survey questionnaires also inquired about specific items, including the use of 'consultations', 'learn & share' approaches or achieving 'resilience' to obtain the unique experiences and insights of the respondents. Thus, different insights, focuses, experiences and challenges were identified in each city such as the range of responses on conducting consultations, how soft assets are perceived as a key development factor and others. The results of the analysis in each city and comparison analysis from answers from the same questionnaires showed clear differences between the two cities on different approaches for soft assets integration.

From the survey, one of the biggest challenges for respondents was to understand the terminologies used in this research and the questions often needed to be modified for easier comprehension. It is clear that ‘people/human capitals’ and 'institutional capital’, including system and processes are important enablers for respondents to make projects operational and these are essentially fundamental soft asset capital elements. The use of technologies to establish better relations between local authorities and communities, diverse communication channels, citizen and community engagement, were also identified in the responses as key elements to make the city smarter. So a higher volume of responses on this aspect is understandable.

The responses did not always indicate utilization of soft assets and anticipated outcomes or impact of project or activities. Soft assets were incorporated at different levels, layers and dimensions of policy, project and action planning and implementation. So it is difficult to attribute specific inputs to outcomes or impact as discussed in Chapter 1 and Chapter 3. But some cases provided examples of anticipated impacts that will be discussed in the value creation mapping section. It was also found that both cities raised further incorporation or areas which needed to be addressed by soft assets integration. This indicates that the importance and awareness of soft assets are clearly identified at individual (respondent) level, which is positive for sustainable development.

Implication of concentration of soft asset incorporation

Overall, use of ‘Smarter services via technology’, ‘Quality communications’, ‘Equal access to services’, and ‘Community engagements’ are the most frequent areas employed. In addition, building resilience is also one of the most frequent areas of incorporation. Unique geographical location and specific disaster types influenced the focus of the disaster prevention and response and fundamentally, influenced how each city employed soft assets in their own way.

Different influential nodes were found to be important in this research and demonstrated that the incorporation of soft assets was aligned with each city’s particular vision and objectives for specific value creation. In Nagpur, for example, incorporating human resources, institutional capital, and external capital in ‘Quality communications’ were used to plan and operate waste management systems to create impact and value at the project level. The value creation process affected other areas of city management as well.

However, the greater number of responses for a specific factor does not necessarily signify being superior or more important than other factors with lower numbers of responses. These elements are not on the same level – some are cross cutting themes (i.e. resilience), some are more fundamental elements than others (i.e. resource management), some involve more a process of

working or relations (i.e. 'Community engagement'). Or different people consider different priorities within the nine core elements because the specific contexts.

So identifying the influential nodes is important to understand where soft assets incorporation is more concentrated than others for better analysis of the value creation process and management and use of soft assets and their management. But their quality and values are context specific and the level of scalability, impacts are unpredicted. Therefore the results of the comparative analysis are neither right or wrong, but present a snapshot of the various city approaches.

Value creation process

As shown in the discussion of value creation mapping (Chapter 5), unpredictable factors can minimize or destroy the value or impacts of soft assets. To achieve desired outcomes, therefore, cities need to consider a variety of innovative and unique approaches for managing such risks. The process may take time depending on the individual context, capacity and enabling factors. The value creation process of soft assets, although unpredictable, fosters better relations between local government and various stakeholders by achieving three higher objectives of public organization discussed in Chapter 3. Thus city administrators have to identify and prioritize the development and utilization of soft assets, understand and commit to the process and be prepared to take risks if they want to see value creation from the process as a result.

The process of using soft assets to create urban value is not cumulative, but is organic and evolves despite uncertainties. As the process constantly evolves (examined in the value creation mapping Chapter 5), consideration and adoption of soft assets in the earlier stages of planning and implementation will have the greatest impact on creating future value.

Linking soft assets utilization to government issued indexes – EOL and MPI

Using soft assets is one of the key contributing factors to improve government performance which can be measured by the Ease for Living Index or EOL and the Municipal Performance Index or MPI. These indexes provide a reliable assessment of soft assets that build capacity and create value over time. These two indexes used by India are very important for the evaluation of India's 111 cities to determine the gaps in implementing the city's urban development programs and fine tune strategies to achieve their goals (MoHUA, MPI 2021). The two indexes cover key 'pillars' and 'a set of five vertical' categories which encompass core functions i.e. for EOL: quality of life, economic ability, sustainability; for MPI: governance, planning, technology, finance, and service delivery.

Two cities have already demonstrated their solid performance outcomes using the EOL and MPI evaluations. From EOL ranking – Bhubaneswar was ranked in 2nd among 62 cities in a group of less than million population and Nagpur was in 25th among 49 cities in a population group of over a million. And from MPI, each city has different areas or enabling factors that score higher than the national average – Bhubaneswar ranks high in 'planning' and 'technology' while Nagpur in 'technology' and 'governance'. And top three city score areas are categorized under sustainability (e.g. city resilience) and quality of life (e.g. housing and shelter, safety and security, education).

This data-based evidence demonstrates that both cities utilize a certain level of enabling factors (represented in MPI indicators) to deliver effective, valued services to their citizens (represented in the Citizen's Perception Index). Taking into consideration the type of EOL pillars and MPI's set of five verticals components, soft assets are definitely significant contributing factors to achieving each city's EOL and MPI results. A broader linkage can also be identified between EOL score in each city and the influential node identified from the survey results.

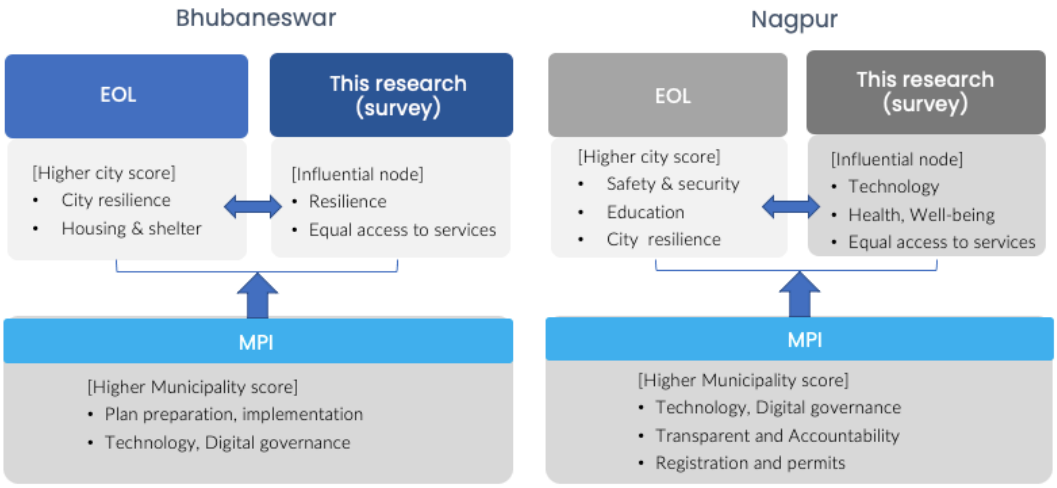


Figure 29: Verifying influential nodes with EOL and MPI

Figure 29 shows higher EOL score items correspond to the influential nodes mentioned in Chapter 5. The EOL scores comprise many other factors that influence the score. However, it also indicates that the level of soft assets consideration is one of the contributing factors to the score. As an enabling factor, the plan preparation and implementation capacity of Bhubaneswar (in this research, this equates with institutional capacity) is used on several fronts in developing the smart, resilient city planning and implementation. Including MPI results on 'Technology' side such as strong digital governance and some 'Services' sectors, Bhubaneswar's efforts and their outcomes were verified by the highest results it received in the Citizen's Perception Index.

Stronger technology orientation in Nagpur is also employed in its smart city proposal and implementation stages. The obvious development impact and values are created by delivering effective services using innovative technology. Other aspects that make Nagpur unique is a strong service sector such as 'Transparency and Accountability', 'Education', 'Registration and permits'. This was also supported by Nagpur's performance score in 'Governance' and 'Service' which is higher than the national average. These enabling factors within the MPI also correspond to the survey results.

Challenges in incorporating soft assets

There are fundamental challenges that interviewees shared in the survey, which relate to institutional systems, enabling factors including human issue and silo mentality issue. The results correspond to the challenges faced by developing countries examined in Chapter 1. More importantly, these challenges result from a combination of features of soft assets and public sector operations, including strong political influence.

The responses from each city highlighted key challenges. There are common areas between the two cities such as skewed focus on hard assets due to the easy visibility, political will or lack of political intervention and support. Limited capacity at both individual level (technical and administrative) and institutional level (coordinating mechanisms) were also highlighted. Other notable points are that: (i) the reasons for shortage of technical expert and skilled people are often attributed to high dependence of government on the private sector instead of its own core staff; (ii) soft assets, especially human capital aspects are usually implicitly considered in planning and implementation; and (iii) Ad-hoc approaches of considering soft assets includes disincentives for investment and lack of political will.

Institutional challenges are not easy to resolve and change in the public sector as it takes time for reforms to occur. Respondents however, felt these should be dealt with at earlier stages as they can contribute to establishing an enabling environment. It is therefore important to understand what type of soft assets are incorporated, when and where, as this will be a starting point for measuring the effectiveness of soft assets outcomes. Measurement requires identifying which capital will be measured, and then setting a benchmark to compare the results and outcome levels. In this regard, the network analysis and value creation mapping provides a sound basis for measuring soft assets utilization. This is the main benefit of soft assets for city administrators and an influential node can also be one of the possible entry points to develop the process with anticipated risk mitigation measures.

