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PLANNING AND DESIGNING OF RESIDENTIAL PROJECT ALONG WITH TECHNICAL ASPECTS OF PERMISSION

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Abstract: This thesis explores the importance of building approval plans, regulatory compliance, and sustainable urban development frameworks in the context of Maharashtra's planning regulations and the emerging role of Urban Digital Twins (UDTs). It examines the procedural, legal, and technical requirements for building permissions under the Maharashtra Regional and Town Planning Act, 1966, including documentation, zoning provisions, and safety standards. Special attention is given to risk-based categorization, online approval systems, and the integration of environmental clearances, fire safety norms, and structural stability certifications to ensure transparency, efficiency, and accountability in the approval process.

The research also investigates the contributions of UDTs in enhancing the sustainable performance of Public, Civic, Urban, and Recreational (PCUR) projects, with the Melbourne Greenline Project serving as a case study. Questionnaire results and focus group discussions highlight environmental, social, economic, and governance factors influencing sustainability, with stakeholder engagement, accessibility, and mobility ranking as top priorities. Findings reveal that UDTs add the greatest value during feasibility, planning, and design phases, while also supporting operational monitoring and adaptive management. However, challenges such as limited data availability, political complexities, and awareness gaps constrain widespread adoption.

By integrating traditional regulatory compliance with innovative digital frameworks, this study demonstrates how building permission systems and UDT applications together can promote resilient, transparent, and sustainable urban growth. The thesis concludes that collaborative governance, localized Sustainable Development Goals (SDGs), and staged implementation strategies are key to bridging the gap between conceptual potential and real-world practice.

Keywords: Building Approval, Urban Digital Twin (UDT), Maharashtra Regional and Town Planning Act, Sustainable Development, PCUR Projects, Greenline Project, Risk-Based Categorization, Building Permission System.

1.INTRODUCTION

Every man in this world has a dream to build his own house. It is seen as societal status to own a house that they have dreamt of. It is necessary for everyone to have knowledge on building process. Knowledge on building process helps them to (i) monitor construction of building (ii) check quality of materials used (iii) estimate number of days required for construction (iv) estimate on cost of building (v) reduce wastage of materials and thereby need to know about materials needed for construction and simple techniques involved in construction. In this lecture let us take a look on building process to be carried during construction. Now let us take an example of process involved in building a residential house which involves Selection of suitable location, Purchase of property, Survey and footprint of property, Accessibility of the project, Planning and designing of the home, Getting the Necessary Permits, Prepare an Estimated Cost Breakdown, Begin Construction, Complete Construction.

1.1 General

Construction planning is a fundamental and challenging activity in the management and execution of construction projects. It involves the choice of technology, the definition of work tasks, the estimation of the required resources and durations for individual tasks, and the identification of any interactions among the different work tasks. A good construction plan is the basis for developing the budget and the schedule for work. Developing the construction plan is a critical task in the management of construction, even if the plan is not written or otherwise formally recorded. In addition to these technical aspects of construction planning, it may also be necessary to make organizational decisions about the relationships between project participants and even which organizations to include in a project.

1.2 Planning and Design your own home

Architects and engineers have special training and years of experience in designing houses, and are necessary for most buildings. Regardless of whether you contract their services or elect to design your own, the house you build will be built for you, so you should be involved closely in the design process. Before you hire or consult an architect, find out what management services the firm may or may not provide. Some architecture firms will help hire contractors they know and trust, as well as consult and inspect the contractor's work as it progresses, making necessary revisions and additions as the work progresses. This can be a significant headache relief in the process. Before building, you'll need to submit plans to the city building commission for approval. Unless you're an experienced architect, it'll be very difficult to produce the necessary to-scale production drawings and engineering specs necessary for approval. To save time, energy, and money, it's recommended that you consult a professional and work alongside them to design the home. Design the living spaces: The fun part of designing a home is imagining your new life in your new space. Spend some time researching pre-drawn floor plans for inspiration and consider using them as a guide for your own space.

1.2.1 Choice of Technology and Construction Method

As in the development of appropriate alternatives for facility design, choices of appropriate technology and methods for construction are often ill-structured yet critical ingredients in the success of the project. For example, a decision whether to pump or to transport concrete in buckets will directly affect the cost and duration of tasks involved in building construction. A decision between these two alternatives should consider the relative costs, reliabilities, and availability of equipment for the two transport methods. Unfortunately, the exact implications of different methods depend upon numerous considerations for which information may be sketchy during the planning phase, such as the experience and expertise of workers or the particular underground condition at a site. In selecting among alternative methods and technologies, it may be necessary to formulate several construction plans based on alternative methods or assumptions. Once the full plan is available, then the cost, time and reliability impacts of the alternative approaches can be reviewed.

