Making the smart region transition: towards a conceptual and assessment framework

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ABSTRACT

Smart region related policy has gained considerable importance. The UN has included "Smart City" as one of the goals in its sustainable development goals (SDG 11- Sustainable Cities and Communities). The concept of Smart regions goes beyond the smart city concept. Smart region, in principle, means the inclusion of smart city (urban) along with non-urban or rural areas as an integral part of the strategic interventions. E-governance has over the years played a key role in bridging the digital-divide between urban and rural areas, thus an important concept in smart regions. Consequently, we offer a conceptualization of smart regions as comprising smart cities and rural e-governance initiatives. This conceptualization is employed in assessing a region initiative in India – Ahmedabad to determine to what extent it could be labelled as a smart region. We argue that our emerging conceptualization offers pragmatic value for regional and spatial planning in contexts looking to scale islands of smart cities initiatives into smart regions.

CCS CONCEPTS

• **Applied computing** → **Computers in other domains** → Computing in government → *E-government*

KEYWORDS

Smart City, Smart Region, E-Governance, Rural E-Governance

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1. INTRODUCTION

There is substantial academic and research work on E-governance globally [1]. E-Governance and ICT for development have generated much interest in global context especially with the emerging role of ICT in MDGs and SDGs, Urban planning, E-Municipalities, E-business, and E-commerce. Discussions on smart city and smart region is gaining momentum globally [2-5]. However, rural E-Governance, as an area of study, is very limited. Research in the areas of rural E-Governance is significant if all goals of SDGs, especially to achieve goals 1,2 and 11. In developing countries in the world and emerging economies like India, rural E-Governance needs more focus as most of these countries are more and more embracing smart region concepts.

Concept of smart regions deals with overarching geographical, spatial, economic, infrastructural, and social dimensions that smart city argues. However, smart regions need to consider non-urban areas as well. Alike academic and research work in the areas of smart region is increasing, understanding urban and non-urban continuum and linking the policies of smart region to rural E-Governance is also limited.

In this work, argue for two considerations. The first is to consider Rural E-Governance as an essential dimension in E-Governance. The second is to connect Rural E-Governance to smart regions.

The plan for the presentation of our work is as follows. In this section we define broad contours of "rurality", and the way global policies are framed. Discussions on Rural E-Governance then follow to explain the importance of rurality. We then situate the broad contours of smart regions to associate the role of E-Governance with making a mart region more sensitive and resilient. In section two, we present a framework to establish the link between smart region and rural E-Governance. In section three, we take up the case of an Indian city that is declared under the smart city mission policy. We argue here that every smart city project needs to evolve as a smart region through analysis of the

situation that the proposed smart city undergoes. Through the application of the framework, we provide a direction to assess any smart region project in the context of E-Governance as part of a future course.

1.1. Rurality and Rural E-Governance

Understanding rural phenomenon leads to country-specific definitions. Each country defines rurality, keeping in view its ecosystem. However, OECD attempted to broad-base the definition of "rural" as per the logic stated [6]:

a) population size, density and contiguity of local administrative units (LAU), b) bottom-up method (population grid: density in 1 sq.km), c) top-down method (disaggregation), d) rural areas are with population density <= 150 inhabitants per sq.km and e) attention on "where people live".

Rurality definition broadly indicates a policy for any nation in which a) economic, historical and community perspectives are challenged by population size or density and remoteness from urban centres, b) services are influenced by limited access to infrastructure, c) potential for consumptive market expansion exists, d) income sources are based on agriculture and livestock oriented production systems, non-farm production systems (Skill based), e) there is perceived natural ambiance leading to tourism, f) migration to urban areas is a continuous phenomenon and lastly, there is scope for rural-urban continuum.

The UN defines "rurality" as follows: "Because of national differences in the characteristics that distinguish urban from rural areas, the distinction between the urban and the rural population is not yet amenable to a single definition that would be applicable to all countries or, for the most part, even to the countries within a region."[7].