6.2. Mapping – inputs, outputs, and outcomes

Value creation mapping provides an immediate visualization or illustration of survey results and a mid-to-long term tool to understand the value creation process. This template was used by Pagano and Neubert (2015) as a useful tool for value chain analysis and was effectively used in this research. This mapping tool will also be useful in the future for policy makers, decision makers, and stakeholders to understand 'what' soft assets are incorporated and 'when' and 'how' impacts can be made. This also address two points: (i) this exercise can contribute to establishing a process to measure soft assets value creation; and (ii) understanding the importance of both value creation process at an individual activity or project level, as well as an adequate appraisal of value creation impacts of a city as a whole.

On the first point, the best way to measure soft assets value is to identify the soft assets to be measured, understand the context, then set a benchmark followed by the timeline to compare any performance improvement, or changes. This mapping exercise can help identify the entry points and anticipated approaches and outcomes.

On the second point, it is difficult to draw this conclusion from the literature review and survey results due to the level of complexity. However, Figure 30 below tries to incorporate the value mapping results in the 'Blackbox' presented in Chapter 1 to simply demonstrate what may occur.

The 'Blackbox' also represents the importance of the time factor with input and output flows. The initial incorporation of soft assets can also represent 'inputs' portrayed in the figure below, left section, the results 'outputs' and 'outcomes' can be identified in the upper left section within the time boundaries of the Smart Mission program. The 'outputs', 'outcomes' or 'impact' could create further 'outcomes' or 'impact' in the future shown below in both upper right sections. Thus value creation progresses with time.

As mentioned, it helps to understand the actual and anticipated flow of individual action but the value creation at city level is not simply an aggregate of individual levels. This is supported by the literature review about the definition of soft assets, their synergetic, spillover, and scale-up characteristics, unpredicted risks in their specific contexts, and the notion of 'wholeness' discussed later in this chapter. In addition, the value creation process needs to be embraced by internal growth and learning mechanisms.

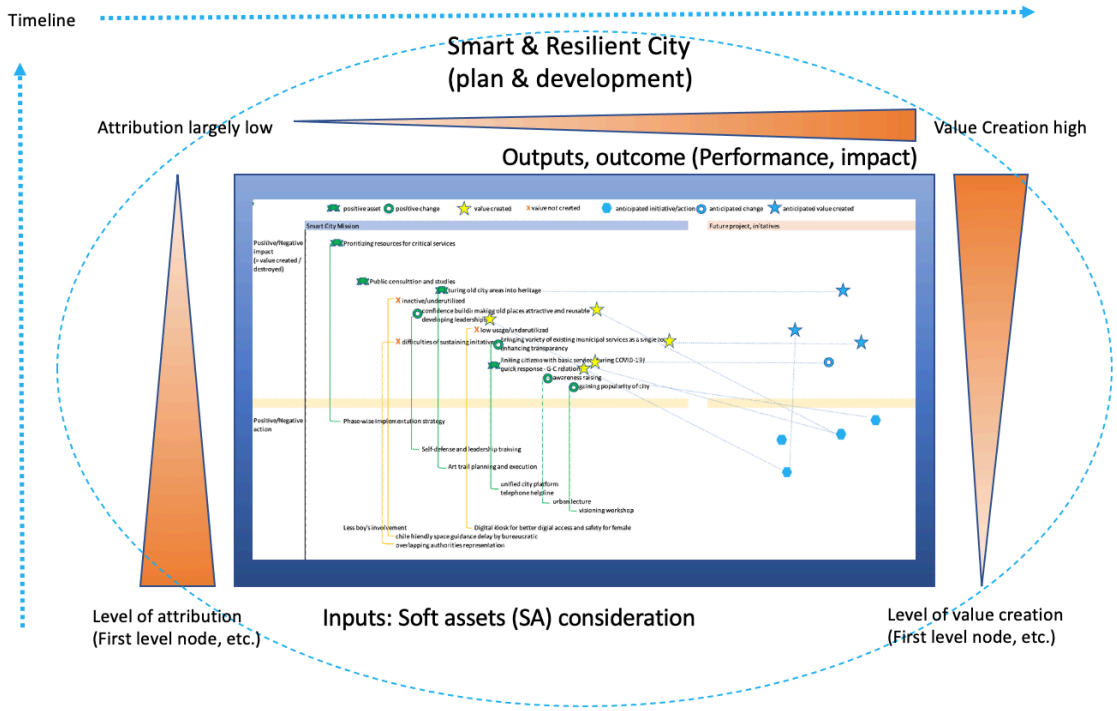


Figure 30 Example of the contents of the 'Blackbox'
(Source: MoHUA, Government of India, Ease of Living 2020. Municipal Performance Index 2020)

For example in Bhubaneswar, 'self-defense and leadership training' (people/human capital, social capital) resulted in 'confidence building and developing leaderships' (value creation). In this case, input and outcomes (or impact/value) would change if there were unpredicted events or factors. The value created in this case can be a foundation for new initiatives planned in the future. But future action will also be affected by unpredicted changes or risks, and may create new synergetic effects with other soft assets in different contexts. The example demonstrates that soft asset value creation is a complex, dynamic and organic process. Also different levels of outcomes occur at project and city-wide level and important to soft asset value creation. This point will be more discussed later in this chapter.

Along with positive cases with successful results, there were several negative results in two value creation mapping exercises, namely Figure 24 (b), Figure 25 (Bhubaneswar) and Figure 28 (Nagpur) in Chapter 5, presented as 'value not created'. Compared to the original plan, the potential positive results of these actions were not achieved and were categorized as 'value not created', 'failure', or 'opportunity lost'. It is important to address these 'not-achieved objectives' cases. 'Values are not created' is not necessarily a classification of permanent failure, as they can provide inputs to determine how to achieve a positive impact if the causes of the negative results are analyzed and appropriately used to strengthen enabling factors to incorporate soft assets. This

requires higher levels of monitoring and evaluation as well as facilitating the 'Learn and Share' process examined in Chapter 5. In this regard, analyzing negative factors can be highly useful to determine how to create a better enabling environment in future.

6.3 Soft assets and knowledge assets

The characteristics of soft assets as knowledge assets were examined in Chapter 1 and Chapter 3. Also the survey results underscored the importance of experiences, cases, lessons for better operation and institutional sustainability. Therefore they are important knowledge assets in each city. It was argued in case of firms that they are very powerful assets if used in specific contexts. Both cities made efforts at different levels to capture and disseminate knowledge. The concept of describing soft assets as knowledge assets was included in the five soft asset capitals components in particular, 'people/human capital' and 'institutional capital'. The survey data found institutional mechanisms such as establishing a central city coordinating function, building strong capacity for retaining knowledge and developing good practices for strengthening institutional capacity are important. Bhubaneswar has adopted this in practice.

Learning and sharing activities usually take place through the MoHUA portal on data sharing which provides considerable value to each city, although there is a tendency towards data quantity prevailing over quality Therefore the roles of the Bhubaneswar Urban Knowledge Center (BUKC) has considerable value in this area.

The BUKC addresses learning and knowledge sharing as a core function by providing central coordination, knowledge and information sharing among city authorities and consultants. The BUKC streamlines the activities across different urban departments and local agencies associated with city operational planning and development, avoiding duplication and omission of efforts to ensure better resource and knowledge management. They also undertake research on existing and evolving trends, and good practices, as well as analyze cases of Bhubaneswar's successes and failures from the perspective of finance, human resources, and administration. However, there are some challenges beyond their control. For example, potential political influence and change of administrations are challenges for the BUKC to support knowledge capture and information development effectively contributing to continued effort to strengthening accumulation of institutional capacity. Effectively documenting key features of different planning and implementation practices also helps to develop future administrative and institutional memory to ensure continuity of initiatives despite management and other changes.

Furthermore, the data sharing illustrates how to disclose data and issue reliable information. Some responses in both cities raised the importance how to utilize and validate the large volumes of data and information collected from different sources, tools, and technologies such as CCTV, RFID,

etc.. The results in gaining optimal benefit from ‘smart cities’ with technology. Two components – technology and its outputs (data) and enabling factors (human, system, resources, etc.) – combine to work well together. Knowledge and soft assets can provide underlying support if they are properly developed and supported in each local city context.

Data accuracy and the system of verification is also important. Data alone is not ‘knowledge’ but information. Also knowledge by itself is not value, but needs to be verified and integrated into the value creation process. The survey results also show despite the availability of large data sets and information, especially on environmental issues, a lack of accurate and reliable data is a barrier to effective and informed planning and implementation and cannot be used to maximum effect by city administrators. Only validated knowledge should be captured and retained. Knowledge and value creation occurs at many levels, but it is also important to systematically collect, curate, and manage knowledge as a key value creation factor for strategic integration in the overall value creation process. How to utilize the information effectively to ensure validated knowledge and accurate data is critical.

This issue is also covered by the five soft asset capital components especially, ‘people/human capital’, ‘institutional capital’, and ‘technology/information capital’. ‘External capital’ also connects to leverage specialized, expert groups or organization to verify data. Depending on how to address data accuracy and the verification system, prioritization of soft assets incorporation will be different. Thus the value creation process mapping can be a useful tool to visualize the possible flows not to only focus on immediate effects but for a long term outcomes and sustainability.

In terms of internalizing the process in organizations or institutions like a city, Bhubaneswar’s centralized knowledge management function is able to create a system to initiate new, innovative technological approaches to benefit smart, resilient city while it adapts to unpredictable changes and risks in the value creation process. Establishing a centralized coordination mechanism, described in the next section provides significant value to an evolving smart, resilient city.

6.4 Challenges in smart, resilient city development

The benefit of a central coordination mechanism is not a new or unique to smart, resilient cities. In summary, a central coordination mechanism operates to avoid overlapping efforts within the city administration by breaking up silo-based approaches across key agencies. This applies not only at city level, but also for example, within the sub-sector of disaster risk management, where multi-stakeholder cooperation across the urban area is required. Here again the value of soft assets comes into play.