1.2.2 Estimating Activity Durations

All formal scheduling procedures rely upon estimates of the durations of the various project activities as well as the definitions of the predecessor relationships among tasks. The variability of an activity's duration may also be considered. Formally, the probability distribution of an activity's duration as well as the expected or most likely duration may be used in scheduling. A probability distribution indicates the chance that a particular activity duration will occur. In advance of actually doing a particular task, we cannot be certain exactly how long the task will require.

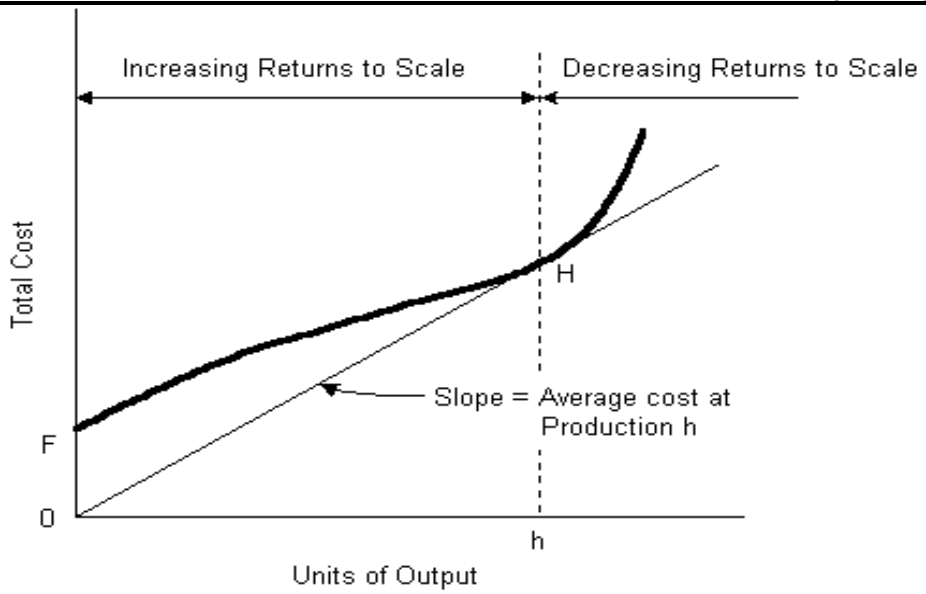
A straightforward approach to the estimation of activity durations is to keep historical records of particular activities and rely on the average durations from this experience in making new duration estimates. Since the scope of activities are unlikely to be identical between different projects, unit productivity rates are typically employed for this purpose. For example, the duration of an activity Dij such as concrete formwork assembly might be estimated as:

$$D_{ij} = \frac{A_{ij}}{P_{ij} N_{ij}}$$

where Aij is the required formwork area to assemble (in square yards), Pij is the average productivity of a standard crew in this task (measured in square yards per hour), and Nij is the number of crews assigned to the task. In some organizations, unit production time, Tij, is defined as the time required to complete a unit of work by a standard crew (measured in hours per square yards) is used as a productivity measure such that Tij is a reciprocal of Pij.

1.2.3 Innovation and Economic Feasibility

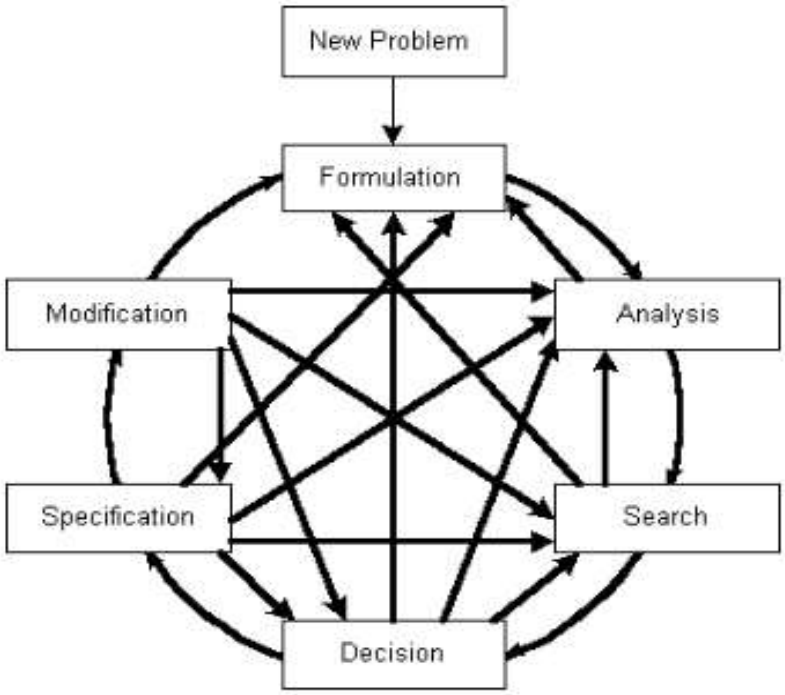
This relationship between the market demand and the total cost of production may be illustrated schematically as in Figure. An initial threshold or fixed cost F is incurred to allow any production. Beyond this threshold cost, total cost increases faster than the units of output but at a decreasing rate. At each point on this total cost curve, the average cost is represented by the slope of a line from the origin to the point on the curve. At a point H, the average cost per unit is at a minimum. Beyond H to the right, the total cost again increases faster than the units of output and at an increasing rate. When the rate of change of the average cost slope is decreasing or constant as between 0 and H on the curve, the range between 0 and H is said to be increasing return to scale; when the rate of change of the average cost slope is increasing as beyond H to the right, the region is said to be decreasing return to scale. Thus, if fewer than h units are constructed, the unit price will be higher than that of exactly h units. On the other hand, the unit price will increase again if more than h units are constructed.