This variation notwithstanding, the UN recognizes the fact that rural-urban migration is increasingly challenging urban planners in terms of managing overpopulation, slum area spread and congestion. This also leads to population pressure on resource planning and use. The UNDESA report suggests average annual (five year period) percentage change in rural population which was -0.60 % in 1950-55, will be around -0.85% by the period 2045-50. Spread of global rural population though is expected to decrease, will still be around 35%. However, in low income and less developed regions, the rural population will be approximately 52% and 36% respectively [8].

Rural areas need special attention due to the reasons mentioned above. This situation leads to address challenges related to augmenting livelihood conditions of rural people, their diversity in skill, competence, and opportunities; and asymmetry in accessing information and services, etc. These people also look for better production systems, processing, getting input and output services through market linkages. In Figure 1, rurality is presented to explain.

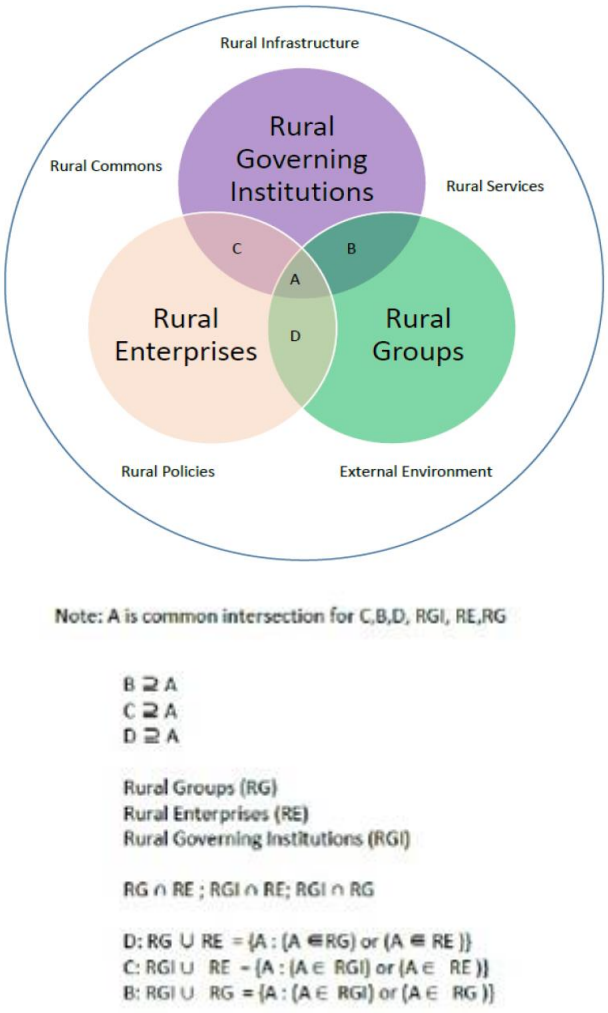

Figure 1: Conceptual Framework for Rurality (drawn by Authors)

Rurality, as shown in Figure 1, discusses how the ecosystem situates a rural person. A rural person is likely to join a group to aggregate the inputs, outputs. These individuals and groups aim to use the rural infrastructure as well as the services supported by government policies. Rural commons such as land, forest, water bodies, fallow lands, and roads belong to the support structure for these people and groups [9]. Because of this the intersection A as presented in Figure 1 deals with complex phenomenon influenced by rural groups, rural policies, external environment and policies [10].

A denoted as a function of an ecosystem that is influenced by B,C and D. These three elements B,C and D are influenced by the factors culminating through a relationship that rural governing institutions, rural enterprises and rural groups are created, nurtured and supported by the ecosystem. In most of the cases, rural groups work as enterprises. Governing institutions have also emerged as a means to control the use of the assets, commons, and

infrastructure through policy frameworks of the governments [11]. Due to these aspects of rurality, therefore, need special attention for better governance. Thus, Rural e-Governance has the potential to emerge as a unique subset of E-Governance. Intersections suggest that all the dimensions of rurality are interconnected and solutions to one should not be considered in isolation [12].

E-Governance paradigm is well studied globally. All the nations today have their national policies to promote E-Governance. Variants of E-Governance and assessment frameworks are well-founded in global standards [2]. E-Government surveys are indications towards attainment of maturity in terms of not only deploying infrastructure but also rendering citizen-centered services. Academia and research communities have also generated their interests to understand the effects of E-Governance policies and the process of service deliveries.

