Evaluation of Building up resilience in the city: A case of Surat City

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ABSTRACT

The Urban population in India has significantly increased from 62 million in 1951 to 285 million in 2001 and is estimated to grow 540 million by the year 2021. In this growth scenario of the population, Surat is an 8th largest city in terms of population and among non-capital cities in India. Surat is 4th fastest growing city globally with a decadal growth of 55% to 60% in the last four decades. With this rapid growth, the major challenges are also affected to city development including globalization, urbanization, climate change, transportation issues, the vulnerability of infrastructure, disaster risk governance must ensure top-level buy-in from city leaders. To overcome this challenge in a city like surat in must require. Surat city is now collaborating and work for resilience with Rockefeller foundation's 100 RC initiatives. The main aim of this paper is to Evaluation of existing resilience condition of the city and to study resilience strategy and initiative adapted by surat city. The objectives of this paper are to identify the definition of urban resilience, to study the existing scenario with reference to resilience and to introduce the city resilience strategy framework which is developed for surat city according to 100RC programme by Rockefeller foundation.

Keywords- *Urban resilience, Resilience challenges, collaborative projects,100 resilient cities, strategy framework, Rockefeller foundation, Surat city, stake holders*

1. Introduction

Surat, situated within the western a part of India within the state of Gujarat, on the banks of the stream Tapi, is a crucial historical trade centre and is a trade link between India and therefore the Gulf countries. Surat is a crucial industrial town in south Gujarat and is around 250 kilometres north of the urban centre. the town is found at 21°10' N – 72°49' E, with associate degree altitude of regarding thirteen meters on top of mean water level (AMSL). Surat too developed on the banks of the Tapi that flows into the sea, just 16 km. from town. The stream dictates the topology of town because the landscape slopes bit by bit from Northeast to Southwest. Surat has seen associate degree unprecedented growth within the last four decades, recording one in all the best growth rates within the country and a 10- fold population rise. It currently ranks because of the eighth largest town within the country (Census, 2011). Plus this, a upshot of the population into the peripheral areas has conjointly been determined. Throughout the last twenty years, Surat and therefore the encompassing metropolitan region has witnessed major floods.

2. Literature review

2.1. Resilience

Acute problems include shocks such as earthquakes, floods, and disease outbreaks. Chronic problems are stresses that weaken the fabric of a city on a daily or cyclical basis. Examples include high unemployment, inefficient public transportation systems and unbalanced composition of the population, chronic food, and water shortages, and endemic

violence. Challenges may be related to economic development [1], social polarisation, and segregation [2] as well as to climate change and ecological degradation [3]. In the 1960s it entered the field of ecology, where resilience is defined as "the magnitude of the disturbance that can be absorbed before the system changes its structure" [7]. "resilience is defined not just according to how long it takes for the system to bounce back after a shock, but also how much disturbance it can take and remain within critical thresholds" [4]. The challenge of climate change required a new approach in the urban context. Planners and decision-makers gradually realized that mitigation alone was difficult to achieve and therefore favored the more adaptive and flexible approaches of resilient strategies in decision-making [5]. "The purpose of the City Resilience Index is to provide cities with a robust, holistic, and accessible basis for assessment so that they are better placed to make investment decisions and engage in urban planning practices that ensure people living in cities, particularly the poor and vulnerable, survive and thrive no matter what shocks and stresses they encounter" [6].

2.2. **Resilience within the 100 resilient cities programme**

"Resilience is the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow no matter what kinds of chronic stresses and acute shocks they experience". This definition and the accompanying resilience indicator framework were developed by [6] ARUP's International Development team (2014) in a commissioned and coordinated study by the Rockefeller Foundation. The Rockefeller Foundation committed itself to the resilience theme in 2007 when it announced its first multi-million dollar contribution to the "Building Climate Change Resilience Initiative". This programme aimed to boost communities' resilience to the effects of climate change with a focus on poor and vulnerable people across the globe [8].

