



Efficacy of Delivering Amrut Programme in Urban Centres of Kerala

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Abstract

India's rapid economic expansion has intensified the demand for comprehensive urban infrastructure development. In response to these growing urban challenges, the Government of India launched the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) as a flagship initiative aimed at enhancing urban infrastructure and improving the delivery of essential civic services. Despite the programme's ambitious objectives, its implementation in Kerala—a state distinguished by unique socio-economic characteristics and geographical complexities—has raised significant concerns regarding its effectiveness and institutional performance. This study critically examines the implementation of the AMRUT programme in Kerala by identifying key structural and operational fault lines and evaluating its



overall performance. The analysis is based on an extensive examination of secondary data sources, with particular emphasis on patterns of fund utilisation, expenditure trends, and project completion rates. The findings reveal a range of challenges that continue to impede the efficient execution of urban infrastructure projects within the state. By systematically identifying these constraints, the study seeks to contribute to the strengthening of the AMRUT implementation framework and to the development of more responsive and resilient urban infrastructure systems capable of addressing the evolving demands of Kerala's urban centres. The statistical analysis further demonstrates that the financial progress (expenditure) of Urban Local Bodies with respect to Corporations and Municipalities exhibits a homogeneous pattern. The study underscores the critical importance of effective programme implementation, institutional coordination, and efficient resource utilisation, while also highlighting the broader necessity for sustainable, inclusive, and strategically planned urban development in Kerala.

Key words: *Urban, JNNRUM, Expenditure, Utilisation*

Introduction

India, as one of the world's rapidly expanding economies, is witnessing an increasing demand for strong and sustainable infrastructure development. In response to this growing necessity, the Government of India (GoI) introduced the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) during the 2000s with the objective of addressing infrastructural deficiencies in urban areas. Later, in 2015, the mission was restructured and relaunched as the Atal Mission for Rejuvenation and Urban Transformation (AMRUT), which emerged as the flagship programme of the GoI for urban infrastructure development. Originally launched in 2005, JNNURM primarily focused on initiating reforms in urban governance and infrastructure. However, persistent delays in project execution and completion led to its replacement by AMRUT in 2015. The AMRUT mission was conceived to overcome the limitations of its predecessor while ensuring planned, sustainable, and inclusive urban development across the country.

The AMRUT programme concentrates on resolving major urban infrastructure challenges in 500 cities and towns throughout India. Its core focus areas include water supply, sewerage and septage management, storm-water drainage, urban



transportation, and the development and rejuvenation of parks and green spaces. Unlike JNNURM, which largely targeted cities alone, AMRUT adopted a wider approach by covering urban areas with populations exceeding one lakh, thereby expanding its developmental outreach. The scheme operates through a Public-Private Partnership (PPP) model, encouraging cooperation between governmental agencies and private stakeholders for effective implementation. Its broader objective is to enhance the quality of urban life by ensuring access to essential civic amenities and by developing sustainable urban infrastructure systems.

By emphasizing critical sectors such as water supply, sewerage, drainage, transportation, and green spaces, AMRUT attempts to address the urgent infrastructural requirements arising from rapid urbanization. The enlarged scope of the programme has enabled a greater number of cities and towns to benefit from infrastructural interventions, thereby reflecting the government's commitment to comprehensive urban development.

In Kerala, three State Annual Action Plans (SAAPs) submitted under AMRUT were approved by the Ministry of Housing and Urban Affairs, involving a total outlay of ₹2357.69 crore. A total of 1020 projects were proposed for implementation across nine mission cities—Thiruvananthapuram, Kollam, Alappuzha, Kochi, Thrissur, Guruvayur, Palakkad, Kozhikode, and Kannur—covering five major sectors: water supply, sewerage and septage management, storm-water drainage, urban transport, and green spaces and parks during the period 2015–2024. Despite these extensive initiatives, several disparities and inconsistencies have been observed in the outcomes of the AMRUT programme in Kerala. These identified fault lines have raised important concerns regarding the effectiveness of implementing large-scale infrastructure programmes within the state. Therefore, a detailed examination of secondary data is essential to understand the underlying causes of the challenges encountered in the implementation of AMRUT in Kerala.

An analysis of indicators such as fund utilisation, project completion rates, and resource allocation across various sectors can provide valuable insights into the overall effectiveness of infrastructure development efforts in the state. Such an assessment would help identify the gaps in implementation and facilitate improvements in programme delivery. Effective infrastructure development requires not only adequate financial support but also efficient planning and execution. By critically examining and addressing the implementation challenges associated with the AMRUT programme in Kerala, it becomes possible to develop a more resilient,



inclusive, and responsive urban infrastructure framework capable of meeting the evolving demands of the state's rapidly growing urban centres.

Literature Review

Singh & Kapoor (2018) examines the implementation and impact of the AMRUT program in selected cities across India. The researchers assess the effectiveness of fund utilization, project planning, and citizen participation in achieving the program's objectives. The findings highlight the need for improved project management, enhanced community engagement, and better coordination between stakeholders to ensure the successful execution of AMRUT projects. *Gupta & Pande (2019)* focuses on evaluating the AMRUT mission's impact on urban infrastructure rejuvenation and transformation. The study analyzes key performance indicators such as project completion rates, fund utilization efficiency, and infrastructure quality improvement. The findings reveal variations in the outcomes across different cities and highlight the importance of tailored strategies to address the specific needs and challenges of each urban center.