E-Governance literature aptly supports the term SMART, which has many dimensions to discuss. Some of the aspects include a) use of the ICT tool to enhance both government efficiency, transparency, accountability, and service delivery, and citizen participation and engagement in the various democratic and governance processes, b) the mainstreaming of ICT into the various Democratic Governance Practice service lines such as e-parliaments, e-elections and others, c) the governance of the new ICT which addresses institutional mechanisms related to emerging issues of privacy, security, censorship and control of the means of information and communications at the national and global levels [13].

However, rural E-Governance as an area of academic research, policy, and a term for use in any policy document is not traceable. This term, rural E-Governance, is indirectly supported by SDGs, ICT4D, rural infrastructure, digital divides, rural services, and rural policy, etc.

1.2. Smart City and Smart Region

Smart region as a concept and part of national policy is fast emerging. Smart regions provide attention to urban and non-urban areas by design [14-15]. Like rurality, there is no single definition to smart region. But broad contours of smart region include a) use of smart technologies, b) E-Governance, c) infrastructure and services, d)strong collaborations between all stakeholders (local and regional administration, citizens, business entities, academic and research institutions). Goal 11 of SDG indicates the slum population though decreasing in percentage, has increased in absolute terms [5]. This situation provides a connection between a smart city and a smart region. A smart region needs to undergo a plausible transformative mechanism to underscore the role of non-urban entities. This goal has the scope to make the smart region to be more connected to the non-urban citizens. These non-urban citizens are likely to come to smart city nearby in search of livelihoods and quality of life. In the process, citizens of the smart city will have the scope of receiving services. Thus mutually benefiting and complementing dependence will lead to a more resilient region. Thus "smart" relationship between these two entities in the smart region will be a reality if E-Governance adopted by each could converge.

It is further argued that rurality, since does not have one-definition-fit-for-all countries globally, is to be discussed in the context it is presented. There could be situations in a country set-up to have a development pole strategy [16] dealing with decentralization, yet with convergence among various entities like small towns, peri-urban and villages. Developing countries do have to deal with such realm. However, sensitivity in terms of interconnections among entities differ due to the unequitable distribution of assets, access and livelihoods. In such scenario, entities under smart regions need co-existence [1],[10]. This approach of coexistence will provide opportunities for complementarity through agglomeration and aggregation services, assets, infrastructures and market conditions [16].

2. CONCEPTUAL FRAMEWORK

The basic purpose, in this work, is to ensure an ecosystem that seeks to explore the seamless management of relationships between non-urban and urban continuum. This non-urban entity is termed as "rural". This purpose has the following inherent assumptions:

a) Smart region needs to include the rural entities in its governance structure;
b) E-governance is a common phenomenon for connected rural entities and smart region;
c) Bringing information symmetry between the smart city and rural E-Governance will have a positive effect on the smart region. This effect is likely to address issues of inclusiveness, resilience, and sustainability.

2.1. Rural E-Governance and Smart City

A conceptual framework is presented below to address these objectives. It is posited that a strong connection between smart city and rural entities through E-Governance setup is needed. This connection will provide the ambiance to encourage rural entities to engage with smart city through business models. This is likely to reduce the population burden in the catchment slum area of the smart city. Migration to the smart city might be reduced and limited to opportunity based movements.

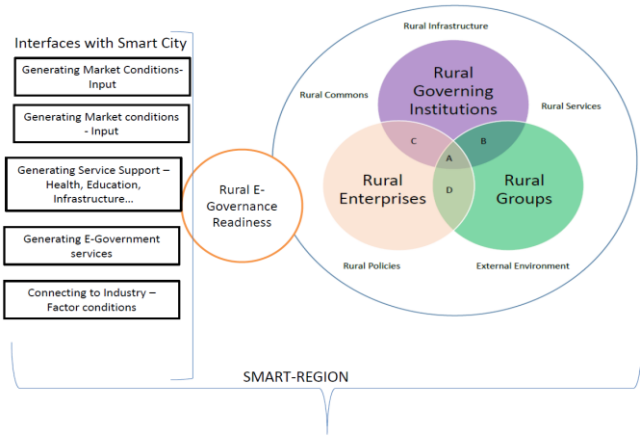

Figure 2: Conceptual Framework for assessing Rural E-Governance Readiness (drawn by Authors)

The framework suggests that a seamless rural E-Governance connection between the rural entities and smart city. The relationships are as presented in the table below.

