Analysis of Bangalore City Budget with citizen feedback

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Using data visualizations and analytics on the Bangalore city budget, the solution aims to measure to find the focus/priorities of the government in each ward, analyze citizen satisfaction and effectiveness of budget, identify sectors where there is overspending/under-spending and make recommendations for the following year's budget and tenders.

I. INTRODUCTION

In the recent past, using analytics to drive city development, infrastructure and budgets has been become more popular and has seen notable successes, namely in Baltimore, Chicago and New York City in the USA. Analytics played a big role through important projects such as deployment of police forces in the city (New York City), abating the rodent issue (Chicago), measuring cleanliness across the city (Los Angeles) etc. Following their example, other cities in the USA are setting up their own analysis-driven solutions. However, every city is unique; in the problems it faces, in its citizen demographics and its major industries. Hence, a specialized and focussed approach is required to understand, analyse and set up a progressive solution with city officials and data analysts.

Performance measures and metrics play an important role in assessing and communicating the current state of the city to internal and external stakeholders, that is, the government and its citizens, in order to take effective action. For instance, creating indexes across the city for water availability, health-care, green space/parks, sanitary facilities, road infrastructure and so on can help measure the effectiveness of municipal work and point out areas for improvement.

In addition, analysis of citizen inputs and complaints based on location, priority level, and frequency can help measure citizen priorities versus municipal focus in the area. The Swachhata platform in India collects cleanliness complaints across the city and works with the municipal offices to rectify the problems. A metric measures user happiness and user engagement from data collected through their app. (note: change last line a bit)

Using location-based complaints from citizens can help measure citizen priorities versus municipal focus in the area, and can measure citizen satisfaction across wards in the city.

Integrating an analytical approach with real-time data can ensure speedy progress in terms of repairing city infrastructure, measuring cleanliness, power-saving and so on based on real-time citizen issues.

This has become possible as the huge amounts of data which have been generated and collected are being made available under an “Open Data Strategy”, which is critical to any city aiming to launch a joint government and citizen solution. In India, government data on city infrastructure, population demographics and citizen concerns are available online on the national portal as part of the Open Data Initiative. This has brought improvements and helped build successful smart city solutions in Surat and Chandigarh.

II. REVIEW OF LITERATURE

A. Swachhata Platform

Established in 2014 in India, the Swachhata application is a citizen complaint redressal platform focused on citizen participation and engagement. Citizens upload their complaints through a mobile application which is sent to their respective municipal corporations and the complaint is successfully closed once it has been addressed. The platform provides a comprehensive dashboard for municipal corporations with visualizations based on location of the complaints, work status on the complaints and resolved complaints.

Rank	City	Total Marks	User Engagement	User Happiness	Agency Responsiveness
1	Mandsaur	138975.80	1398.30	131273.10	6304.40
2	Neemuch	92422.50	1483.50	87637.80	3301.20
3	Kanpur	64402.60	2045.70	57812.10	4544.80
4	Singrauli	50175.20	1735.20	41506.80	6933.20
5	Ahmedabad	40691.40	26142.00	879.00	13670.40

Image from swachh.city/analytics

The citizen dashboard which is available on the Web, assesses the number of resolved complaints to calculate a user happiness and user engagement index for every city. The mobile and web applications were developed by I Change My City, which also provides open data on citizen complaints and helps in civic engagement. The user happiness and engagement indexes are calculated based on the feedback given by the citizens once their complaints were resolved, on the number of complaints resolved and on the number of citizens utilizing the app.

B. *Italy : Transforming to a smart city*

City centres in US began a gradual decline in 1961 and urban planners got together to investigate and Jane Jacobs began an investigation and published "The death and Life of Great American Cities" which proposed 4 conditions which she claimed were essential for vibrant city life

- City districts must serve more than 2 functions to attract people with different purposes and different times of the day
- City blocks must be small with dense intersections to allow pedestrian mingling
- Buildings must be diverse in terms of age and low rent and high rent
- District must have sufficient density and population

These were given in 1960s and not actually confirmed even though many cities like Toronto were built following these rules. A new method by De Nadai to analyse data from OpenStreetMap, census data, land use data and Mobile phone records to measure frequency of calls were gathered from 6 cities- Rome , Naples, Florence, Bologna, Milan, and Palermo.

The team used mobile-phone activity as a measure of urban vitality and land-use records, census data, and Foursquare activity as a measure of urban diversity with a goal to see how vitality and diversity are correlated in the cities they studies.

They found correlation between land use and vitality. They also found that the structure of city districts have importance. “In the Italian context, mixing buildings of different eras is not as important as it is in the American context,” for the case of mixture of old and new buildings. The team however found that having a third location apart from home(first) and work(second) was also very important. Third places are bars, restaurants, places of worship, shopping malls, parks, and so on —places where people go to gather and socialize.

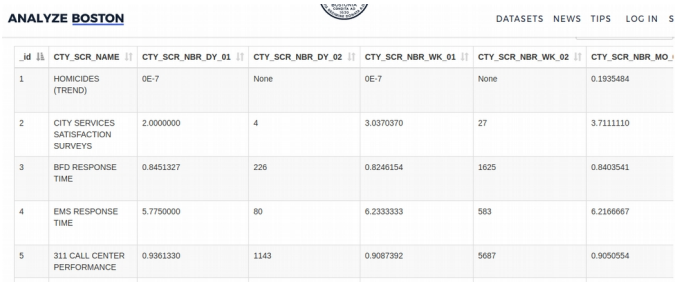
“Our results suggest that Jacobs’s four conditions for maintaining a vital urban life hold for Italian cities,” is concluded by the analyzing team. They further add “Active Italian districts have dense concentrations of office workers, third places at walking distance, small streets, and historical buildings.” based on the city-data of Italian cities they worked with.