The John D. Rockefeller Foundation, a hundred Resilient Cities (100RC) helps cities around the world become additional resilient to the physical, social, and economic challenges that are a growing a part of the twenty-first century. 100RC views resilience not even as shocks—earthquakes, fires, floods, etc.—but additionally as stresses that weaken the material of a town on a day-after-day or alternating basis. Samples of these stresses embrace high state, associate overtaxed or inefficient public facility, endemic violence, or chronic food and water shortages. By addressing each the shocks and therefore the stresses along, a town higher equipped to retort to adverse events and is overall better ready to deliver basic functions in each smart times and unhealthy to any or all populations[8]. Rockefeller has gradually developed its understanding of resilience while widening its scope both geographically and thematically from a focus on poor and vulnerable regions to western cities in advanced economies as well, and from climate change alone to a broader perspective on disaster risk reduction, including financial shocks, terrorism, and slow-moving chronic stresses [6].

2.3. **RESILIENCE CHALLENGES TO SURAT CITY**

The city is at risk of high tides, flooding, extreme heat, and subsequent health risks. The daily issues of traffic jams and obstructed roads in Surat have an effect on property and quality Surat conjointly suffers from an absence of social control of the traffic management system. Factors like an oversized variety of personal vehicles, associate inefficient transport system, inadequate parking facilities, unacceptable footpaths for pedestrians, encroachments on existing footpaths and road margins, similarly as informal and nickel-and-dime business activities on major corridors—all contribute to the congestion of roads within the town.

A wide vary industries of business and commercial activities occur in Surat. individuals from rural areas and different less-developed states flock to town seeking employment opportunities within the industrial, allied, and repair sectors; in trade

and business activities; and in hawking, retailing, carting, and different such activities. This has resulted in slums and low financial gain settlements on the riverside and in low-lying, risk-prone areas. There's a large demand for cheap housing within the town to cater to the migrant population. in keeping with a groundwork report by the important estate firm, Cushman & Wakefield, Surat top-notch a listing of eleven Indian cities that are witnessing a surge in housing demand (TOI, 2016).

At present, the most supply of water for the whole town is that the stream Tapi. The river's water quality is deteriorating—anthropogenic activities and development on the riverside contribute to large-scale pollution of the river's water. In such a scenario, each water quality and amount are going to be an enormous challenge for Surat. Surat, familiar for its sprucing, textile producing, and diamond cutting industries, is heavily keen about the latter 2 dominant economic sectors. Recession in these 2 sectors has had a big impact on the city's economy (UNDP, 2009). The economy is additionally characterized by an oversized variety of tiny and medium scale unorganized industries. The economic base is effortful. The setting and scheme of town and its close areas—critical determinants of the health of its inhabitants—impact work-related productivity and concrete quality of life. Located on the banks of the stream Tapi, and with its proximity to the Arabian Sea, Surat contains a sensitive scheme. Industrial growth, similarly as high growth and density, place pressure on this scheme.

Social cohesion and social networks are weak in Surat. Communities are deceased within the town, however, they're not connected. Stronger efforts from society and therefore the government ought to be created to ascertain social property and stability. Rules and policy are going to be crucial for the town to manage a population that's quite giant, with a lot of diversity existing among the communities. Surat contains a well-developed health infrastructure, as well as government health centers and personal health services, however, there's a desire for a virtuoso and specialized human resource. The upscaling of public health must be achieved by increasing awareness and capability building against urban health challenges. Surat is ill-famed for vector- and water-borne diseases.