Table 1: Assessment of the Relationship between Rural Entities and Smart City

Relationship	Expected Deliverables of Rural E-Governance	What to Assess	Relationship with Intersections
Market Conditions for Rural enterprises - input	Connection between input service providers of smart city and the rural enterprises, groups	E-Commerce; E-Tax; E-Registration;	A
Market Conditions for Rural enterprises - output	Connection between markets of smart city and the finished goods of rural enterprises, groups	E-Commerce; E-Tax; E-Registration; E-Supply Chains	C,D
Generating Service Support for rural citizens	Connection between service providers in smart city with rural enterprises, groups	E-Health; E-education; E-Banking; enhancing proximity through better infrastructure and connectivity....	A
Generating E-Government Services	Connection between Government administration and rural governing Institutions	E-election; E-citizen services; Land registration;...	B
Connecting to Industries-Factor Conditions	Connection between industry and rural groups and individuals	E-identity; information on labour market; Skill development, training, and capacity building..	A

2.2. Digital Governance and Smart Region

In this work, we argue that a smart region is considered as a "smart city" and "rural E-Governance" for establishing a rural-urban continuum. To determine this relationship between smart city and rural E-Governance, we can identify the two following categories of digital government elements as necessary for smart regions.

Digital governance initiatives in smart cities include a set of actions listed below [17]:

- Coordination and integration- includes identification of an agreed set of projects by stakeholders across sectors, use of administrative and legal instruments for conformance, and integrated planning practices involving multiple sectors;
- Service integration- consists of the use of Urban Operating Systems (UOS) for managing urban services;
- Participation and co-production - includes building multi-stakeholders partnerships with industry, academia, and residents in addition to the involvement of internal firms in the development of smart cities; and
- Policy and regulations - include master-planning, institutional development, certification of practices (e.g. buildings), promotional activities (e.g. low carbon growth), and development of framework acts.

E-government or digital government has been identified to be one of the essential ways of bridging the digital divide, particularly in developing countries [18]. Digital governance in the rural area include:

- Mobile, broadband and internet access [19];
- Co-creation and participatory development of digital services to ensure that cultural elements are considered [20];
- Digital services targeted at basic community needs including water and sanitation [21];
- Digital services aimed at reducing administrative burdens for rural businesses – this is linked to the traveling cost to reach respective public administrations, particularly for businesses located in remote and isolated areas [22];
- Intermediary services to assist rural businesses and citizens in using digital services as this group tend to have low ICT skills or e-literacy [23].

Table 2 presents relationships between digital governance and smart region for indicative measurements.

Table 2: Assessment of the Relationship between Digital Governance and Smart Region

Relationship	Smart Region Deliverables	E-Governance Deliverables
Coordination and Integration	Market-driven interfaces between rural and urban areas for products and services	E- Supply Chains, On-line grievance redressal, on-line citizen demand tracking, and e-Content management (A of Figure 1)
Service Integration	Service-oriented aggregators, service agents, and service providers	Service-oriented Architectures (SoA) based solutions (A of Figure 1)
Participation and Co-Production of digital services	Rural and urban citizens come to a common platform to remain market-oriented; information symmetry	Destination oriented information tracking, pricing symmetry of services, sourcing of services and blogs (A,B,C and D of Figure 1)
Mobile, Broadband and Internet Access	Equitable access to services	Availability of network nodes with equitable bandwidth, uniform costing and universal access (A, B and C of Figure 1)
Ease of doing Rural E-Business	B2B, B2C, C2C solutions	Information symmetry of policies, access to information on warehouse, market prices, agents and price discovery (A and D of Figure 1)
Optimization of intermediary services for rural e-Business and Citizen Services	Convergence of policy-driven support for rural-urban continuum	E-participation, E-filling of demands and E-networks (A of Figure 1)

3. A CASE IN INDIAN CONTEXT

Smart city mission in India has identified 21 cities for transformation [23]. Indian administration recognizes that there is no firm definition for smart city and is local context-specific. The "mission" has four pillars, and these are institutional, social, physical and economic. Among other dimensions, the essential services that smart city mission in India recognizes are services to poor, better E-Governance and citizen participation, and infrastructure. These dimensions have direct relationships with rural E-Governance readiness, as presented in Figure 1 and Table 1.