Market Demand and Total Cost Relationship

1.2.4 Design Methodology

While the conceptual design process may be formal or informal, it can be characterized by a series of actions: formulation, analysis, search, decision, specification, and modification. However, at the early stage in the development of a new project, these actions are highly interactive as illustrated in Figure.Many iterations of redesign are expected to refine the functional requirements, design concepts and financial constraints, even though the analytic tools applied to the solution of the problem at this stage may be very crude.



The series of actions taken in the conceptual design process may be described as follows:

Formulation refers to the definition or description of a design problem in broad terms through the synthesis of ideas describing alternative facilities.

 Analysis refines the problem definition or description by separating important from peripheral information and by pulling together the essential detail. Interpretation and prediction are usually required as part of the analysis.

 Search involves gathering a set of potential solutions for performing the specified functions and satisfying the user requirements.

 Decision means that each of the potential solutions is evaluated and compared to the alternatives until the best solution is obtained.

 Specification is to describe the chosen solution in a form which contains enough detail for implementation.

 Modification refers to the change in the solution or re-design if the solution is found to be wanting or if new information is discovered in the process of design.

1.2.5 Geotechnical Engineering Investigation

Since construction is site specific, it is very important to investigate the subsurface conditions which often influence the design of a facility as well as its foundation. The uncertainty in the design is particularly acute in geotechnical engineering so that the assignment of risks in this area should be a major concern. Since the degree of uncertainty in a project is perceived differently by

different parties involved in a project, the assignment of unquantifiable risks arising from numerous unknowns to the owner, engineer and contractor is inherently difficult.

Design of a tie-back retaining wall

The tie-back retaining wall was designed to permit a cut in a hillside to provide additional space for the expansion of a steel-making facility. Figure shows a cross section of the original hillside located in an urban area. Numerous residential dwellings were located on top of the hill which would have been prohibitively costly or perhaps impossible to remove to permit regrading of the hillside to push back the toe of the slope. The only realistic way of accomplishing the desired goal was to attempt to remove the toe of the existing slope and use a tie-back retaining wall to stabilize the slope.

1.2.6 Value Engineering

The use of value engineering in the public sector of construction has been fostered by legislation and government regulation, but the approach has not been widely adopted in the private sector of construction. One explanation may lie in the difference in practice of engineering design services in the public and private sectors. In the public sector, the fee for design services is tightly monitored against the "market price," or may even be based on the lowest bid for service. Such a practice in setting professional fees encourages the design professionals to adopt known and tried designs and construction technologies without giving much thought to alternatives that are innovative but risky. Contractors are willing to examine such alternatives when offered incentives for sharing the savings by owners. In the private sector, the owner has the freedom to offer such incentives to design professionals as well as the contractors without being concerned about the appearance of favouritism in engaging professional services.

1.2.7 Construction Planning

The estimate stage involves the development of a cost and duration estimate for the construction of a facility as part of the proposal of a contractor to an owner. It is the stage in which assumptions of resource commitment to the necessary activities to build the facility are made by a planner. A careful and thorough analysis of different conditions imposed by the construction project design and by site characteristics are taken into consideration to determine the best estimate. The success of a contractor depends upon this estimate, not only to obtain a job but also to construct the facility with the highest profit. The planner has to look for the time-cost combination that will allow the contractor to be successful in his commitment. The result of a high estimate would be to lose the job, and the result of a low estimate could be to win the job, but to lose money in the construction process. When changes are done, they should improve the estimate, taking into account not only present effects, but also future outcomes of succeeding activities. It is very seldom the case in which the output of the construction process exactly echoes the estimate offered to the owner.

In the monitoring and control stage of the construction process, the construction manager has to keep constant track of both activities' durations and ongoing costs. It is misleading to think that if the construction of the facility is on schedule or ahead of schedule, the cost will also be on the estimate or below the estimate, especially if several changes are made. Constant evaluation is necessary until the construction of the facility is complete. When work is finished in the construction process, and information about it is provided to the planner, the third stage of the planning process can begin.