3. Resilience strategy in Surat City

3.1. Surat city collaborates to 100RC

The Rotterdam 100RC Water Exchange command in October 2015 centered on the advanced intersection of global climate change, aging infrastructure, flood management, urban development, and social property combined with the varied views brought by collaborating CROs from 9 cities. This offered an expensive learning expertise for Surat. Over 5 days in the capital of Mexico in Gregorian calendar month 2015, Surat had an opportunity to collaborate with alternative cities and, by shaping and sharing its own learning, came to an improved understanding of resilience. The Second International conference for Resilient Communities in Koriyama, Japan, was co-organized in Gregorian calendar month 2016 by the Institute for Resilient Communities and also the Fukushima Renewable Energy Institute. It brought along scientists, engineers, public health consultants, educators, policy manufacturers, etc to collaborate on building resilient communities. Surat educated itself concerning knowledge base analysis programs to handle crucial problems in resilience and learned the way to have interaction with varied public activities to foster interactions between consultants and communities. The urban infrastructure of Asian cities faces social, political, environmental, and monetary risks thanks to global climate change evoked shocks and stresses. This creates the impetus for town stakeholders to assess their cities' vulnerabilities and to appear for investment opportunities in planning and building resilient urban infrastructure. This coaching in Singapore was organized by Cities Development Initiatives of Asia in might 2016, beneath its Cities and global climate change coaching Series. The good Cities

Innovative Summit Asia Conference in South Korea was organized in September 2016. It provided the Surat oscilloscope a chance to debate good town plans with several good town Leaders of alternative Asian countries. The 'leadership of management' and 'policy problems for fourth revolution and ICT business' were conjointly deliberated together with the good town initiation agenda of budgeting, funding, challenges, management, and cooperation.

3.2. **Stakeholder involvement**

One of the most important challenges for city resilience today is the development of a multidisciplinary theory that integrates and coordinates a variety of city dimensions such as critical infrastructures, society, economy, and environment into a unified conceptual framework. This challenge has to be addressed at both the theoretical and the practical levels by developing theories and implementation tools. Each city dimension has its own mechanisms for involving relevant stakeholders in the resilience-building process (Gagnon et al., 2016).

Public-private partnerships (PPPs) are, in particular, an effective tool for increasing critical infrastructure resilience (Dunn-Cavelty and Suter, 2009). Other mechanisms, such as participatory governance, have increased community resilience (Chandra et al., 2015; Doyle et al., 2014). Private companies also understand, to varying degrees, that they have an important role in ensuring the well-being of society; to that end, some have designed corporate social responsibility strategies that also contribute to increasing city resilience (Twigg, 2015)[10]

The strategy development method was started by characteristic and fascinating with relevant stakeholders and town champions underneath the aegis of town administration. Seven discovery teams were fashioned, comprising call manufacturers, planners, municipal engineers, academicians, researchers, entrepreneurs/businessmen, builders' associations, water resource managers, public health practitioners, and energy/ gas suppliers.

Surat is taken into account a model town permanently governance still as for providing effective service delivery compared with several different Indian cities. Surat additionally has the benefits of economical town administration, robust political agreement, and comfortable municipal finances.

In the past, the town has incontestable its capability to create resilience by up the standard of its lifeline services like disaster management, facility, sewerage, solid waste disposal, and health. The mission of town is to strengthen its infrastructure, face up to future shocks and stresses, build redundancies, and improve resilience. The SMC has improved its capability to accommodate shocks and stresses and has haunted proactive initiatives in urban development, community health, and disaster management, operating closely with trade and voters. Inputs from multistakeholder teams junction rectifier by the SMC can't solely address varied problems at town level however additionally influence policy at the state and central levels. Therefore, Associate in Nursing progress during this town is going to be keenly ascertained and may act as an example for urban resilience in different Indian cities, together with the 100RC cities.

3.3. **Surat Resilience pillars, goals and initiatives**

The Surat resilience strategy has been developed around seven strategic pillars, 20 goals, and 63 initiatives/actions. This section includes the initiatives that Surat will further develop and implement between 2016 and 2025. Each pillar is defined by a number of goals and associated initiatives. Figure -1. Shows the resilience pillars, goals, and initiatives in Surat's strategy.