3.1. Regional Planning in India

Regional planning in India is not new. In the year 1992, the Government of India (GoI) brought in the 74th Constitution Amendment Act. Under this amendment, the GoI envisioned democratic decentralization and power to the people. In its 12th schedule, GoI clarified the role of "Regional Planning", and gave more autonomy to the states. The regional planning indicated inclusive governance, inclusive economic growth and suggested integrated planning with state plans. The amendments advised states for governance responsive to the changing needs and demands of citizens. In its report, the working group for Urban Strategic Planning, 12th Five-year plan, recognized that urban population will grow phenomenally from the current level of 31 percent to 50 percent by 2040. It also recognized the urgent need for addressing deteriorating conditions of cities. This has been due to migration, the creation of slum areas, lack of basic amenities, unorganized planning to meet growth, among other issues [23].

It is a challenge for the planners that spatially regions will increase due to the influx of people migrating (seasonal, permanent and distress) from rural areas and also from other states. The plan acknowledged that significant sectors like agriculture, manufacturing, and services have not been able to contribute to employment. Absolute employment has decreased in agriculture over the last decade and seasonal migration to cities has increased. This type of migration reflects distress in rural areas. It is also noted that 84 percent of India's farmers are small and marginal with farm land-holding of around 2.5 acres of land or less. The trend acknowledged in the twelfth five-year plan suggests the shift from informal agriculture employment to informal non-agriculture employment. It means regional planning should be ready for addressing this issue smartly [24].

It is recognized that the rural-urban divide in productivity has widened since 1993–94. This calls for identifying the opportunity for migrants to hone their skills through policy-driven interventions to get employment in cities. A similar situation is there for the poor living in cities who are mostly engaged in the informal sector. Staying in slum and peri-urban areas has deprived these poor the basic amenities and access to gainful and sustainable employment.

The twelfth five-year plan also recognized the fact that enterprises need encouragement through enabling policies irrespective of rural and urban space. Spatial divides should not be the factor for promoting such enterprises in the agriculture and non-agriculture sector to broad-base the livelihood portfolios of the poor. The plan also considered it important to ensure better cash-flows for the poor and enterprises. These enterprises need integration and convergence of policies of GoI and state governments.

Integration and convergence of schemes of GoI and states in India call for a unified view and this the basic building block for regional planning. Regional planning indicates that inclusive growth with seamless management of quality of life for rural-urban continuum is a necessary condition.

3.2. National E-Governance Plan in India

National E-Governance Plan (NeGP) provided the basic building block for Digital India (DI) initiative in vogue today. Under NeGP central government of India and its state governments partnered and established Common Service Centers (CSC) for a cluster of five villages. These CSCs under entrepreneurship mode, a Village Level Entrepreneur (VLE) owns this CSC and extend services to citizens in rural areas. Services are basically channelled through state-designated agencies (SDA) with state level mission mode projects (SMMPs) and special purpose vehicle (SPV) of the central government, termed as central mission mode projects (CMMPs). The CSCs channelled

both SMMPs and CMMPs based services. Categories of services include G2C, G2B, B2C, B2B, and C2C. This type of CSCs are now available in urban areas as well. This was introduced in the year 2006 [23]. CSC v.2.0 has been introduced in the year 2015 with the introduction of DI initiative. CSC v.2.0 envisaged covering all 250,00 villages through CSCs, providing non-discriminatory e-governance services through district- level e-Government society (DeGS), provisioning of services, information technology infrastructure with solar back-ups, and connectivity to national fibre optic networks with broadband services. CSC v.2.0 implementation is planned within 48 months.