As reviewed in Chapter 2, developing countries have major disadvantages compared to developed countries due to fragmented governance, environmental concerns, lack of technological knowledge, capacity and skills among citizens and financial resources. Soft assets integration is vital to create an enabling framework to optimize the benefit of smart city development where technology is fully exploited to improve quality of the lives of its citizens. But technology-related infrastructure readiness, governance frameworks and regulatory safeguards for smart cities, skilled human capital, inclusivity, citizen participation, and other factors are identified as major implementation challenges in most developing countries (Tan and Taeihagh, 2020).

The survey results in this research support these results.

First, regarding perspectives toward soft assets, there is often a lack of national and local political support for proactive investment in planning and implementing soft assets. The explanation is that the major focus of government is primarily on physical and hard infrastructure and soft assets, such as human resources are invariably not considered in urban planning and implementation.

On human capital, it seems skills development is created mainly through training programs or on an ad-hoc basis, not mid to long term planning on the ground. It is important not rely on the private sector but use internal skilled staff available to manage workload due to additional requests from multiple departments, This builds ownership, quality control and sustainability within the city administration itself.

On technology use, both citizens and city staff need to rely on technology to increase service delivery and effectiveness, but is often reluctance by many staff to use technology effectively. Also, there is often a disconnect in knowledge sharing between equipment installer (government, other stakeholders) and citizens regarding the benefit impacts of using technology. Another major challenge in developing countries is that technology issues including basic infrastructure for technology use, and its enabling environment can hamper the speed and effectiveness of smart city development.

Central coordination mechanisms

Institutional mechanisms for horizontal coordination among different department and agencies are critical for efficient resource utilization and functioning of major projects like the Smart City Mission. It is essential that cities in developing countries provide a consolidated approach in line with smart city vision and objectives, effective resource allocation, reallocation, and distribution to establish initiatives, and proposing innovative approaches to optimize a city's human, and financial resources as well as regulating planning capacity and knowledge.

Under the Smart City Mission, the Command and Control Centre (constituted as a Special Purpose Vehicle, SPV) is a central coordinated system to collect information across the smart city area. In Bhubaneswar, there is also a BUKC under MoHUD to coordinate data collection for key department and stakeholders. It is clear from the survey results that such institutional mechanisms are critical for effective and efficient city management and development.

On the governance level, administrative policies and availability of required resources were highlighted as an issue which affected project implementation time and service delivery. Political interference, obtaining adequate resources and delays in approval times were also singled out as key challenges. A major problem referred to is inadequate inter-departmental and agency coordination due to bureaucratic silos effects. In this case, the BUKC type of mechanism that applies the existing knowledge base and ensures close coordination with engineers and urban planners in different departments, including resource allocation, can make a difference.

These central units at national level are often time-limited measurement facilities and eventually phased out as part of the exit strategy of the Smart City Mission, but reestablished under local authority like the Bhubaneswar Development Authority, the SPV. Cities will need to employ their own local mechanisms with clear descriptions of roles and responsibilities assigned to associated stakeholders, key ministries, and agencies.

6.5 Early integration of soft assets

This research also highlights the clear axiom that creating an enabling environment by using soft assets in the early planning stages is critical for developing effective smart, resilient cities in developing countries.

So far in this chapter, the following points were discussed.

(i) Soft assets influential node identification can be valuable information for facilitating strategic incorporation of soft assets and understanding the impact creation process.

(ii) Soft assets support the development of enabling factors for quality service delivery, and the level of soft asset consideration and utilization can contribute to a city's EOL and MPI results.

(iii) There are inherent challenges in using soft assets, but political influence in the public sector presents additional difficulties. Therefore, to effectively create an enabling environment to incorporate soft assets, it is important to understand which assets are incorporated and how, as this is the starting point for measuring soft asset outcomes.

(iv) The value creation mapping process is dynamic and organic. It is important to examine the process both at project and city level as the sum of individual results will not capture

the city environment as a whole. A separate value creation mechanism is needed and effectively integrated into the planning and development process.

(v) Soft assets are also knowledge assets. It is an important aspect in terms of citywide learning and productivity. This also corresponds to the public sector value creation framework examined in Chapter 3. Also, soft assets as knowledge can contribute to optimal outputs.

(vi) With the many challenges in developing countries, a central coordination mechanism can optimize the benefits derived from 'smartness'. An effective way to create an enabling environment is needed in developing countries to provide a consolidated approach, effective resource allocation, distribution, and reallocating initiatives, and proposing innovative approaches to optimize a city's human and financial resources and regulate planning capacity, learning and knowledge sharing.

A key recommendation of this research is the importance of early integration of soft assets in the project planning and implementation stages and as well as application holistically at citywide level. This must be accomplished in advance of the implementation of hard infrastructure to identify gaps and consider necessary remedies. Incorporating soft assets at the early development and planning stages increases: (a) the optimization of technology use, and (b) the use of resiliency solutions toward external shocks. Some results in the city survey reinforced these points. Hence to optimize such effort, it is important to understand the value creation process and incorporate the process into project planning and policy making processes.

As for the optimization of technology use, this research found that soft assets can enhance enabling factors and improve results for a city in EOL and MPI evaluations. Also some future impacts and outcomes can be anticipated from current value creation mapping. On the second point, incorporating soft assets in the prevention and evacuation stages of planning increases resiliency toward external shocks. The focus and the way to incorporate soft assets were fully utilized in the prevention and evaluation stages. The research outlined in Chapter 5 about the level of vulnerability and capacity of Bhubaneswar (Kawyitri, Shekhar, 2021) strongly supports the importance of early incorporation. Social and human factors have a higher capacity to minimize the effects of disasters like cyclones than other physical, smart-city and financial dimensions It takes time for a city to put elements such as communication in place using soft assets. A strong community response and evasive action from citizens create more self-dependent and adaptive defenses against disaster.

These two points illustrate the complicated aspects of the soft assets value creation process. The results of the level of vulnerability and capacity assessment in Bhubaneswar clearly demonstrates that the value creation process occurs at multidimensional and in different layers of the city administration. As mentioned before, the process evolves organically, and is influenced by unpredictable factors as value is gradually transformed within the specific context. And the value

created evolves or disappears over time depending on the context. This is another reason why early consideration and utilization is recommended.

Comprehensive city level appraisal

Regarding the comprehensive city level appraisal, As mentioned in Chapter 1, the theories of living structure and wholeness can also be an appropriate reference for the importance of early soft asset integration and city level evaluation.

The idea of 'Living structure' was developed by use of the notion of 'beauty'. Despite the different targets - a feature of objectiveness ('beauty') and soft assets, both largely depending on subjective judgement. The idea provides some guiding thoughts to objectively explore a complex process of capturing soft asset value creation and appraisal using the notion of 'wholeness'. A 'notion of beauty' used the computation approach to analyze one 'beauty' image by classifying many small items into the inherent scaling hierarchy using a computational approach. This research employed this analysis to identify or classify many small items (nodes) to isolate the influential node in network analysis to pinpoint the entry point of the value creation mechanism. Soft assets value creation involves multiple stakeholders and different contexts so complexity is similar to this research, but the approaches are not similar. However, the key idea of wholeness creating beauty is also an organic process and assessment cannot use a static structure (computation) only because the image of beauty is also created in a dynamic and organic process.

The important findings from this research are: (i) the value creation process is complex and influenced by unpredictable risks but specific values evolve from the process in the specific context; (ii) the process itself needs to be incorporated in the smart, resilient city development process by local authorities to create an enabling environment at early stages; and (iii) the process can be utilized to develop an approach to measure the effective integration of soft assets.

6.6. Co-value creation

Based on the initial discussion in Chapter 3 and the foundational arguments outlined in this chapter, this sub-section describes a soft assets co-value creation model for use in smart resilient city development.

In Chapter 3, the public sector value creation models of Kaplan (1999) was examined and also discussed the importance of establishing a two-way interaction between the city service provider and the citizens or consumers receiving the service delivery. Based on the literature review and

the survey results, a credible model can be developed to provide a framework to better understand the relationship between soft assets and the value creation progress.

Figure 31 shows a reciprocal model of co-value creation. This places weight on the value of 'Quality communications' and relationships between city administrators and community beneficiaries that will be ultimately leading to hard infrastructure investment. Balanced interaction on both sides of the equation– providers and recipients – creates the desired outcomes and value necessary to lay the foundation for sustainable smart urban development and resilience. The important point is that both ends of the spectrum have to develop their capacity to make it possible to create values within each group.