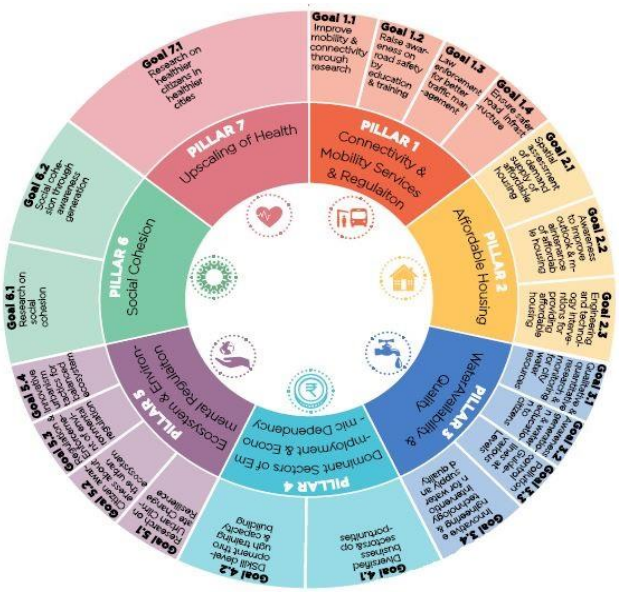

Fig. 1: Surat Resilience Pillars And Goals [9]

Lens	Characteristics
Reflective	Initiatives are capable of addressing future needs, handling sudden/ foresighted shocks and stresses of Surat, and serving multiple sectors (drivers).
Robust	Opportunities have been passed through a rigorous process of selection and prioritization, which is well reflected in how the goals address the major shocks and stresses of the city.
Redundant	For each of the discovery areas, more than 10 different initiatives were identified to address city-specific needs. Care was taken to have the identified initiatives implemented by a range of stakeholders to maximize reach and replicability of the strategy.
Flexible	Surat resilient strategy contains research, awareness, and enforcement level opportunities which can be modified according to future needs.
Resourceful	Projects related to engineering and infrastructure development are already supported by the city. Resilience initiatives and opportunities are therefore aligned to state- or national-level programs.
Inclusive	The strategy reflects multistakeholder engagement in the initiative description as initiative owners and supporters. Every initiative identified within this strategy has a supporting brief which indicates the scale of stakeholder involvement needed. This includes a range of actors from academia, business/private sector, government, and civil society
Integration & Alignment	Resilient initiatives are well aligned to the different levels of administrative policies applicable in Surat. The initiatives are also linked to plans, programs, and projects—for instance, Smart City, Atal Mission for Rejuvenation and Urban Transformation (AMRUT), etc.— supported by national and state governments.

TABLE 1: Characteristics of Surat Resilient Initiatives [9]

The Surat resilience strategy identifies 7 pillars, 20 goals, and 63 initiatives—the lattermost can produce a resilient impact on all the pillars, therefore increasing their resilient worth. Eleven initiatives were known around property and quality. These

initiatives were additionally targeted towards shared quality, transport, nonmotorized transport (NMT) solutions for traffic hotspots, traffic awareness and education. Throughout professional cluster discussions, these initiatives were prioritized by committee members and subject consultants. Later, these initiatives were investigated with different pillars to test the interdependencies between resilience problems bussing numerous impact eventualities. The results indicate that property and quality central initiatives have higher levels of interdependencies with different initiatives within the areas of surroundings and scheme, Public Health, and Social Cohesion. As transport forms, the backbone of any economical urban quality system adequate public transportation can contribute to the opposite in progress surroundings friendly and safety initiatives. Presently town administration is increasing the number of public buses and conjointly going to develop new and alternate modes as well as BRTS and railway line Rail system.