Pujari & Tiwari (2017) assesses the implementation of the AMRUT scheme in urban areas of Odisha. The researchers evaluate the utilization of funds, project selection criteria, and the overall impact on infrastructure development. The findings underscore the need for better coordination between state and local agencies, enhanced monitoring mechanisms, and effective stakeholder engagement to optimize the outcomes of the AMRUT program. *Tewari & Singh (2019)* evaluates the AMRUT mission's effectiveness in facilitating urban development in India. The study examines the progress and achievements of the program, with a focus on infrastructure projects and their impact on the quality of life in urban areas. The findings emphasize the importance of timely project completion, efficient fund utilization, and the integration of sustainable practices for long-term urban development.

Mishra & Bhadoria (2020) evaluates the performance of the AMRUT program in selected cities in Madhya Pradesh. The researchers analyze the utilization of funds, project implementation processes, and the overall impact on urban infrastructure development. The findings reveal variations in the effectiveness of the program across different cities and emphasize the need for better coordination between stakeholders, improved project monitoring, and enhanced citizen participation for successful implementation. *Ramanathan & Subramaniam (2018)* assesses the effectiveness of the AMRUT program in the state of Tamil Nadu. The study



examines the allocation and utilization of funds, project selection criteria, and the impact on urban infrastructure development. The findings highlight the need for strategic planning, efficient resource allocation, and capacity building of local authorities to ensure successful implementation of AMRUT projects in Tamil Nadu.

Selvarasu & Kanagaraj (2020) presents a case study analysis of the AMRUT scheme in selected cities in India. The researchers evaluate the progress and outcomes of the program, focusing on infrastructure projects such as water supply, sewerage, and solid waste management. The findings emphasize the importance of effective project monitoring, timely completion, and stakeholder collaboration for successful implementation and long-term sustainability of AMRUT projects. *Pandey & Agrawal(2021)* assesses the AMRUT scheme's implementation in selected cities of Madhya Pradesh. The study analyzes the utilization of funds, project execution processes, and the impact on urban infrastructure development. The findings highlight the need for enhanced financial management, improved project monitoring, and better coordination among different government agencies to achieve the desired outcomes of the AMRUT program.

These studies offer deeper insights into the implementation and effectiveness of the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) across various states and cities in India. They emphasize critical aspects such as project performance, resource allocation, stakeholder participation, and the importance of efficient governance mechanisms in ensuring successful infrastructure development. Collectively, these analyses enrich the ongoing discourse on improving the outcomes of the AMRUT programme and formulating effective strategies for urban transformation in India.

The reviews further underline the importance of factors including efficient fund utilisation, sound project management practices, active community participation, and context-specific implementation strategies for achieving sustainable infrastructure development. Building upon the findings of these studies, future research can play a significant role in strengthening the implementation framework of the AMRUT programme and enhancing its capacity to achieve sustainable, inclusive, and resilient urban development objectives.

Research Gap

Despite the growing body of literature on the AMRUT programme in India, existing studies have largely focused on national-level performance indicators,



infrastructural targets, and broad policy outcomes, with limited attention to state-specific implementation dynamics in Kerala's urban centres. Kerala presents a unique urban context characterized by dispersed urbanisation, high population density, strong local self-government institutions, and distinctive socio-economic development patterns, which differ significantly from other Indian states. However, there is a lack of comprehensive empirical studies examining the component-wise completion status of AMRUT projects, the efficiency of fund utilisation, and the administrative, financial, and institutional challenges affecting programme delivery in Kerala municipalities and corporations. Most available analyses also fail to assess the gap between sanctioned projects and actual execution outcomes in sectors such as water supply, sewerage, storm-water drainage, urban transport, and green spaces. Furthermore, insufficient scholarly attention has been given to identifying the practical constraints and governance-related issues that influence the efficacy of AMRUT implementation in Kerala's decentralised planning framework. Therefore, this study is highly relevant in the Kerala context as it seeks to bridge these gaps by providing a systematic evaluation of project completion, fund utilisation patterns, and the underlying factors affecting programme performance, thereby contributing policy insights for improving the effectiveness and sustainability of urban development initiatives in the state.

Objectives of the Study

To study the quantum of completed projects in the urban areas with respect to each component.

To examine the reasons for the current state of AMRUT and to identify areas for improvement to increase the efficacy of the program.

To Study regarding the fund utilisation of the sanctioned projects with respect to various component.

Research Methodology of the Study

The present study is primarily based on secondary data collected from various reliable and authentic sources relating to the implementation of the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) in Kerala. The required data have been obtained from government reports, official publications, AMRUT mission documents, project progress reports, Urban Local Body records, and other credible institutional sources. These sources provide detailed information regarding project



allocation, tendering, fund utilisation, expenditure patterns, project completion rates, and sector-wise performance under the AMRUT programme.

The collected data were systematically classified, tabulated, and analysed using appropriate statistical and analytical techniques. Descriptive statistical tools such as percentages, averages, ratios, and trend analysis were employed to examine the status and progress of projects accorded, tendered, awarded, and completed across various sectors under the AMRUT scheme in Kerala. Comparative analysis was also carried out to evaluate sector-wise performance and the efficiency of financial utilisation among different Urban Local Bodies.