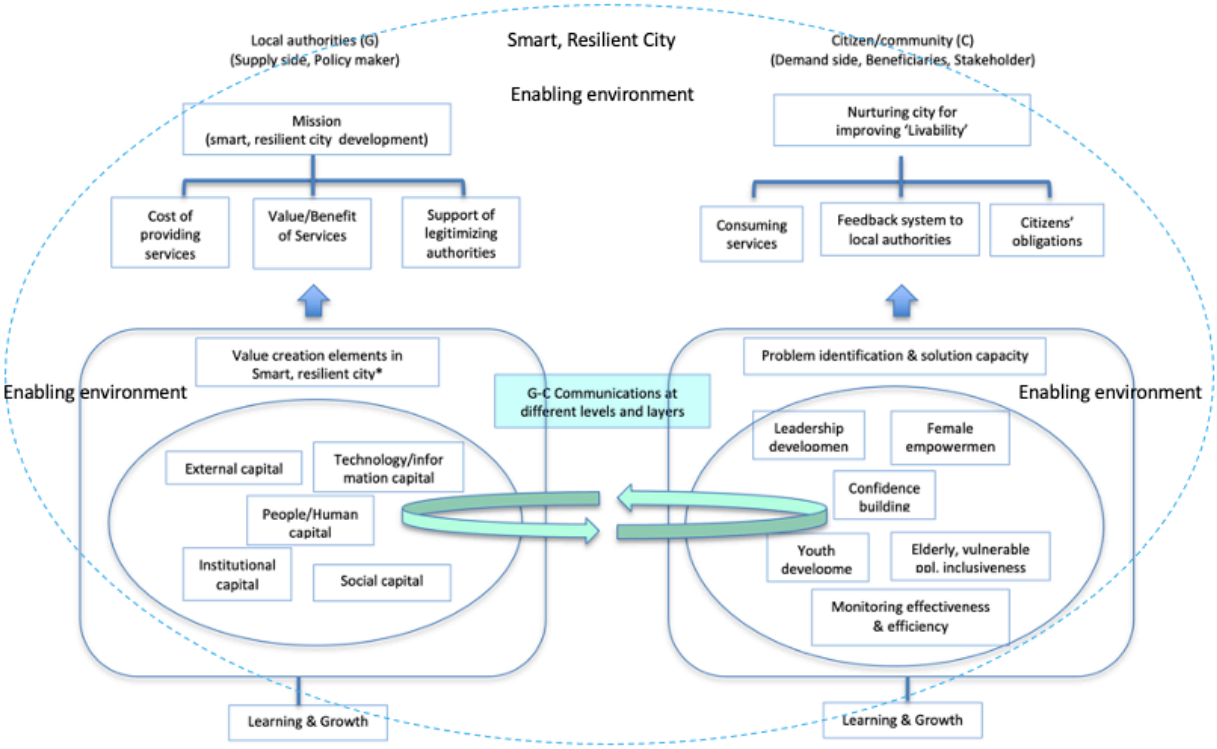


Figure 31 Reciprocal model of co-value creation

On the left side of the diagram, there are opportunities for value creation where city authorities deliver services to citizens. The quality of service delivery can be enhanced by incorporating soft assets. Also reliable internal knowledge capture learning, productivity and growth strengthens and improves the process. The effectiveness of the way the city authorities use soft assets in the initial planning and implementation stages contribute to the overall improvement of the three higher level

objectives – ‘cost of providing services’, ‘value/benefit services’ and ‘support of legitimizing authorities which support city’s service delivery providing finance and other means (citizens, etc.).

The right side of the diagram represents the community at large where citizens are expected to fully play their part – ‘consuming services’, ‘providing performance ‘feedback system to authorities’, and ‘citizen’s obligations including paying tax. To fully achieve the balance, this research identifies some key findings. Outcomes will depend on different contexts and the condition of the local community. In this research, as an example, listed items are used as examples. They basically contributed to building capacity and creating fundamental assets of value to the urban community (value creation).

Soft assets are related to knowledge and strengthened by external relations/synergetic actions which comprises various human experiences motivated by different desires, objectives or incentives. The body of knowledge and experience belongs to each individual, and the city authority, entity or community cannot adopt them as their own corporate assets. Furthermore, the collective body of knowledge and information needs to be updated in the development process. In this regard, the human resources in an urban community are essential to create social capital for long-term development and sustainability.

This dynamic also creates a unique state. A body of knowledge of people in the city or citizens belongs to them alone, but at the same time, they are also counted as soft assets within their sphere. Furthermore, the collective body of knowledge and information needs to be updated in the development process. In this regard, the human resources in an urban community are essential to create social capital for long-term development and sustainability. This ‘two-tiered nature’ of people/human involvement creates another level of complexity in the value creation process.

Quality outcomes depend on better interactions and two-way relationship and communication at all levels within the city administration and across the urban community under their jurisdiction. As the survey results demonstrate, using the consultation process and engendering effective communication is one of the most successful approaches. Highly important is continuity, quality and in-depth consultations as well as follow-up, to fully internalized the feedback within the city administration to create better outcomes for future action. Ultimately, but not limited to, these actions develop an enabling environment and fundamental conditions in the city that will benefit the effectiveness of infrastructure development projects in the city.

This reciprocal model of co-value creation also confirms the value creation process will occur within each department and at all levels of the city as a whole.

CHAPTER 7: CONCLUSION

This chapter summarizes the findings and conclusions of this research, as well as the limitations of the research. It also suggests avenues for future related research.

The previous chapter discussed key findings from the survey namely, identification and verification of influential nodes, including contributing factors to the livability index, challenges in establishing smart, resilient cities in developing countries, and the importance of early integration of soft assets to create an enabling environment.

The value creation process is a key mechanism which enhances 'smartness' using technology to build resilience in developing countries With the literature review and analysis of the survey interview results of this research, it is also found that the value creation process is complex, evolutional and occurs at many dimensions and layers. With city development, the process of reciprocal co-value creation is an internal process and depends on the quality of external relations between the city authorities and the community, as well as other external, and unpredictable factors. At the same time, a value creation model indicates the importance of time as a factor leading to the importance of early integration of soft assets. Another unique feature is that the city authority and the community need to develop an enabling environment and capacity through the value creation process. Its main assets, human capital, has a two-tiered nature: the owner of a body of knowledge and a soft asset within the urban systems. Moreover, the value creation process itself becomes a soft asset and occurs at different levels individual activity, within institutions or groups, and the citywide level.

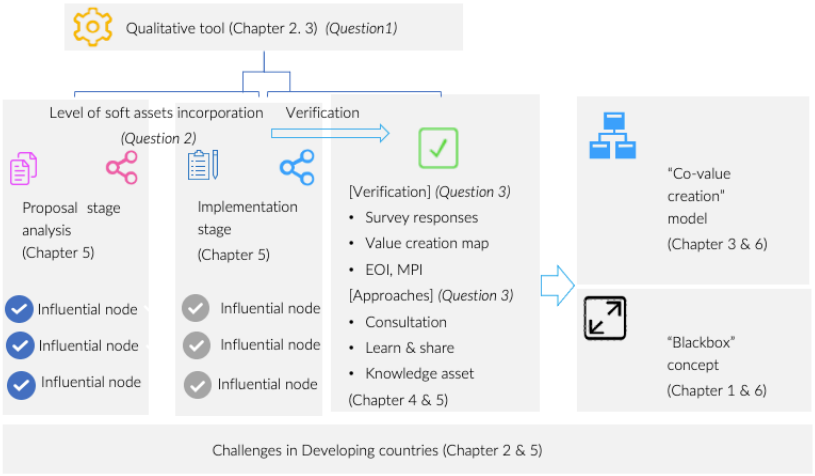


Figure 32: Summary of actions, results and findings

Taking into account the survey results, discussion and analysis set out in the previous chapters (Figure 32), there are five key findings as follows:

7.1. Summary of key findings

1. **Establishing a smart, resilient city is one of the major solutions to address the rapid urbanization trends in developing countries. With an appropriate balance of investment between hard infrastructure and soft assets in cities in each developing country context, resilient and long-term urban sustainability is achievable**

With the recent trends towards building smarter and resilient cities in developing countries, the application and incorporation of soft assets are a key contributing factor to creating value and sustainability. Although there is no one size fits all approach to smart, resilient city development, it is observed that there are three key approaches were identified (i) strategic and systematic soft asset consideration at an early stage; (ii) a realistic balanced approach to meet each city's development objectives; and (iii) institutionalizing soft assets management mechanisms for long-term sustainability. This includes integrating a soft asset value creation process in the development process.

The research also identified multiple challenges faced by developing countries to implement smart city solutions in the context of rapid urbanization. The principal challenges are lack of enabling factors and a favorable environment to implement the necessary changes. This makes it difficult for cities to fully benefit from smartness.

Also, the findings and analysis in Chapter 5 showed the urgency to deliver basic services with a priority to use hard infrastructure, and soft assets are often not considered and omitted from consideration. Cities have challenges to utilize soft assets to supplement the implementation of hard infrastructure.

From Chapter 3, it was observed that soft asset capital components drive context specific value. The literature review confirmed that soft assets create a solid foundation to operationalize basic infrastructure and organizational structures that benefit citizens and the community as a whole. However the unique and intangible characteristics of soft assets act as disincentives to their utilization. As Chapter 5 argues, value creation or soft asset benefits accrue from consideration and incorporation at an early stage of project development.

2. **Utilizing soft assets are vital to creating sustainable urban solutions. Although the five capital components are broad with each category covering a wide range of items, they are not absolute and need modification to better meet the local context for creating smart, resilient city solutions. The same approach can be applied to the definitions of the nine key elements specifically selected for this research. Customized definitions can further help to identify soft asset integration. This approach should be adopted by cities in developing countries to build smart urban systems developing an enabling environment creating value to produce sustainable outcomes.**

Chapter 3 set out an in-depth literature review of research on intangible assets. To make smart cities resilient and sustainable, it is argued that "value creation" through soft assets is not only important, but essential. Soft assets create a foundation or enabling environment in cities for operationalizing basic infrastructure and organizational structure required to produce social benefits for citizens and consumers. Here, spillover, synergistic, scaling up effects create value through a dynamic and organic process.

Defining and identifying soft assets was explained in a broad context. This is because building a solid foundation to accomplish city authorities' goals and responsibilities and implementation of public works requires dealing with a range of issues and different degrees of soft (intangible) assets, including enabling capital like human, political, analytical, planning, systems, and accountability, to technology and information. Social capital was particularly important in this research as it is also considered as enabling capital to operate communities effectively as a whole.

Although the five capitals are quite broad with each category covering a wide range of items, they are supported by many studies by academia and practitioners. They can also be compared to how private firms manage intangible assets. Developing specific and clear definitions of these soft intangible items could further help to identify how best soft assets can be adapted to the development context.