Seven initiatives were known around Affordable Housing. These were centered on housing demand and provide assessment, accessibility of monetary aids for, affordable housing, identification of reasonable localities, in the town and neighborhoods, and inexperienced infrastructure. The results indicate that the initiatives of reasonable housing have higher levels of interdependencies with different initiatives within the areas of Employment and Economic Dependency and Social Cohesion. Within the case of reasonable housing in Surat, key industrial nodes will function work hubs, wherever similar financial gain teams will live along in exceedingly cohesive social surroundings.

Thirteen initiatives were known to deal with Water accessibility and Quality. These were cantered towards innovative infrastructure for higher management of installation, aiming for zero water waste, and conservation of freshwater and groundwater resources. The known initiatives of the water sector have higher levels of mutuality with initiatives within the space of scheme and surroundings and Employment and Economic Dependency pillars. The textile trade conjointly contributes abundant to the city's economy and employment. Solutions to those key environmental problems, therefore, can make sure that town Associate in Nursing its economy grows in an environmental property manner. Five initiatives were known below Employment and Economic Dependency. These are targeted towards developing various employment opportunities in new and rising sectors like info technology, shipping, and technical talent development programs additionally to assist to encourage entrepreneurship. The bulk of textile industries trust heavily on native roads and regional transport networks (rail and road) to acquire raw materials and to export processed product.

Fourteen initiatives were known around surroundings and scheme. These initiatives are additional cantered on environmental rules and policies, new infrastructure interventions for resource conservation, energy potency, and community-level awareness of environmental conservation. These initiatives can have positive impacts on Water accessibility and Quality, Economy, Public Health, and reasonable Housing. Discussions with professional committee members highlighted the actual fact that the initiatives this pillar have the next level of interdependencies with initiatives of Water accessibility and Quality, Public Health, and Employment and Economic Dependency. Therefore, the symptoms of water and health need continuous watching within the town thanks to the geoclimatic location and thanks to historical flood and plague events.

Ten initiatives were known around Social Cohesion. These are inclined towards encouraging public participation at the community level and cooperation with the govt. by developing community-level activities. Such programs and community areas can facilitate produce a far better, habitable surroundings and encourage cultural conservation which is able to, in turn, enhance the native identity of the town. The results indicate that the initiatives of surroundings and scheme have higher levels of mutuality with the pillars of property and quality, surroundings and scheme, and Public Health.

Three initiatives were known below Public Health. These are centered towards talent development, which is able to increase the provision of general health care facilities and create it reasonable. The initiatives below this pillar also are inclined towards urban climate-health challenges to form a healthy, habitable urban scheme in Surat. Town desires more cost-effective and general health care, particularly throughout disaster-like things [9].

4. Conclusion

As Surat town Growing speedily from last twenty years it faces major embody in the composition of the population, the Rapid growth of industries, inefficient facility, water shortage, chronic floods, housing shortage, global climate change and disturbance in the ecological system. to beat this pragmatic challenges by governance surat adapting resilience strategy, Surat resilience work builds shut collaboration with philanthropist foundation. The resilience strategy replicates through the superb progress town has created in understanding its resilience challenges and grasp the holistic thinking and planning that true resilience needed. Through initiatives and actions that strengthen town as a whole, the strategy permits surat to addresses its past challenges whereas conjointly recognizing the increasing unpredictability of the longer term. While the Stsrategy addresses the fissures fashioned by the city's ascent, it goes a lot of any. Aboard the social control of traffic rules, license norms, quality of life assessment, and pointers on open public area, the Strategy conjointly includes innovative and progressive initiatives like a health and action set up that emphasizes the association between urbanization, global climate change and public health, support for girl's entrepreneurs, and promotion of civic engagement. Through this varied blueprint for the city's gift and future, Surat has the chance to guide not solely in Bharat, however throughout the 100RC network, and also the world. Central to all or any of those efforts area unit the individuals of Surat. The Strategy provides for inventive public reach to unfold awareness of challenges and also the role of all residents in operating to strengthen the city.

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