In addition, Analysis of Variance (ANOVA) was applied to examine whether significant differences exist in the financial progress (expenditure) among Urban Local Bodies, particularly between Corporations and Municipalities. The ANOVA results indicate that the expenditure patterns of Corporations and Municipalities are statistically homogeneous, suggesting a relatively uniform pattern of financial progress in the implementation of the AMRUT programme.

Further, the study analyses the major challenges and constraints affecting project implementation, including issues related to fund utilisation, administrative coordination, project execution, and completion delays. The overall methodological framework of the study is designed to critically evaluate the effectiveness of the AMRUT programme in Kerala and to provide insights for improving sustainable and inclusive urban infrastructure development in the state.

Limitations of the Study

It is essential to acknowledge the limitations of using secondary data. Firstly, the data may have inherent limitations in terms of completeness, accuracy, and availability. Any biases or discrepancies present in the data may impact the overall analysis. Secondly, since the data is pre-existing, there may be limited control over the variables and factors considered. Finally, the research is reliant on the quality and reliability of the secondary data sources used.

Analysis & Interpretation

As per the project updates depicted in the official website of AMRUT in Kerala the following figures throws a light regarding the various project components implemented in the various urban areas, their fund utilisation and projects falling under the work in progress and work completed category. (data source: Govt. website <https://amrut.gov.in/> and <https://lsgd.kerala.gov.in/>)



Table 1. Devolution of Fund and Expenditure of Amrut in Kerala During 2017-2022

Sl. No.	Amrut Fund	2017 (In lakh)	2018 (In lakh)	2019 (In lakh)	2020 (In lakh)	2021 (In lakh)	2022 (In lakh)	
1	Allocation	3750000000	2000000000	5837847000	7610841000	7200000000	2190554000	1913914000
2	Expenditure	1138800000	1253496000	3734684000	5670969958	3997113688	2915814000	2915812500
3	Unutilised Fund	2611200000	746504000	2103163000	1939871042	3202886312	725260000	1001898500

Table 1 shows the allocation and expenditure of fund from 2017-2022. In 2017, approximately 30.37% of the allocated funds for the AMRUT component in Kerala were expended, indicating that a significant portion of the funds was utilized. However, around 69.63% of the allocated funds remained unutilized. The year 2018 saw an improvement in expenditure, with approximately 62.67% of the allocated funds being utilized. This suggests a more effective utilization of funds compared to the previous year. However, around 37.33% of the allocated funds remained unutilized. In 2019, the expenditure further increased to approximately 64.03% of the allocated funds. This indicates a continued effort to utilize a larger portion of the funds effectively. However, around 35.97% of the allocated funds remained unutilized. The year 2020 saw a significant improvement in expenditure, with approximately 74.51% of the allocated funds being utilized. This suggests a notable increase in the utilization of funds for the AMRUT component. However, around 25.49% of the allocated funds remained unutilized. In 2021, the expenditure decreased to approximately 55.52% of the allocated funds, indicating a lower utilization compared to the previous year. However, around 44.48% of the allocated funds remained unutilized, suggesting a substantial portion of the funds went unused. The year 2022 witnessed a significant decrease in expenditure, with only approximately 13.29% of the allocated funds being utilized. The consistent underutilization of these years could be a reason of lockdown related to Covid Pandemic. This indicates a substantial underutilization of funds for the AMRUT component. Around 33.11% of the allocated funds remained unutilized.

Overall, the percentage analysis shows that while there were improvements in fund utilization in some years, there were also instances of significant underutilization. It highlights the need for effective planning and execution to ensure that a higher percentage of allocated funds is utilized for the intended purposes.

**Table 2 Urban Local Body Wise Progress in Kerala**

City	Total Projects	Project Cost*	AS Amount*	TS Amount*	Awarded	Awarded Amount*
Thiruvananthapuram	270	357.50	360.12	331.24	269	328.26
Thrissur	109	269.93	258.55	241.78	106	189.48
Palakkad	150	221.75	220.02	202.11	148	165.86
Kozhikode	50	274.76	308.14#	307.61	50	305.47
Kannur	38	225.72	225.65	205.74	38	202.92
Kollam	59	253.45	305.27	299.02	55	155.00
Kochi	98	328.78	272.06	264.46	96	234.89
Guruvayur	33	203.10	213.71	213.71	33	213.71
Alappuzha	194	222.70	219.65	218.07	191	212.97
Grand Total	1001	2357.69	2383.18	2283.74	986	2008.57

The Table 2 shows: - *The Project Distribution*: the total number of projects in each city, ranging from 33 in Guruvayur to 270 in Thiruvananthapuram. This indicates variations in the scale and scope of development activities across different cities. *Project Cost*: The project cost varies across cities, with Thiruvananthapuram having the highest cost of 357.50 crore and Guruvayur having the lowest cost of 203.10 crore. This reflects the differing infrastructure requirements and development needs in each city. *Sanctioned Amount and Released Amount*: The sanctioned amount represents the approved funds for the projects, while the released amount indicates the actual amount disbursed. In some cases, there is a slight difference between the sanctioned and released amounts, suggesting potential delays in fund disbursement. *Awarded Projects*: The number of awarded projects signifies the projects that have been contracted for implementation. The percentage of awarded projects varies across cities, ranging from 96.36% in Kochi to 100% in Kozhikode, Kannur, and Guruvayur. This implies differences in the progress of project implementation and the readiness of cities to undertake development initiatives.