Because the specific value of soft assets depends on the context, the research also identified core value creation elements in smart, resilient cities by referring to various approaches and key pillars, classifications, and sectors of smart city including green, eco cities. These nine value elements are unique to this research. Each one was different but they cover broadly: (i) the key features of smart, resilient city; (ii) different smart city approaches; (iii) refer to three higher level objectives of value creation model with the assumption that the soft assets can be a driver for value creation. There can be more than nine elements, but these are sufficient to cover key clusters to this research.

The uniqueness of the nine value elements can be used as one example of demonstrating a combination of bottom-up and top-down smart city approaches described in Chapter 1. Other smart

city classifications include community engagement, communications, and social capital related aspects, but they comprise part of a larger pillar representing broader city characteristics. For example, Giffinger et al. (2007) presented a hierarchical structure of analysis consisting of 6 characteristics explained in Chapter 3, with 31 factors and 74 indicators, which apply to and rank medium-size smart cities in Europe. However, elements relating to community engagement, communications, and social capital related aspects are combined with other main pillars or domains; for example, community, and aspects related to efficient city government administration are classified under 'Smart Governance' and 'Smart People'. Elements involving participation in decision making, and political strategies are incorporated under 'Smart Governance'. Notwithstanding this analysis, the proposed tool in this research can be used as a unique way to review the efficiency of city administration and the community response separately, as well as conventional smart city key pillars or domains.

Based on the above nine elements and five capital components, a qualitative framework is developed. The purpose of this tool is not to evaluate soft asset performance when smart city initiatives or projects are being discussed, but to assess the level of utilization of soft assets in line with the overall vision and objectives of the city. Using the tool to assess the level of soft assets incorporation cannot avoid subjective judgements, but it could be adjusted if parties are directly involved in planning and activities and the assessments process.

It should be reiterated that the qualitative tool for measuring soft asset consideration has some limitations due to its purpose and the classification approaches mentioned so far. Inevitably, the qualitative tool analyses and classifies data subjectively based on individual knowledge and experiences. To ensure the tool can become objective, practical an operational in different contexts, it is important to determine how to reduce the subjective judgements of overlapping or ambiguity associated with individual knowledge and experiences, One way to minimize this is to further subdivide and adapt both the classification of the five soft asset capital components and the nine value creation elements to fit local city contexts.

3. **India Smart City Mission Program - India has implemented one of the most extensive national smart city programs to deal with 'urbanization' by modernizing its infrastructure and improving the quality of life of its citizens. Soft assets are proactively incorporated in this process and many useful lessons can be learned from this program. Both case study cities have excellent EOL and MPI scores, but some critical challenges are also identified that can be continuously addressed by strategic integration of soft assets at any level.**

Chapter 4 examined the India Smart City Mission Program which provided a nation-wide smart solution for urban sustainability and resilience. It envisioned promoting core infrastructure and

citizen's quality of living in 100 targeted cities. The India Smart Mission Program was selected because its objective was to set examples that can be replicated both within and outside the Smart City, and catalyzing the creation of similar Smart Cities in various regions and parts of the country. Another reason to focus on this program is that India is a disaster prone country with a large number of natural disaster incidents involving different types of hazards across different climatic zones.

With six fundamental concepts, the Smart City Mission has unique implementation arrangements including a Special Purpose Vehicle (SPV), established to plan, appraise approve, release funds, and implement, manage, operate, monitor and evaluate the Smart City development projects. However not all SPVs operate efficiently as planned. Some SPVs have capacity issues and have to depend on support from existing national government systems.

A convergence scheme also fills the gaps in services provided by using the Smart City Mission resources. Basic infrastructure (core infrastructure) needs were incorporated into the Smart City Mission which improve the livability and sustainability of the cities. In this regard, India has implemented one of the most extensive national smart city programs to deal with 'urbanization' by modernizing its infrastructure and improving quality of life of its city inhabitants. Soft assets are proactively incorporated in this process and much can be learned from this experience.

However, despite the high risk of disaster damage and destruction, DRR and climate change adaptation aspects were not originally included in the Smart Mission proposal (template). It is necessary to take action for long term impact not only focus on immediate prevention and evaluation measures. The new framework will be to complement to the Smart City Mission performance on the climate side -The Climate Smart Cities Assessment Framework 2.0 which covers 5 key pillars which remediate climate change issues and environmental degradation (Chapter 1).

The gaps between immediate and long term impact can be shortened using a better balance of soft assets and hard infrastructure, including communications, awareness, behavioral changes, regulation, cross-ministerial coordination mechanisms, and others as well as reliable social, health, financial, and other services that are self-dependent for people to be able to the aftermath of the disaster. In this context, soft assets can play a greater role in improving urban resilience.

4. **Comparative analysis of smart cities shows consistency between proposal and implementation stages and also correspond to existing livability indexes. The qualitative tool to identify soft assets integration can be one possible way to further develop measurement and assessment of soft assets values.**

Chapter 5 described a network analysis and value creation mapping of soft assets in each city to demonstrate how small nodes (initiatives, activities using soft assets) link to a large node (key core value creation elements). Also this chapter examined how such different approaches are reflected in their respective operations for each city. Based on the literature review and this research, influential nodes have many small nodes that contribute to performance. Small nodes are more important than larger ones, working synergistically, spill-over, and scaling-up.

The analyses were also verified by field investigation and in-depth interviews conducted with senior city administrators, SPV staff, private sector firms, non-profit organizations, and academia in each city. The analysis shows that in case of Bhubaneswar, the influential nodes are identified as 'Quality communications', 'Community engagement'; while in Nagpur the focus is on: 'Equal access to services' and 'Smarter services via technology'. Desk top research and network analysis results on the degree of soft asset integration were different in Bhubaneswar, but the same in Nagpur. Each city's approaches were aligned with the city's particular strategy and vision.

It was also found that higher EOL and MPI score pillars or sectors broadly correspond to the desk top network analysis and the survey results regarding the degree of soft asset incorporation. This indicates that the degree to which soft assets were considered, influenced the level of EOL score EOL scores. MPI sector verticals with higher scores also correspond to the influential node. As an enabling factor, planning capacity (in this research, equates to institutional capacity) of Bhubaneswar is heavily exploited on many fronts in smart, resilient city planning and implementation. Bhubaneswar's efforts and outcomes were verified by its high rating in the Citizen's Perception Index. Stronger technology orientation in Nagpur strongly employs technology in its smart city proposals and implementation stages. The obvious development impact and values is created by delivering effective services, using technology. This was also supported by Nagpur's performance score in 'Service' which is higher than the national average.

Past experience with disasters in both cities support, the observations (the 2020/21 floods in Nagpur as well as the 2019/20 cyclones in Bhubaneswar). Nagpur's approach to disaster resilience was focused on using smarter technology in sharing flooding information, while Bhubaneswar focused on inclusive approaches, working with people with different roles and responsibilities, including community-based preparedness and building resilience. In Bhubaneswar, vulnerability and capacity assessment research (Kawyitri, Shekhar, 2021) indicated that social & human dimensions were more significant than infrastructure, smart technology, finance, and other dimensions. The analysis of the contribution of the India Smart Mission program to this capacity development convincingly verified the network analysis in this research. On the influential or focus nodes analysis, focus areas identified in each city are aligned with each city's smart city development approaches. But this is just one snapshot. To address current issues and gaps, strategic soft assets consideration would be an entry point to implement sustainable DRM

Value creation mapping exercises based on the survey responses also indicated similar results for the network analysis. The value creation mapping is, however, still very rudimentary and very difficult to follow up, but it is nevertheless a useful tool for policy makers, decision makers, and stakeholders to understand how the value of soft assets can be appraised. The mapping exercise highlights the importance of time as a factor affecting inputs to output, outcomes to impact.

The mapping exercise was simplified to present the flow from inputs to outcomes over time. The activity cases examined in Chapter 5, demonstrated that soft assets create value invisibly by connecting with each other. But as demonstrated by the 'blackbox' in Chapter 1 and Chapter 6, soft asset attributions to outcomes are lower at the outcome level and the level of value creation will be higher (represented in the diagram by a right side-up triangle and an inverted one) at any level. This makes the explanations of the footprint from inputs to outcomes more difficult over time. In this process it is also important to take into consideration failed initiatives or actions 'not value created' as discussed in Chapter 6.

This explains the contents of the 'Blackbox' where a collection of individual values are not equated to overall city values. The value creation process is dynamic and evolves organically, and is also affected by unpredicted factors and risks. It is important to incorporate this process in city planning and implementation. This would strengthen approaches cities adopt to build smart, resilient and sustainable cities.

The 'Consultation' and 'Learn and Share' (L&S) approaches can provide solutions for challenges in developing country cities where soft asset capital provides a unique contribution to city innovation and value. L&S will also become useful to document and learn from failed case 'value not created' to convert the failures and mistakes to positive results over time. To understand these unique city values, it is important to review how the 'Learn and Share' process is operationalized, including learning from experiences, successes, failures, and the internalization process within each city administration.

5. **A qualitative framework and reciprocal co-value creation model could be one useful entry point to measure how soft assets can be better incorporated into the planning and implementation stages of smart, resilient cities.**

The survey results set out in Chapter 5 suggests that cities trying to incorporate soft assets integration can easily be impeded by political bias favoring hard infrastructure which produces faster, more tangible and measurable results. It is important to develop a mechanism to review, identify gaps strategically support, monitor and evaluate performance to be aligned with smart resilient city vision and objectives.

The city's capacity to create an enabling environment is fundamental in developing a smart, resilient city. These observations can also be applied beyond smart city concepts to every aspect of city administration and management, but lack of enabling factors diminishes the city's ability to apply technology delaying development and depriving the benefits derived from 'smarter smartness'. This is a significant change for cities in developing countries.