DI has nine pillars and these include universal broadband access, mobile access, internet access, information for all, reforming government services, and early harvest advisory among others[24]. Apart from these two approaches, financial inclusion (FI) services are extended to rural areas. Aim of FI services is to provide access to finance, working capital, savings, and other services at the doorsteps of rural citizens in villages [25]. Thus in Table 3 below the rationale for establishing a holistic approach for establishing a rural-urban continuum through digital governance is presented for clarity and assessment.

Table 3: E-Governance and Smart Region (Rural-Urban Continuum)

E-Governance Dimensions	Rural-Urban Continuum	E-Governance Deliverables	Target Orientation for Rural e-Governance
Coordination and Integration	CSC, DI and FI Services	Rural IT Infrastructures (including Broadband, internet, NoFN)	Individuals, groups, and enterprises, service agents
Service Integration	SDA, SPV, CMMPs, SMMPs	Convergence	Rural enterprises, rural groups, rural governing institutions
Participation and Co-production of digital services	Citizen participation	Universal services and UNICODE	Rural enterprises, rural groups, rural governing institutions
Mobile, Broadband and Internet Access	NoFN, Bandwidth and internet service providers	Service on Demand, Universal access, ease of use and portability	Individuals, groups, and enterprises, service agents
Ease of doing Rural E-Business	Agents in cities, rural areas with service brokers	E-Supply Chains, E-Government	CSC, DI and FI Services
Optimization of intermediary services for rural e-Business and Citizen Services	Market orientation, public services, Information sharing, and symmetry	Convergence	CSC, DI and FI

3.3. Ahmedabad – A Smart Region

Regional planning for Ahmedabad gained its importance because of the phenomenal growth in its size, population, industrialization and yet having its population rooted in villages. Ahmedabad has its regional planning authority. Named as Ahmedabad Urban Development Authority (AUDA), it was established on February 1st. 1978. Its objective includes the preparation of the physical plan for the Development of Ahmedabad Urban Agglomeration. It is responsible for town planning, monitoring, and control of development activities. Its area of operation includes Ahmedabad Municipal Corporation's limit, five growth centres and 169 villages of Ahmedabad district. The expansion of AUDA comes of 186600 Hectares (1866-sq. km.) Area, which includes Ahmedabad City (Municipal Corporation) of 44950 Hectares. Its governance is well defined. AUDA is governed through a board whose members are the Chairman - AUDA. Secretary - Urban Development Secretary - Revenue Department, Presidents of District Panchayats of Ahmedabad, Gandhinagar, Kheda and Mehsana; standing committee Chairperson of Ahmedabad Municipal Corporation, Chief Town Planner - Gujarat State. Financial Advisor - Urban Development, Municipal Commissioner - Ahmedabad Municipal Corporation, Collector - Ahmedabad District and the Chief Executive Officer – AUDA[25].

Ahmedabad city is listed in the smart city mission of India. Understanding the motivation to transform this city into a smart region needs a situational analysis. Ahmedabad city is 30Km away from Gandhinagar, the capital of the state of Gujarat. Its industry output is 18%. It ranked 6th among Indian states in E-Governance Readiness, tele-density of 87 in the year 2016. Gujarat is one of the largest milk producers in the country and has 7% share. Ahmedabad is a heritage city declared by the UN. This city has a population of 5,577,940 with a literacy rate of 88% [26]. The smart

city planning process for Ahmedabad recognizes issues related to slum dwellers and their settlement. E-Governance strategy of this proposed smart city has plans for convergence with "digital India" initiatives. It does not, however, have any mention of transforming the smart city programme to smart region. There is no mention of rural E-Governance linkages with the proposed smart city.