Awarded Amount: The awarded amount represents the funds allocated for the awarded projects. It varies across cities, reflecting the different scales and complexities of the projects. Thiruvananthapuram has the highest awarded amount of 328.26 crore, while Guruvayur has the lowest awarded amount of 213.71 crore. The data indicates variations in the distribution of projects, project costs, sanctioned and released amounts, and the progress of project implementation across different cities in Kerala. Thiruvananthapuram, being the capital city, has a higher number of



projects and a relatively higher project cost. Kochi, another major urban centre, has a significant number of awarded projects but a lower awarded amount compared to Thiruvananthapuram. The comparison highlights the need for equitable distribution of projects and resources across cities, considering their respective requirements and priorities. It is important to ensure that the sanctioned funds are effectively released to facilitate project implementation in a timely manner. Furthermore, the 100% award of projects in certain cities like Kozhikode, Kannur, and Guruvayur indicates their proactive approach and readiness for development initiatives. This could be attributed to efficient planning, effective coordination, and proactive participation of local bodies in the project selection and implementation processes

Table 3 Financial Progress (Expenditure) – KWA & ULB

Sector	TVM	Kol-lam	Alappu-zha	Kochi	Thrissur	Guru-vayur	Palak-kad	Kannur	Kozhi-kode	Total	%
WS – KWA	85.57	65.34	139.23	91.46	125.91	126.48	114.3	118.88	112.96	980.14	79.05
SEW - KWA	131.77	12.29	0	13.72	0	0	0	0	0	157.78	50.07
Total KWA	217.34	77.64	139.23	105.17	125.91	126.48	114.3	118.88	112.96	1137.92	73.18
WS – Non-KWA	0	0.01	1.18	0.4	8.78	1.58	0	0	0	11.95	12.86
SEW – Non-KWA	0	0	0	0.55	0.76	0	0	23.57	4.73	29.61	31.77
Storm Water Drainage	35.21	20.77	42.52	44.92	27.9	10.33	29.79	35.28	29.52	276.24	82.48
Urban Transport	5.94	5.93	4.95	16.82	10.92	28.12	21.64	12.51	10.86	117.7	63.85
Green Space & Parks	5.18	3.09	3.05	3.16	4.04	3.66	5.96	4.76	3.82	36.72	77.09
Total ULB	46.33	29.8	51.7	65.85	52.4	43.69	57.39	76.12	48.93	472.22	63.17
Grand Total	263.68	107.44	190.93	171.02	178.31	170.17	171.7	195	161.89	1610.14	69.93



The provided data in Table 3 presents the allocation of funds for different sectors under the AMRUT project in various cities of Kerala. Here's a breakdown of the interpretation and in-depth analysis:

Water Supply (WS) - Kerala Water Authority (KWA): Thiruvananthapuram has received an allocation of 85.57 crores for water supply, indicating a significant investment in improving the water infrastructure in the city. Kollam has been allocated 65.34 crores, suggesting a relatively lower investment compared to Thiruvananthapuram. Alappuzha has received the highest allocation of 139.23 crores, indicating a strong focus on water supply in this city. Kochi has been allocated 91.46 crores, suggesting a significant investment in improving water supply infrastructure in the city.

Sewerage (SEW) - Kerala Water Authority (KWA): Thiruvananthapuram has received a substantial allocation of 131.77 crores for sewerage projects, indicating a significant investment in improving the sewerage infrastructure in the city. Kollam has been allocated a relatively lower amount of 12.29 crores, suggesting a lesser focus on sewerage projects in this city. Kochi has received an allocation of 13.72 crores for sewerage, indicating investment in improving sewerage infrastructure in the city.

Storm Water Drainage: The cities of Thiruvananthapuram, Kollam, Alappuzha, Kochi, Thrissur, Guruvayur, Palakkad, Kannur, and Kozhikode have received varying amounts for stormwater drainage projects. Kochi has received the highest allocation of 44.92 crores, indicating a significant focus on improving stormwater drainage infrastructure in the city. Other cities have also received substantial allocations, suggesting efforts to address stormwater drainage issues in various areas of Kerala.

Urban Transport: Urban transport projects have received allocations in cities like Thiruvananthapuram, Kollam, Alappuzha, Kochi, Thrissur, Guruvayur, Palakkad, Kannur, and Kozhikode. Kochi has received the highest allocation of 16.82 crores for urban transport projects, indicating a focus on improving transportation infrastructure in the city. Other cities have also received allocations, suggesting efforts to enhance urban transportation facilities in various parts of Kerala.

Green Space & Parks: Allocation for green space and parks has been made in cities like Thiruvananthapuram, Kollam, Alappuzha, Kochi, Thrissur, Guruvayur, Palakkad, Kannur, and Kozhikode. The highest allocation has been made in Thiruvananthapuram with 5.18 crores, followed by Alappuzha with 3.05 crores.



The allocations suggest a focus on creating and maintaining green spaces and parks in urban areas across Kerala. Overall, the data reflects the allocation of funds to different sectors under the AMRUT project in various cities of Kerala.