The work performed by this team can be a good standard to follow while using our dataset, as we have data about city wards instead of city blocks, for example, with lengths of footpaths and roads which can be mapped per ward to measure intersections of roads.

C. *Boston : Smart City*

Analyze Boston is an open data initiative inviting the community to contribute and improve Boston’s city services. Datasets containing city budgets, infrastructure, city services reports etc are provided on this portal which has helped create innovative solutions to city issues.

CityScore, a part of the initiative undertaken as part of the analytics effort in Boston is a robust tool designed to display the health of the city to city officials at any point of time by calculating performance metrics over the past weeks. It’s proved useful in improving city services, for example, when the program found that the response time for the Emergency Medical Services (the time taken by the ambulance to arrive on the scene) was increasing over time. The Mayor immediately reached out to the organization to find out the cause and try to decrease response times, following which prioritized funding was provided.



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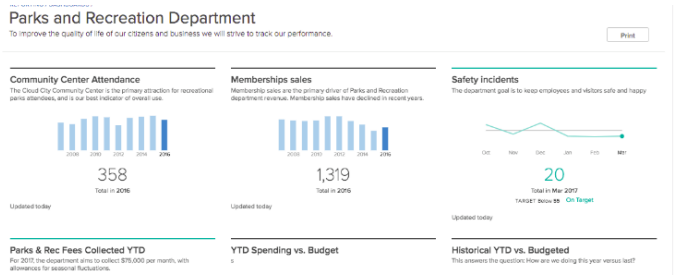
1	HOMICIDES (TREND)	0E-7	None	0E-7	None	0.1935484
2	CITY SERVICES SATISFACTION SURVEYS	2.0000000	4	3.0370370	27	3.7111110
3	BFD RESPONSE TIME	0.8451327	226	0.8246154	1625	0.8403541
4	EMS RESPONSE TIME	5.7750000	80	6.2333333	583	6.2166667
5	311 CALL CENTER PERFORMANCE	0.9361330	1143	0.9087392	5687	0.9050554

D. *OpenGov platform*

The OpenGov platform aims to provide transparent, effective and easy-to-use government performance solutions. The platform provides department-wise performance measures on a comprehensive dashboard and analytics-driven solutions across the USA. In terms of transparency, the OpenGov portal also provides a history of the cities’ budgets and spending for the past 10 years, available to the general public. The portal uses easy-to-understand dashboards to track performance and infrastructure of cities. For instance, the Parks and Recreation department in a particular city can view statistics on their financial position, any pending or ongoing work, the number of members and any fees collected, all at any point of time.



https://opengov.com/article/meet-performance-measures-latest-enhancement-to-our-operational-performance-solution

III. A SMART CITY SOLUTION FOR BANGALORE

The solution aims to bridge the gap between government focus and citizen concerns using open data on citizen complaints, city infrastructure and spending.

The solution will :

- Find the focus/priorities of the government in each ward
- Analyze citizen satisfaction and effectiveness of budget
- Identify sectors where there is overspending/under-spending
- Make recommendations for the following year's budget and tenders

A. *Open Data Strategy*

The common point in Data-driven solutions is the need for Open Government Data, which has proved to increase efficiency and customer satisfaction through transparency and interaction between the government and citizens.

Taking informed decisions on policies, through a combination of human judgement and analysis of open city data can lead to more effective decisions.

Data visualization is an extremely important part of this process and allows the government to notice links between their policies and trends in the city. It provides insights by comparing related datasets from different sources and can point out new patterns.

Next, predictive analysis can use historical and real-time data from city sources to predict future events or simulate the effect of tentative policies.

IV. CONCLUSION

A large amount of related data is available about the different wards in the city of Bangalore that the authors of the other similar works did not have simultaneously.

We have length of footpaths and roads and population density of wards with which we can predict rate of deterioration and inadequate availability of roads and footpaths while also being able to check with the registered complaints about particular roads and complaints in each ward. We also have parks and playgrounds and public toilets and their locations in wards and the respective budget that each ward gets , which combined with the population distribution data will allow us to make analyses that have been not been congregated in such a conclusive way before.

Thus allowing at one glance, to see which wards are in need of more amenities due to their need of repair or relatively higher population than other wards and which wards are underrepresented or overrepresented in the budget, while simultaneously using the complaints to adjust the scale of expenditures in the entire city of Bangalore.

[1] http://swachh.city/assets/files/SwachhCityBook-v1.22.pdf

[2] https://opengov.com/

[3] “Analyze Boston.” City of Boston. https://data.boston.gov.

[4] https://arxiv.org/abs/1603.04012
The Death and Life of Great Italian Cities: A Mobile Phone Data Perspective, Marco De Nadai, Jacopo Staiano, Roberto Larcher, Nicu Sebe, Daniele Quercia, Bruno Lepri

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[6] http://www.cortell.com.au/wp-content/uploads/2017/05/Cortell_Business_Analytics_for_Government.pdf

[7] http://datasmart.ash.harvard.edu/news/article/how-civic-tech-can-address-urban-inequality-1141

[8] https://assets.kpmg.com/content/dam/kpmg/be/pdf/Markets/at-gov-brochure.pdf

[9] The Responsive City: Engaging Communities Through Data-Smart