Developing a tool or framework to understand the complexity, holistic nature, and wholeness of soft assets will be an important building block towards creating smart, resilient cities. The tool can also be an important tool to identify and understand what should be examined and measured before the next stage of implementing and managing soft, intangible assets. IoTs or technology integrated infrastructure can embrace soft assets and effectively measure the impact and results. Improving soft asset management and developing effective measurement tools can greatly strengthen the capacity of a city to deliver quality services to its citizens. At the same time, citizens also need to improve their capacity to consume services, provide useful feedback to the city and fulfill their obligations, including paying taxes for service provided (Chapter 3).

This led to the co-value creation model that functions and interacts at city authority and community level respectively. This research used the survey results to identify six specific components creating values for the community. 1) leadership development, 2) women empowerment, 3) confidence building, 4) youth empowerment, 5) inclusivity including elderly and vulnerable people and 6) enhancing effective monitoring. Co-value creation model can be utilized to proactively integrate the components at different levels and scales. And the components can be reviewed and changed to reflect local context. What will be focused is in the specific context of that city. In this dynamic, a continuous learning process can be reciprocal and beneficial at various levels. The learning process itself will constitute a soft asset within the city institutions or the community.

To enhance the value and effectiveness of soft assets, the survey of city administrators and the stakeholders uncovered the following important findings:

Institutional mechanisms such as a central coordinating function, like a special purpose vehicle or centralized coordinating entity can not only play a key role in planning comprehensive urban development, providing urban services, and bridging communication gaps between different authorities, but also in building a strong foundation for retaining knowledge and establishing good practices to strengthen institutional capacity. Bhubaneswar provides an excellent good example of this outcome.

The survey results pointed to the lack of enabling factors in the cities to optimize 'smartness'. This finding corresponds to another study detailing challenges in developing countries for smart city development (Tan and Taeihagh, 2020). The survey results also highlighted the challenges about

governance, administrative policies, technology and availability of human resources, often filled by the private sector. Using central coordinating mechanisms assists in integrating soft assets in an holistic manner and strengthening the enabling environment for smart city development.

Integration of soft assets in early planning stages is also essential for cities in developing countries to develop basic conditions and an enabling environment for smart, resilient city development and to address implementation challenges. From the EOL, MPI results and the vulnerability and capacity assessment results of Bhubaneswar and a value creation mapping exercise, the capacity or enabling factors are developed and improved in the process. The network analysis demonstrates in the relationship between small nodes and large nodes, small nodes are more important in terms of synergetic, spill over and scaling up effects in the value creation process. The research also suggest that the process of soft asset value creation is organic, evolves over time and is influenced by context, creating unique values for cities. Also, the citywide appraisal is important to assess the overall value of soft assets.

7.2. Limitation of the research

The limitations of the research are as follow:

1. Limited target:
   The research focused on the developing country context and specifically, India's Smart City Mission Program using only two Indian city case studies.

2. Five soft asset capital components, nine soft asset core value elements:
   The selection of soft asset capital components and the core value elements are selected only for this research. The selections were made based on current research and definitions developed by other researchers and organizations. These references were adapted to cover key areas. The soft assets and core elements referred to in this research are not applicable to other research.

3. Subjective judgement:
   Due to the nature of the research topic, considerable subjective judgement was involved but results were verified to the extent possible with the current existing research and the interpretation of the survey results. To the extent that the results and conclusions resonate with previous research and literature reviewed, this increases the authenticity of this research.

4. Small number of the interviewees/respondents:

Due to the technical nature of the research topic and objectives, the survey was not designed to collect a large number of respondents, rather it focused on more detailed in-depth responses from key senior officials in each city administration. To achieve the most accurate responses, the interviewer explained the terminology and equated it with local city terminology, and also provided some additional explanations about the content of the questionnaires before and during the survey interviews.

5. Level of follow up on the details of the 1st desktop review and the 2nd in-person interview/survey: It was not possible to follow on all activities reviewed in the proposal stages. It was also not feasible to cover all city initiatives and projects taking place involving numerous officials and levels of stakeholders. The in-person interviews focused on personal observations, experiences, analysis, and impressions of the target interviewees with a range of different roles in the Smart City Mission Program. The survey results capture the major trends assumed to occur during the proposal stage.

6. Subjective responses to the survey questionnaires:
   The type of questions surveyed the personal experiences, observations, and insights of the respondents and answers were naturally subjective. To avoid overlap and duplication, the respondents were selected from different levels and sections of city agencies and departments. Secondly, many of the respondents were busy senior officials with limited time for the interviews and therefore tended to cover more general strategic approaches. Some of the questions were not relevant for some senior officials so the questionnaires were separated and allocated to respondents based on their functions for more accurate responses.

7.3. Contributions

This research focused on the importance of soft assets integration in smart, resilient city, while many of the other studies and research focus on the technological aspect of smart city development. The research proposes one viable approach to identify the entry point for soft asset value measurement.

The research also focused on raising awareness of the key contribution of soft assets to create an enabling environment for cities implementing smart development. Soft assets are essential to provide cities substantial benefits from ‘smartness’ approaches. Highly important is early, and priority consideration and integration by city decision makers.

The research proposed the reciprocal co-value creation model for soft assets options. The co-value creation concept itself is widely used and this model can be flexibly used in alignment with the city's strategy and focus.

7.4. For future study

Based on the findings of this research, the following areas are suggested as future directions for study and research on integrating soft assets in smart, resilient city development.

1. Further verification of value creation mapping results

   The research has limited information to create the value creation mapping. Also information about time factors were not fully incorporated. The development of more detailed and precise value creation mapping can not only help city policy makers and administrators but also various stakeholders better understand the importance and priority of utilizing soft assets to derive benefit from 'smartness' of the city.

2. Integrating the value creation process into the city development

   The research discussed the importance of integrating the value creation process in the various city development stages. There are already different approaches such as characterizing soft assets as knowledge assets, institutionalization of learning and growth or learning and sharing. Given the need to strengthen disaster risk management in the Smart City Mission Program, the approaches to identifying soft assets incorporation can be customized further for disaster risk reduction and management and associated indicators. Ongoing research and analysis of the Smart City Mission Program from this DRR and CCA aspects will expand these research findings with more guidance and insight on how practical use of soft assets can strengthen city disaster prevention and resilience.

3. Measuring soft asset value at city level

   Individual value creation requires an analysis and evaluation to identify, implement and justify utilization of soft assets. However, since the soft assets value creation process is an evolving phenomenon, study at the city level value creation approach could pave the way to integrate soft assets at various levels of city activity. This includes further development and refinement of the qualitative tool and co-value creation appraisal methods at city level. Using the MPI index for evaluating municipal performance on enabling verticals, for example, could be a useful tool to study further mainstreaming soft asset capital components into smart, resilient city development strategies.

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ANNEX 1: List of Activities/Components: Area-Based Development and Pan-City Solution (Bhubaneswar, Nagpur)

Bhubaneswar
(Source: India Smart City Mission, The Smart City Challenge Stage 2 – Bhubaneswar, 2016)

AREA-BASED DEVELOPMENT	
No.	Activity/component
1	BUILD BASICS SUB-PLAN
1.1	Citizen's Connect Initiative
1.2	I Support My City- Volunteer Program
1.3	Town Centre Online- Online Services and Dashboard
1.4	One Map- Data Visualization through Thematic Mapping
1.5	Project "BUKC"- Legal Systems strengthening and Capacity Building
2	TOD SUB-PLAN
2.1	Railway Station Multimodal Hub
2.2	Raj-Mahal MLCP
2.3	Satya Nagar MLCP
2.4	Satya Nagar Institutional Core
2.5	Lake Neutral
3	Urban Mobility Sub-Plan
3.1	Janpath - People's Smart Path
3.2	Project URBS- Urban Regeneration through Bhubaneswar Streets
3.3	BBSR Cycle Highway
3.4	PBS Scheme
3.5	E-Rickshaw Project
4	HOUSING FOR ALL SUB-PLAN
4.1	Janpath Government Housing Redevelopment
4.2	Mission Abaas- Slum Redevelopment Projects- Bapuji Nagar, Kharavela Nagar, Shanti Nagar, Saheed Nagar Abaas Yojna
4.3	Rental Housing for Construction Workers
4.4	Project Kutumb- One stop Social Equity Centres
5	SOCIAL DEVELOPMENT SUB-PLAN
5.1	Museum of Urban History
5.2	"I am BBSR" Initiative
5.3	Neighbourhood Watch
5.4	Senior Citizen Direct Contact Program
5.5	Safe Refuge Points for Women Safety
5.6	E- Primary Health Care for All

6	ECONOMIC DEVELOPMENT SUB-PLAN
6.1	Invest BBSR- City ED Office
6.2	Project Swabhimaan- Integrate | Incubate | Innovate
6.3	Street Vendors Improvement Project (SVIP)
6.4	Project Kusum- E3C- Model Anganwadi Centres | Multimedia Digital Learning in Schools
7	BASIC SERVICES SUB-PLAN
7.1	24x7 water supply
7.2	Water recycling project
7.3	Decentralized sewerage treatment project
7.4	24x7 energy supply
7.5	Underground electric wiring
7.6	Waste- lets recycle
7.7	Project "samman"
7.8	City gas distribution project (cgdp)
7.9	City fiber ducting
8	TECHNOLOGY FOR ALL SUB-PLAN
8.1	Integrated City Operation and Management Centre (ICOMC) Project
8.2	City Wi-Fi Project
8.3	Smart Water – Meters and SCADA
8.4	Smart Energy – Meters and SCADA
8.5	Smart Waste Management
8.6	Smart Environment Management
8.7	Public Internet Access Centres (PIAC)
8.8	Digital Literacy Initiative
9	FUTURE PROOFING SUB-PLAN – CONSERVE | CONFORM | COMBAT
9.1	Energy Efficiency Initiative
9.2	Solar City Program
9.3	Structural Stability – Earthquake Resilience
9.4	Rain Water Harvesting
9.5	Urban Flooding – Early Warning System
9.6	Incident and Disaster Management Plan