Table 4. Sector Wise Project & Fund Distribution

Sector	Total Project	Project Cost*	As Accorded	As Amt	Ts Issued	Ts Amt	Tendered	Tendered Amt*	Awarded	Awarded Amt*	Work Completed	Expenditure*	Expenditure %
Water Supply	178	1082.98	178	1323.63	178	1330.6	178	1328.6	178	1236.67	152	990.9	74.86
Sewerage & Septage	130	628.87	130	412.06	129	373.04	129	372.72	124	287.22	95	188.57	45.76
Storm Water Drainage	508	385.21	508	334.94	507	334.37	507	334.25	506	322.51	482	276.25	82.48
Urban Transport	126	212.04	126	184.32	126	177.53	126	174	123	171.1	99	117.7	63.86
Green Space & Parks	77	48.59	77	47.63	77	47.53	77	47.53	77	45.12	66	36.72	77.09
Grand Total	1019	2357.69	1019	2302.58	1017	2263.07	1017	2257.09	1008	2062.61	894	1610.14	69.93

Table 4 shows the sector wise projects and their respective fund utilisation.

Water Supply: There are a total of 178 water supply projects in Kerala under the AMRUT scheme. The project cost for these water supply projects amounts to 1082.98 units. All 178 projects have been accorded, with a total amount of 1323.63 units allocated, which exceeds the project cost by 22.26%. Tender documents have been issued for all 178 projects, and the total tender amount is 1330.60 units, surpassing the project cost by 22.80%.

Sewerage & Septage: There are 130 sewerage and septage projects included in the AMRUT scheme in Kerala. The total project cost for these projects is 628.87 units. All 130 projects have been accorded, and the allocated amount is 412.06 units,



which corresponds to 65.59% of the project cost. Tender documents have been issued for 129 out of the 130 projects, accounting for 99.23% of the total projects. The total tender amount for these projects is 373.04 units, representing 59.29% of the project cost.

The storm water drainage component shows comparatively higher project completion and expenditure because Kerala's urban areas face recurring problems of flooding, waterlogging, and monsoon-related disasters, making drainage projects an immediate public and administrative priority. These projects are generally easier to execute as they mostly involve the renovation, widening, or construction of open drains, canals, and culverts using existing urban infrastructure. They require comparatively lower technical complexity, shorter implementation periods, and fewer inter-agency approvals, which helps urban local bodies utilise funds more quickly and achieve visible results within a limited timeframe. Moreover, the impact of drainage projects is directly visible to the public, creating greater political and institutional pressure for timely completion. On the other hand, sewerage and septage management projects lag behind in both completion and expenditure because they involve highly complex and capital-intensive infrastructure such as underground sewer networks, pumping stations, and sewage treatment plants. These projects require extensive technical planning, land acquisition, environmental clearances, and coordination among multiple agencies, which often cause delays.

Storm Water Drainage: There are a total of 508 stormwater drainage projects under the AMRUT scheme in Kerala. The project cost for these projects amounts to 385.21 units. All 508 projects have been accorded, with a total amount of 334.94 units allocated, exceeding the project cost by 87.47%. Tender documents have been issued for 507 out of the 508 projects, accounting for 99.80% of the total projects. The total tender amount for these projects is 334.37 units, representing 86.76% of the project cost. Tender bids have been received for 507 projects, which is 99.80% of the total projects. The tendered amount for these projects is 334.25 units, corresponding to 86.71% of the project cost.

Urban Transport: There are a total of 126 urban transport projects under the AMRUT scheme in Kerala. The project cost for these projects amounts to 212.04 units. All 126 projects have been accorded, with a total amount of 184.32 units allocated, exceeding the project cost by 86.92%. Tender documents have been issued for all 126 projects. The total tender amount for these projects is 177.53 units, representing 83.71% of the project cost. Tender bids have been received for all 126 projects. The tendered amount for these projects is 174.00 units, corresponding to 82.06% of the



project cost. All 126 projects have been awarded, and the awarded amount is 171.10 units. The work completion status is at 63.86%, with 99 projects being completed out of the total 126. The expenditure on the completed urban transport projects amounts to 117.70 units, representing 68.82% of the awarded amount.

Green Space & Parks: There are a total of 77 green space and parks projects under the AMRUT scheme in Kerala. The project cost for these projects amounts to 48.59 units. All 77 projects have been accorded, with a total amount of 47.63 units allocated, exceeding the project cost by 98.02%. Tender documents have been issued for all 77 projects. The total tender amount for these projects is 47.53 units, representing 97.82% of the project cost. Tender bids have been received for all 77 projects. The tendered amount for these projects is 47.53 units, corresponding to 97.82% of the project cost. All 77 projects have been awarded, and the awarded amount is 45.12 units. The work completion status is at 77.09%, with 66 projects being completed out of the total 77. The expenditure on the completed green space and parks projects amounts to 36.72 units, representing 81.39.

A comparative analysis of the sectors under the AMRUT scheme in Kerala gives the following details

Project Count: Storm Water Drainage has the highest number of projects with 508, followed by Water Supply (178), Sewerage & Septage (130), Urban Transport (126), and Green Space & Parks (77).

Project Cost: Water Supply has the highest project cost of 1082.98 units, followed by Storm Water Drainage (385.21 units), Sewerage & Septage (628.87 units), Urban Transport (212.04 units), and Green Space & Parks (48.59 units).

Allocation: In terms of the percentage of project cost allocated, Water Supply has the highest allocation (122.26%), followed by Sewerage & Septage (65.59%), Storm Water Drainage (87.47%), Urban Transport (86.92%), and Green Space & Parks (98.02%).

Tendering: Water Supply, Storm Water Drainage, Sewerage & Septage, Urban Transport, and Green Space & Parks have achieved 100% accorded projects.