3.4. Need for Digital Governance for Ahmedabad Smart Region

It is worth noting here that Ahmedabad smart city has interfaces with 169 villages. Inclusion of District Panchayats of Ahmedabad, Gandhinagar, Kheda, and Mehsana in the governance structure provides access of its villages to the AUDA infrastructure, resources, market, and population. These villages predominantly have rural enterprises engaged in the dairy sector. In the AUDA region, there are 214 milk parlours in the supply chain of cooperative dairy federation supported by dairy farmers living in villages/rural areas. Dairy production system under the federation, Gujarat cooperative Milk Marketing Federation (GCMMF), supports these outlets employing 3.6 million farmers with an annual turnover of 4.8 billion US $ [27]. These parlours are connected with the production and processing centres available in AUDA region, including those at each district of Ahmedabad, Gandhinagar, Kheda, and Mehsana. AMUL brand owned by GCMMF has access to AUDA and its farmer members are spread over 18 district Unions in the state. The federation does not depend on government support and manages its own affairs which are farmer member-driven. However, its members depend on public health, roads, electricity, water and dairy-based innovation services supported by the National Dairy Development Board (NDDB) of the Government of India. Elections in cooperative dairy societies are not part of the national E-Governance Plan despite having state-sponsored 18086 common service centres in the state.

4. DISCUSSIONS AND CONCLUSIONS

Based on the prevailing smart city strategy for Ahmedabad city in the state of Gujarat, it is evident that smart city planning should take note of the convergence plan with rural E-Governance in the state. Dairy enterprises are examples of showcasing self-sustained approaches to mitigate slum related challenges by connecting to rural enterprises in the vicinity. Dairy enterprises provide the promise for such a connection. The assessment, though conceptual and is based on the desk research, indicate the scope for improvements. The table below presents the assessment results. The assessment is classified as "not available", "moderately available", "adequately available".

Table 4: Assessment of the Relationship between Rural Entities and Smart City of Ahmedabad

Digital Governance Dimensions	Relationship	Rural-Urban Continuum	Digital Governance Deliverables	Target Orientation for Rural e-Governance	Assessment
Coordination and Integration	Market Conditions for Rural enterprises - input	CSC, DI and FI Services	Rural IT Infrastructures (including Broadband, internet, NoFN)	Individuals, groups, and enterprises, service agents	A of Figure 1 is Weak; Moderately Available
Service Integration	Market Conditions for Rural enterprises - output	SDA, SPV, CMMPs, SMMPs	Convergence	rural enterprises, rural groups, rural governing institutions	A of Figure is Not Available
Participation and Co- Production of digital services	Genera ting Service Support for rural citizens	Citizen participation	Universal services and UNICODE compliant; E-Participation	rural enterprises, rural groups, rural governing institutions	A,B,C and D of Figure 1 Not Available
Mobile, Broadband and Internet Access	Genera ting E-Government Services	NoFN, Bandwidth and internet service providers	Service on Demand, Universal access, ease of use and portability	Individuals, groups, and enterprises, service agents	A,B, and C of Figure 1 Moderately Available
Ease of doing Rural E- Business	Connecting to Industries-Factor Conditions	Agents in cities, rural areas with service brokers and orchestrators	E-Supply Chains, E-Government	CSC, DI and FI Services	A and D of Figure 1 Not Avail able
Optimization of intermediary services for rural e- Business and Citizen Services	Connecting to Industries-Factor Conditions	Market orientation, public service s, Information sharing, and symmetry	Convergence	CSC, DI and FI Services	A of Figure 1 Not Available

This conceptual assessment framework developed to evaluate the likelihood of a smart city to have smart region tag provides challenging insights. The arguments made in section two were the basis for the connection between rural enterprises and the smart city. In the case of Ahmedabad smart city, none of these could successfully support noted three arguments. As a smart city, Ahmedabad has progressed well. But its approach to seamlessly integrate with rural areas is yet to come up. E-Governance connections to rural enterprises in Ahmedabad smart city planning are absent. Common phenomena for the E-governance are also absent despite having common service centres. Information asymmetry on governance, market conditions (input and output), convergence among government and business entities to help rural enterprises influence the seamless integration between rural and smart city of Ahmedabad for a better smart region. Lastly to support factor conditions influencing rural enterprises also limit the effort of Ahmedabad smart city to develop to a smart region.

This work is typically based on desk research and on a conceptual framework. It needs validations through expert engagements, development of metrics and data collections through primary interactions with rural groups, enterprises, government, and business entities.

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