PAN-CITY SOLUTION	
No.	Activity/component
1	INTELLIGENT TRAFFIC MANAGEMENT SUB-SYSTEM:
1.1	Traffic Signalling with Area Based Traffic Control
1.2	Traffic Network Flow Monitoring
1.3	Video Surveillance, Incident Management and Video Management
1.4	Variable Message Signs
1.5	Video Analytics supported Traffic Violation Detection and E- challan
1.6	Traffic Analytics, Simulation and Modelling - TIA
2	SMART PARKING SUB-SYSTEM:
2.1	Electronic Parking Systems for on-street Parking (20 km) and publicly owned Parking Lots

2.2	Integration of public and privately owned (publicly accessible) parking availability data on to common platform and Parking Mobile App.
3	TRANSIT OPERATIONS SUB-SYSTEM
3.1	Fleet tracking for BPTSL buses, privately owned city buses and para-transit
3.2	Depot and Asset Maintenance Management (limited to BPTSL bus fleet)
3.3	Crew and Bus scheduling for BPTSL for 2 operators;
3.4	Passenger Information systems on-board and at bus shelters- Mobile App for Journey Planning
4	COMMON PAYMENT CARD SUB-SYSTEM:
4.1	Systems for Pre-payments and card issuance; recharge; on-board ticketing systems
4.2	Back office and customer management system
4.3	Central Clearing House
5	EMERGENCY RESPONSE AND INCIDENT MANAGEMENT SUB- SYSTEM:
5.1	Emergency Response intake through call, App or panic button, CAD; First Responder Coordination
5.2	Multi Agency Incidence Management for complex events – Unplanned and Planned
5.3	Radio Communication and Messaging
5.4	Extreme Weather Disaster Response
6	CITY COMMAND AND CONTROL SUB- SYSTEM:
6.1	Command and control centre- Physical building
6.2	Video Wall- Operations Room and video management
6.3	Operator Work Stations
6.4	Data Centre Build Up
6.5	Conference Facilities
6.6	Core Utility Operations Integration City Operation Centre- Alerting, Monitoring and major Incidence Management

Nagpur

(Source: India Smart City Mission, The Smart City Challenge Stage 2 - Nagpur, 2018)

AREA-BASED DEVELOPMENT	
No.	Activity/component
1	ACTIVATE PLAN
1.1	Ignite Civic Engagement
1.2	LEAD volunteer Program
1.3	My Area Sabha Initiative
1.4	My Neighbourhood My Plan (Rollout of TPS)
1.5	Project Urban Knowledge Center
2	PROJECT RESILIENT INFRA SUB PLAN
2.1	PROJECT H20- 24x7 water supply
2.2,3	PROJECT INTEGRATED SEWERAGE and STORM WATER DRAINAGE SYSTEM
2.4	Duel piping system
2.5	Underground electrical ducting

2.6	City Community OFC Network
2.7	Piped gas project
3	SMART LIVING AGENDA PLAN [A] Urban Mobility- sub plan
3.1	Project TenderSURE for revitalization of urban streets in PBP
3.2	PADESTRIAN FIRST initiative
3.3	MOVE PEOPLE initiative: E-Buses
3.4	Interactive Bus Stop project
3.5	Project SHARE A BIKE
3.6	Project OPEN STREET
3.7	Project E-rickshaw
3.8	Junction Improvement project
3.9	MLCP at Pardi, Bhartwada and Punapur
4	SMART LIVING AGENDA PLAN [B] Social Development sub plan
4.1	Project HOME SWEET HOME affordable housing, night shelters, rental housing and Hostels for working women)
4.2	Project SHIKSHIT and NIRAMAY PBP (Primary school and multispecialty hospital)
4.3	Project KAUSHAL PBP (Skill development center)
4.4	Project ABHAY (CCTV, police kiosk and street lighting)
4.5	Senior citizen safety initiative
4.6	SURAKSHA APP
4.7	Public markets
5	SMART LIVING AGENDA PLAN
5.1	Project ATTRACTIVE PUBLIC REALMS
	a) Public art, fountain, street furniture installations
	b) landscaping of junctions
	c) Graffiti wall
	d) Planting 10,000 trees in PBP area
5.2	Project EVER GREEN PBP
	a) 5 theme based public parks covering 30 acre
5.3	Project NIRMAL NAG (3.0 km riverfront development)
6	SMART ENVIRONMENT AGENDA SUB PLAN
6.1	Project ZERO GARBAGE SOCIETY
	a) Transfer station
	b) GPS/RFID tagged collection fleet
	c) BRING BACK centers (recycle sheds)
	d) Smart trash bins
6.2	E-toilets
6.3	Project GREEN LIGHT
	a) LED Street lights
	b) Solar Roof Top Heaters
	c) Electricity from 5 MTD
	d) Bio-methanization plant
6.4	Rainwater Harvesting project

7	SMART GOVERNANCE SUB PLAN
7.1	Unified Operations Command and Control Center (UOCCC) project
7.2	Wi-Fi spots
7.3	Smart Water Metering and SCADA system
7.4	SCADA system for integrated sewerage system
7.5	Smart energy grid and meters
7.6	Smart Swachh City Solution (SSCS)
7.7	ORANGE CITY Kiosk Centers
7.8	Smart Police Kiosks

PAN-CITY SOLUTION	
No.	Activity/component
1	NAGPUR CITY COMMUNITY NETWORK PROJECT
1.1	Dark Cable and OFC network
1.2	Data center/Cloud infrastructure
1.3	Disaster recovery center
1.4	Network operation center
2	UNIFIED OPERATIONS COMMAND AND CONTROL CENTER (UOCCC)
2.1	UOCCC building
2.2	Video walls- 2
2.3	Work stations-25
2.4	IP telephony
2.5	Conference facilities
2.6	Citizen service operations center
3	SMART SWACHH CITY SOLUTION
3.1	Smart Trash Bins
3.2	GPS, RFID and video cameras for mounting of collection fleet
3.3	RFID readers
3.4	Rout optimization module
3.5	VTS units
3.6	Handheld Device with inbuilt RFID Scanner, Camera and GPS
3.7	Software and mobile application

ANNEX 2: Survey Questionnaires: 'Consideration of soft assets in smart and resilient city development

Definitions: *Soft (or intangible) assets covers a broad range of assets such as human, policies, process, network with stakeholders, data, applications, community level organization, representative groups, etc. These soft or intangible assets are considered as key assets of cities that are equivalent to hard or physical infrastructure to deliver quality services to citizens.*

This questionnaire *is designed to understand: (i) how you (or your city) as a [senior city official etc.] make decisions about using the soft assets during planning and implementation of Smart City Mission (ii) how a balance between soft and hard assets is strived for/achieved and (iii) how the soft assets support creating value/impact and enhance the functioning of Smart City Mission.*

In this questionnaires, soft (or intangible) assets refer to the following

Soft asset capitals	Description
People/Human capital	• Technical, operational individual capacity (Knowledge that employees take with them when they leave the firm, including the knowledge, skills, experiences, and abilities of people)
Institutional capital	• Legislation, policies, strategies, standards, frameworks, systems, mechanisms, modality, and other relevant items. They are backbone of smart city development • Processes, procedures, data, systems, culture, designs, and knowledge (knowledge retention to execute tasks and responsibilities
External capital	• Relationships with stakeholders such as citizens, donors/financial sources, private sector, academia, LGU, SPV (depends on your roles) • Network or any form of creating benefits to stakeholders for promoting relationships
Technology, information capital	• Computerized products, databases, information systems, networks, technology infrastructure, also covering a wide meaning of the use of technology for smart city development
Social capital	• Community rules, regulations, framework, community representative groups (e.g. contribute to LUG's planning/consultation process) • Local level organization, values (trust, solidarity, reciprocity), social norms, behaviors, attitudes (strength, number, quality of relationship among people in a society)

PART A: DEMOGRAPHIC QUESTIONS

Name: _____

e-mail address: _____ **Contact details:** _____

Gender:

A. Male B. Female C. Prefer not to say

Job Title: _____ **Department:** _____

Major roles/duties:

( )	Policy, strategy maker
( )	Project director
( )	Technical officer (engineer)
( )	Project manager
( )	Project officer (non-technical)
( )	Project administrative staff
( )	Academia
( )	Private sector (sector: _____)
( )	Others (please specify: _____)

Work experience:
How many years in your job?
( ) 0-3 years ( ) 3 -5 years ( ) 5-10 years ( ) 10 - 20 years ( ) > 20 years

PART B: UNIVERSAL QUESTIONNAIRES

1. MAINTAINING A BALANCE BETWEEN PHYSICAL INFRASTRUCTURE AND SOFT (OR INTANGIBLE) ASSETS IN SMART CITY DEVELOPMENT

Question 1: Optimizing soft assets consideration and management
Please describe 3 successful/best ways or actions undertaken by your organization/ department to achieve the strategic vision and goals of Smart City Mission in terms of delivery of quality service to citizens at minimal cost, utilization of local agencies, better identification of local needs, etc. How were soft assets considered and used during these actions?

Vision, goal	Successful action/best practice	How were soft assets used during the action?

Question 2: Advantages of using soft (intangible) assets
Q2-1. From your experiences, describe the 3 key benefits, challenges, and opportunities of using soft (intangible) assets to achieve a balanced approach to Smart City Mission implementation.

Benefits	1.	2.	3.
Challenges	1.	2.	3.
Opportunities	1.	2.	3.

Q2-2. Describe any lessons for the future city initiatives, projects, etc.