Storm Water Drainage has the highest percentage of tendered projects (99.80%), followed by Urban Transport (100%), Water Supply (100%), Sewerage & Septage (99.23%), and Green Space & Parks (100%).

Awarded Projects: Urban Transport has the highest percentage of awarded projects (100%), followed by Water Supply (100%), Storm Water Drainage (99.60%),



Sewerage & Septage (95.38%), and Green Space & Parks (100%).

Work Completion: Green Space & Parks has the highest work completion percentage (77.09%), followed by Water Supply (85.39%), Sewerage & Septage (45.76%), Storm Water Drainage (82.48%), and Urban Transport (63.86%).

Expenditure: Water Supply has the highest expenditure on completed projects (990.90 units), followed by Storm Water Drainage (276.25 units), Sewerage & Septage (188.57 units), Urban Transport (117.70 units), and Green Space & Parks (36.72 units).

Hypothesis for The Study

Hypothesis 1: (H_0): Financial progress (Expenditure) of Urban Local Bodies with respect to corporation and municipalities are homogeneous. Against (H_1): Financial progress (Expenditure) of Urban Local Bodies with respect to corporation and municipalities are non-homogeneous.

Hypothesis 2: (H_0): Financial progress (Expenditure) of WS – KWA & SEW – KWA w.r.to corporation and municipalities are homogeneous. Against (H_1): Financial progress (Expenditure) of WS – KWA & SEW – KWA w.r.to corporation and municipalities are homogeneous are non-homogeneous.

Table 5 Financial Progress (Expenditure) ULB-Corporation and Municipalities

Sector	Tvm	Kollam	Kochi	Thrissur	Kozikode	Kannur
Total Ulb Corporation	46.33	29.80	65.85	52.40	48.93	76.12
Sector	Guruvayur	Palakkad	Alappuzha			
Total Ulb Municipalities	43.69	57.39	51.70			

Table 5 With Financial Progress (Expenditure) –ULB (WS – NON-KWA, SEW – NON-KWA, Storm Water Drainage, Urban Transport, Green Space & Parks) Corporation And Municipalities. From Table V, let us consider the Hypothesis that financial progress (Expenditure) of ULB w.r.to corporation and municipalities are homogeneous.

To analyze this hypothesis, an ANOVA (Analysis of Variance) was conducted. Table VI shows the results of the ANOVA test, including the source of variation, sum of squares (SS), degrees of freedom (df), mean squares (MS), F-statistic, p-value, and the critical F-value.

**Table 6. ANOVA: Single Factor A = 0.05**

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	10.68761	1	10.68761	0.053679	0.823408	5.591448
Within Groups	1393.712	7	199.1017			
Total	1404.4	8				

The ANOVA results indicate that the between-groups variation (variation between corporations and municipalities) has a sum of squares (SS) value of 10.68761 and 1 degree of freedom (df). The mean squares (MS) for the between-groups variation are calculated by dividing the SS by the df, resulting in 10.68761. The within-groups variation, which represents the residual variation within each group, has a SS value of 1393.712 and 7 degrees of freedom. The total variation, which is the sum of the between-groups and within-groups variations, is calculated as 1404.4 with 8 degrees of freedom. The F-statistic is computed by dividing the MS for between-groups by the MS for within-groups, resulting in a value of 0.053679. The p-value associated with this F-statistic is 0.823408. The critical F-value is not explicitly provided in the table, but it is typically determined based on the significance level (α) of the test. In this case, α is stated as 0.05. Interpreting the analysis, since **the p-value (0.823408) is greater than the significance level (0.05), we fail to reject the null hypothesis (H_0)**. Therefore, based on this analysis, we conclude that there is no significant evidence to suggest that the financial progress (expenditure) of ULBs with respect to corporations and municipalities is non-homogeneous. In other words, we accept the hypothesis that the financial progress of all corporations and municipalities is homogeneous.

Table 7. Financial Progress (Expenditure): Water Supply-Corporation & Municipalities

Sector	TVM	Kollam	Kochi	Thrissur	Kozhikode	Kannur
Total ULB(C)	217.34	77.64	105.17	125.91	112.96	118.88
Sector	Guruvayur	Palakkad	Alappuzha			
Total ULB(M)	126.48	114.30	139.23			

Table 7 includes Financial Progress (Expenditure) – Water Supply – Kerala Water Authority & Sewerage – Kerala Water Authority Corporation and Municipalities. From Table VII, let us consider the Hypothesis that financial progress (Expenditure) of WS – KWA & SEW – KWA w.r.to corporation and municipalities are homogeneous.

**Table 8 ANOVA: Single Factor A = 0.05**

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	0.249689	1	0.249689	0.00015	0.990568	5.591448
Within Groups	11646.52	7	1663.789			
Total	11646.77	8				

Interpreting the analysis, since the p-value (0.990568) is greater than the significance level (0.05), we fail to reject the null hypothesis (H_0). Therefore, based on this analysis, we conclude that there is no significant evidence to suggest that the financial progress (expenditure) of WS - KWA & SEW - KWA with respect to corporations and municipalities is non-homogeneous. In other words, we accept the hypothesis that the financial progress of all corporations and municipalities is homogeneous with respect to WS - KWA & SEW - KWA.

Reasons for Non-Utilisation of Funds

Variation in Fund Utilization: There is a significant difference in fund utilization among the different components of the sanctioned project. This suggests that certain components may have utilized funds more efficiently than others. The reasons for this difference could be related to the nature of the components, their priorities, or the management of funds allocated to each component.

Allocation of Funds: Water supply, storm water drainage, and green space and park components have spent more than three-fourths of the total funds. This indicates that these components have received a larger share of the allocated budget compared to other components. The reasons for this disparity could be due to their perceived importance, immediate needs, or the availability of resources for these specific areas.

Work Completion and Expenditure: Out of a total of 1001 projects, 828 have been completed, which represents roughly 82.7% completion. However, in terms of expenditure, only 1414 crore out of 2357 crore has been spent, indicating a spending rate of approximately 60%. This data suggests that there might be delays in completing the larger budget projects or inefficient utilization of funds. Considering the interpretation, there are a few possible scenarios:

Delays in completing the big budget projects: The completion rate might be affected due to delays in executing the projects, resulting in a lower expenditure rate compared to the completion rate.



Inefficient utilization of funds: There may be inefficiencies in managing and utilizing the allocated funds, leading to a lower expenditure rate despite the completion of projects. This could be due to poor project planning, implementation, or monitoring.

Unequal allocation of funds: The allocation of funds among different components may not be proportional, resulting in variations in fund utilization. Some components might receive a larger share of the funds, leading to underutilization in other areas.

In summary, the non-utilization of funds in the AMRUT projects could be attributed to variations in fund utilization, unequal allocation of funds, and potential inefficiencies in project implementation. These factors may impact the quality and timely completion of projects, necessitating further investigation and corrective measures.

Reason for Delay of Projects & Its Incompletion

The reasons for the delay of projects under the AMRUT scheme include:

Land Acquisition: Delays in acquiring land for project implementation can significantly impact the timeline of infrastructure projects. Issues such as legal complexities, disputes, and negotiations with landowners can lead to prolonged delays.

Administrative Processes: Lengthy administrative processes, such as obtaining clearances, permits, and approvals from various government departments, can cause delays. Bureaucratic red tape and coordination challenges between different authorities involved in the project can contribute to the slowdown.

Funding Constraints: Insufficient funding or delays in the release of funds can hamper the progress of projects. If the allocated funds are not disbursed on time, it can lead to a shortage of resources and disrupt the planned timeline.

Technical Challenges: Projects involving complex engineering designs, site-specific constraints, or the need for innovative solutions may face technical challenges that can cause delays. Unforeseen ground conditions, geological issues, or the need for design modifications can all contribute to project timeline extensions.

Contractor Performance: In some cases, the performance of the contractors hired for project execution may not meet the expected standards. Delays can occur if contractors fail to mobilize resources, encounter financial difficulties, or face operational inefficiencies.

Public Resistance and Community Engagement: Projects in urban areas often require community engagement and public support. If there is resistance from



local communities, public protests, or legal challenges, it can delay the progress of projects as additional efforts are needed to address concerns and ensure stakeholder buy-in.

Natural Disasters and Unforeseen Events: Natural disasters, adverse weather conditions, and other unforeseen events can disrupt project timelines. Kerala, for instance, is prone to heavy rainfall and flooding, which can cause significant delays and damage to infrastructure projects.

It's important to note that project delays can result from a combination of these factors, and each project's circumstances may vary. Effective project management, proactive mitigation of risks, improved coordination among stakeholders, and streamlined administrative processes can help minimize delays and ensure timely completion of AMRUT projects in Kerala.

Areas to Increase the Efficacy

Accountability and transparency: It is a vital aspect in decision-making processes related to the AMRUT projects for ensuring efficient utilization of funds and addressing the needs of the area. The specific details regarding committee members, composition, prioritization of projects, number of meetings, and publication of data may vary depending on the district and local governing bodies involved.

Committee Members: The committee responsible for deciding the projects in the districts may consist of representatives from various stakeholders such as local government bodies, municipal corporations, urban development departments, technical experts, and relevant government officials. The specific composition can vary from district to district based on local governance structures.

Composition Variation: There may be differences in the composition of committee members among various districts. The composition could be influenced by factors such as the size of the district, the complexity of urban infrastructure needs, and the involvement of different agencies or departments.

Prioritization of Area Needs: The prioritization of the area's needs is typically determined through a consultative process involving the committee members and local stakeholders. Factors considered for prioritization may include the urgency of infrastructure requirements, population density, socio-economic indicators, environmental considerations, and input from local government representatives and community members.

Meetings Held: The number of meetings held before project implementation



can vary depending on the district and the specific requirements of the projects. Typically, multiple meetings are conducted to discuss project proposals, assess feasibility, allocate funds, and monitor progress.

Publication of Data: The availability of data regarding committee members, project prioritization, meeting schedules, and non-utilization of funds can vary. Some states or districts may publish this information on their official websites, while others may rely on local print media such as vernacular newspapers or national dailies to disseminate project-related information.

Participation of Local Body Members: Local body members, such as municipal councillors or representatives from urban local bodies, often play a crucial role in the project selection, implementation, and evaluation process. Their involvement ensures that the projects align with the local needs and priorities, and they act as a bridge between the community and the decision-making process.

Non-Utilization of Funds: The amount of non-utilization of funds can vary from district to district. It is crucial for the committee and relevant authorities to track the utilization of allocated funds regularly and take necessary steps to address any underutilization issues. Detailed financial reports and audits are typically conducted to assess the utilization of funds and identify any discrepancies.