Question 3: Based on your perspective, please rate scores **on the level and intensity of soft (intangible) assets utilization during the Smart City Mission planning/implementation stage**. (Note: Higher scores indicate a higher level of utilization of soft (intangible) assets together with hard infrastructure development (the maximum is '4') and lower scores mean less utilization of the same (the minimum is '1').

Nine (9) clusters (*where balanced approaches are highly required)*	**Definitions**	**Five (5) types of soft infrastructure** *to be considered with hard infrastructure*	**Your rating** 1, 2, 3, 4 (4: max; 1: min)
1. Resource* management	To optimize limited human and natural resources for building a smart and resilient city.	1.1 People/Human capital	
		1.2 Institutional capital	
		1.3 External capital	
		1.4 Technology, information capital	
		1.5 Social capital	
2. Accessibility (Mobility)	To facilitate reduced automobile dependence, providing alternative modes of transportation. It reflects on the competency of establishing a holistic urban development plan.	2.1. People/Human capital	
		2.2 Institutional capital	
		2.3 External capital	
		2.4 Technology, information capital	
		2.5 Social capital	
3. Health-well-being	To build an environmentally sound (green), healthy environment for citizens. It focuses on establishing a shared vision of a healthy community for residents	3.1. People/Human capital	
		3.2 Institutional capital	
		3.3 External capital	
		3.4 Technology, information capital	
		3.5 Social capital	
4. Equal access to services	To maintain social stability. This also secures support from citizens, stakeholders, and beneficiaries.	4.1. People/Human capital	
		4.2 Institutional capital	
		4.3 External capital	
		4.4 Technology, information capital	
		4.5 Social capital	
5. Smarter services via technology	To provides access to effective and efficient services that meet the needs of citizens and improve service quality through the use of smart infrastructure	5.1. People/Human capital	
		5.2 Institutional capital	
		5.3 External capital	
		5.4 Technology, information capital	
		5.5 Social capital	
6. Community engagement	To improve quality of life by strengthening the community's capability and engagement	6.1. People/Human capital	
		6.2 Institutional capital	
		6.3 External capital	

Nine (9) clusters (*where balanced approaches are highly required)*	Definitions	Five (5) types of soft infrastructure *to be considered with hard infrastructure*	Your rating 1, 2, 3, 4 (4: max; 1: min)
		6.4 Technology, information capital	
		6.5 Social capital	
7. Quality communications	To improve communications between local government and communities to build a sustainable and resilient smart city.	7.1. People/Human capital	
		7.2 Institutional capital	
		7.3 External capital	
		7.4 Technology, information capital	
		7.5 Social capital	
8. Security	To provide a stable, secure environment in citizens' daily life and improve smart city resiliency against unexpected external shocks and damage.	8.1. People/Human capital	
		8.2 Institutional capital	
		8.3 External capital	
		8.4 Technology, information capital	
		8.5 Social capital	
9. Resilience	To make a city stronger against external shocks and risks, prepare it for short-term and mid- to long-term adaptability to hazards.	9.1. People/Human capital	
		9.2 Institutional capital	
		9.3 External capital	
		9.4 Technology, information capital	
		9.5 Social capital	

2. REVIEW, FEEDBACK, LEARN AND SHARE PROCESS

Question 4: Effective integrating soft (intangible) assets

In '**Making a city smart' (2021 March) report4, 'LEARN AND SHARE'** (robust monitoring and evaluation process) is an important part of the process to establish a smart city. It is an effective way to develop soft (intangible) assets in and outside of your affiliations. In this regard, please answer the following questions:

Q4-1. How was the 'Learn and Share' process undertaken (practiced) during the Smart City Mission planning and implementation process in your city? What was the role of your department in this?

Q4-2. Suggest **key steps or actions that can be undertaken to further use/ facilitate the 'learn and Share' process.** What are the available incentives for you (or organization) to take such steps?

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4 https://smartnet.niua.org/sites/default/files/resources/making_a_city_smart_mar2021.pdf

Q4-3. How are the vision, goals and activities under the Smart City Mission monitored and evaluated? Who conducts the monitoring and evaluation in your affiliation? (general M&E)

Q4-4. How are soft (intangible) assets monitored and evaluated under this process? What is the frequency of such a monitoring, evaluation and learning process?

Question 5. Consultation process, Quality of communication, Community engagement

Q5-1. In the Smart City Mission preparation stage, comprehensive consultation with citizens (or beneficiaries) is required. Describe how are consultations conducted in your Smart City Mission implementation process? How is feedback incorporated to improve the implementation process?

Q5-2. In your experience, do you find these consultations effective? How were the citizen's (or other stakeholders) feedback or perspective useful or supported the planning and functioning of Smart City Mission? Can you share examples if any?

Q5-3 In the 'Ease of Living Index' your city's **CITIZEN PERCEPTION SURVEY**5 score is higher than the national average. Describe 3 ways your city successfully **enhanced community engagement** and established **quality communication channels** with citizens during the Smart City Mission implementation period. Also please share challenges.

Success	• • •
Challenges	• • •

3. FACTORS INFLUENCING USE OF SOFT (INTANGIBLE) ASSETS

Question 6: Assessing the influence of 9 clusters

From your perspective, please answer following questions by referring to the Table below:

Q6-1. For item (a) Resource management, which themes or sectors strongly influenced your decision to use soft (intangible) assets *(i.e. human resources, skills, policies, process, network with stakeholders, data, information systems, applications, community level organization, representative groups, etc.)*

5 The Citizen Perception Survey (CPS) provides a perception of the city residents and allows them to evaluate the level and quality of development in their respective cities. Furthermore, the survey acts as a source to validate the findings of the index and examine whether they comply with the results of the data provided by the cities. The CPS pillar holds a weightage of 30% in the overall index score. (source: Ease of Living Index 2020)

Q6-2. From item (a) Resource management to (i) Resilience, please rank (in the table below) the clusters in terms of their influence in considering/utilizing soft assets (rank 1: most influential, rank 9; least influential).

Rank	9 clusters (where balanced approaches are required for creating effects, benefits, results, etc.)	Definitions	Example theme, sectors to cover *(referred to Quality of live pillars in 'Ease of Living Index')6*
	(a) **Resource management**	To optimize limited human and natural resources for building a smart and resilient city.	e.g. Mobility, Education, Health, Recreation, Environment, Green spaces and Buildings, Housing and Shelter, Wash & SWM, Energy consumption, Safety & Security, city Resilience
	(b) **Accessibility (mobility)**	To facilitate reduced automobile dependence, providing alternative modes of transportation.	e.g. Mobility
	(c) **Health well-being**	To build an environmentally sound (green), healthy environment for citizens	e.g. Education, Health, Recreation, Environment, Green spaces
	(d) **Equal access to services**	To maintain social stability	e.g. Housing and Shelter, Wash (Water, Sanitation and Hygiene) & SWM (Solid Waste Management)
	(e) **Smarter services via technology**	To provides access to effective and efficient services that meet the needs of citizens and improve service quality through the use of smart infrastructure	e.g. Wash (Water, Sanitation and Hygiene) & SWM (Solid Waste Management) Green spaces and Buildings Energy Consumption
	(f) **Community engagement**	To improve quality of life by strengthening the community's capability and engagement	e.g. Mobility, Education, Health, Recreation, Environment, Green spaces and Buildings, Housing and Shelter, Wash & SWM, Energy consumption, Safety & Security, city Resilience
	(g) **Quality communications**	To improve communications between local government and communities to build a sustainable and resilient smart city	e.g. Mobility, Education, Health, Recreation, Environment, Green spaces and Buildings, Housing and Shelter, Wash & SWM, Energy consumption, Safety & Security, city Resilience
	(h) **Security**	To provide a stable, secure environment in citizens' daily life and improve smart city resiliency against unexpected external shocks and damage.	e.g. Safety & Security
	(i) **Resilience**	To make a city stronger against external shocks and risks, prepare it for short-term and mid- to long-term adaptability to hazards.	e.g. City Resilience

Q6-3. Please share your observations/examples of significant effects, benefits, results on how these clusters influenced utilization/consideration of soft assets.

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6 https://smartnet.niua.org/content/f3fe50c5-70f1-4830-bdda-6d9a2b565842

Question 7. Please share examples where the actions have led to positive impacts (beyond the expected outputs and outcomes) and negative impacts (unexpected negative outputs and outcomes) while using the soft assets.

(i) **Positive action** (occurred during interaction with your stakeholders) that influenced value creation opportunity; and

Impact (beyond the expected outputs and outcomes)-

(ii) **Negative action** (occurred during interaction with your stakeholders) that prevented value creation opportunity (value destroyed).

Impact (unexpected negative outputs and outcomes)-

Question 8. Resilience

Q8-1. In the 'Ease of Living Index' your city's **CITY RESILIENCE**7 score is higher than the national average. Describe 3 (successful) ways your city incorporates soft (intangible) assets to build resilience during the Smart City Mission implementation period.

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Q8-2. Taking into account the potential **hazards that affect your city/state**, from your perspective, please share 3 examples of soft (intangible) assets are required to improve resilience.

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Question 9 Due to the COVID-19 pandemic, it is assumed that the Smart City Mission implementation faced unexpected challenges from the original plans. How did COVID-19 difficulties affect utilization or reaffirmed importance of soft (intangible) assets? Please share your experiences of the challenges faced and how soft (intangible) assets need to be strengthened further to overcome these challenges?

7. The category of City Resilience incorporated the following indicators: whether the City has Implemented Disaster Reduction Strategies and the Number of Deaths and Directly Affected Persons Attributed to a Disaster. Addressing climate change challenges, depleting resources, public health constraints, and the high frequency of natural calamities present significant governance challenges.. (source: Ease of Living Index 2020)