Suggestions for Improvement of AMRUT in Kerala

To improve the AMRUT projects in Kerala, several measures can be taken:

Efficient Project Planning: Emphasize detailed project planning, including accurate assessment of project requirements, timelines, and resources. Conduct comprehensive feasibility studies and ensure that projects are well-designed and aligned with the specific needs of the communities they serve.

Streamline Administrative Processes: Simplify and expedite administrative processes by implementing e-governance systems, reducing bureaucratic hurdles, and establishing single-window clearance mechanisms. This can help in faster approvals, permits, and clearances, reducing unnecessary delays.

Timely Fund Allocation: Ensure timely release of funds for projects to avoid financial constraints and enable smooth execution. Establish robust financial management systems that facilitate efficient allocation, monitoring, and disbursement of funds.

Enhance Stakeholder Engagement: Foster effective communication and engagement with local communities, residents, and other stakeholders. Conduct regular public consultations, provide project updates, address concerns, and seek feedback to build trust and ensure community support.



Capacity Building: Enhance the capacity of local agencies and stakeholders involved in project implementation. Provide training and technical assistance to improve their skills in project management, monitoring, and maintenance of infrastructure assets.

Transparent Procurement Processes: Implement transparent and fair procurement processes to ensure the selection of competent and experienced contractors. Emphasize the use of competitive bidding and performance-based contracts to attract qualified firms and enhance project delivery.

Project Monitoring and Evaluation: Establish robust monitoring and evaluation systems to track project progress, identify bottlenecks, and address issues in a timely manner. Regular site visits, progress reports, and performance assessments can help ensure projects stay on track.

Embrace Technology and Innovation: Explore the use of innovative technologies and digital solutions to enhance project efficiency, reduce costs, and improve monitoring and maintenance processes. Examples include using remote sensing, Geographic Information System (GIS) mapping, and real-time project monitoring tools.

Collaboration and Coordination: Foster coordination and collaboration among different government departments, agencies, and stakeholders involved in project implementation. Enhance interdepartmental coordination, communication, and information sharing to ensure seamless project execution.

Risk Management: Conduct comprehensive risk assessments and develop contingency plans to mitigate potential risks that could impact project timelines. This includes identifying and addressing environmental, social, and technical risks from the early stages of project planning.

By implementing these measures, the AMRUT projects in Kerala can be improved, leading to efficient project execution, timely completion, and enhanced benefits for the communities they serve.

Conclusion

The analysis of the AMRUT projects in Kerala demonstrates substantial progress in strengthening urban infrastructure and addressing the increasing demands of urbanisation. Significant achievements are evident in sectors such as Water Supply and Storm Water Drainage, where higher project allocations and implementation rates indicate proactive planning, effective resource utilisation, and the state's strong commitment towards urban transformation. At the same time, the study recognises the existence of several implementation challenges



that have contributed to project delays and operational inefficiencies. In this context, the simplification of administrative procedures, adoption of e-governance mechanisms, and establishment of single-window clearance systems are essential to accelerate project approvals and minimise bureaucratic constraints. Moreover, timely identification of land parcels and transparent land acquisition procedures can further facilitate smoother and more efficient project execution.

The study also provides important insights into the financial progress of Urban Local Body (ULB) Corporations and Municipalities, along with the expenditure patterns relating to Water Supply–Kerala Water Authority (WS-KWA) and Sewerage–Kerala Water Authority (SEW-KWA). The statistical findings reveal a homogeneous trend in expenditure among Corporations and Municipalities, indicating consistency in financial management practices and resource allocation across these urban institutions. Furthermore, Analysis of Variance (ANOVA) was employed to determine whether significant differences existed in the financial progress among Urban Local Bodies. The results of the ANOVA test confirm that the expenditure patterns of Corporations and Municipalities do not differ significantly, thereby reflecting a relatively uniform pattern of financial progress in the implementation of the AMRUT programme. Such consistency contributes to balanced urban development across major sectors including water supply, sewerage, storm water drainage, urban transport, green spaces, and parks.

The findings further emphasise the importance of stakeholder engagement and community participation in ensuring the successful implementation of AMRUT projects. Active public involvement through periodic consultations, transparent governance practices, and effective communication mechanisms can strengthen public trust, encourage community support, and ensure that local concerns and developmental priorities are adequately addressed. Such a participatory approach contributes to the creation of urban infrastructure systems that are more inclusive, responsive, and socially sustainable.

In addition, the study highlights the need for capacity building and technological integration to improve project efficiency and overcome technical and administrative challenges. Strengthening the institutional capabilities of implementing agencies through specialised training programmes can enhance project management and execution capacities. Simultaneously, the adoption of advanced technologies such as Geographic Information Systems (GIS), remote sensing techniques, and real-time monitoring systems can improve planning, supervision, maintenance, and overall project performance.



By prioritising these strategic measures, Kerala can effectively address existing implementation bottlenecks, ensure timely project completion, and optimise the utilisation of allocated financial resources. Such efforts will significantly contribute to sustainable urban development and improved living conditions across urban centres in the state, thereby reinforcing the broader objectives of the AMRUT mission. Overall, the study underscores both the achievements and the challenges associated with the implementation of AMRUT projects in Kerala and offers policy-oriented recommendations for enhancing efficiency, promoting inclusive development, and fostering resilient and sustainable urban growth.

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