1.2.8 Computer-Aided Engineering

Computer graphics provide another pertinent example of a potentially revolutionary mechanism for design and communication. Graphical representations of both the physical and work activities on projects have been essential tools in the construction industry for decades. However, manual drafting of blueprints, plans and other diagrams is laborious and expensive. Stand alone, computer aided drafting equipment has proved to be less expensive and fully capable of producing the requiring drawings. More significantly, the geometric information required for producing desired drawings might also be used as a database for computer aided design and computer integrated construction. Components of facilities can be represented as three dimensional computer based solid models for this purpose. Geometric information forms only one component of integrated design databases in which the computer can assure consistency, completeness and compliance with relevant specifications and constraints. Several approaches to integrated computer aided engineering environments of this type have already been attempted.

Computers are also being applied more and more extensively to non-analytical and non-numerical tasks. For example, computer based specification writing assistants are used to rapidly assemble sets of standard specifications or to insert special clauses in the documentation of facility designs. As another example, computerized transfer of information provides a means to avoid laborious and error-prone transcription of project information. While most of the traditional applications and research in computer aids have emphasized numerical calculations, the use of computers will rapidly shift towards the more prevalent and difficult problems of planning, communication, design and management.

1.3 Objectives of the Present Study

The aim of this research is to analyse the resource constraint factors influencing planning and designing of residential project with in construction projects. Only construction projects in India are considered for this study. The Potential in construction site are identified from the literature survey and experts opinions.

The aim of this research is divided into the following objectives:

1. To identify the factors causing time Planning and designing of construction projects.
2. To determine the causes of relative importance of the factors and management factors owners, consultants and contractors perceptions of the construction projects.
3. To evaluate the degree of planning and designing, analyse and develop a model to depict the relationship between influential Overseeing factors and Potential risks.
4. To formulate the recommendations to reduce the Potential risks of construction projects through planning and designing so as to improve the performance of the construction projects.

1.4 Scope of the Research

This Research / Study illustrates the evaluation of high potential planning and designing during managing construction projects.

Prior to embarking on any study, it is necessary to define the scope and to plan its implementation in operational terms as if it were a project in its own right. The aim is to provide a clear explicit shared understanding of the process that will be implemented. The tasks required to accomplish this aim are the production of a scope document and a plan document.

2.0 LITERATURE REVIEW

One of the most important problems in the construction industry is managing the Project risk. Project risk in every construction project and the magnitude of these delays varies considerably from project to project. So it is essential to define the actual causes of Project risk and managing those in any construction project. This chapter discusses about the literatures under the following heads: Project risk, types of risks, causes of risks, resource related factors causing managing, data analysis and inference from literature survey.

2.1Project Planning and Scheduling for residential level Project.

Varalakshmi.V (2014): This project designed a G+5 storey residential building's various components such as foundation, column, beam and slab. The loads, namely dead load and live load, were calculated in accordance with IS 875(Part I II) and HYSD bars, namely Fe415, were used in accordance with IS-1986 and IS- 1985. They came to the conclusion that the safety of a RCC is determined by the initial architectural and structural configuration of the entire structure, the quality of the structural, design, and reinforcement detailing of the building frame to achieve element stability and ductile performance.

S. Harish and L. Ramaprasad Reddy (2017): This paper was discussed briefly entire structure from top to bottom required parameters of foundations, different types of columns different shapes of beams. The design of storage building are taken as different methods limit state and working stress method based upon on the experimental results. Planning and designing are also used in various software like Auto Cad. In this case learned about particular thing is design in right track for calculation.

R.D. Deshpande (2017): This project makes an attempt to view the construction working of varied elements in the multi-storied building. Designing and scheming and evaluation of multi-storied building has been done for G+2 building. According to material properties the loads are calculated is taken from code IS 875 part-II and piles are schemed based on protected bearing capacity of soil.

Atika Pathan, Nidhi Sonavane and Praduman singh (2021): In this project on "Design of a 6-storeyed building". An Residential building design was performed as Auto cad and Staad-pro software. The building comprises structures for the superstructure and concrete for substructure. This design was safe and can be implemented. Also, a market survey was undertaken for the market rates of various materials and activities on different construction sites.

Housing quality was not only an important driver for resident satisfaction and neigh borhood perception but also a robust predictor of quality of life **(Lee & Park, 2010**). **A. Mukhopadhyay and Rajaraman (2012)** argue that improving housing infrastructure has the potential to yield significant economic and social benefits in rural areas, making it an essential investment. By incorporating resident needs, sustainability principles, and cost effectiveness, affordable housing projects can provide more comfortable and desirable living environments **(Nor Haniza Ishak et al., 2016).**

Residents'health and well-being are greatly impacted by the condition of their housing. Enhancing physical and mental health and general well-being are benefits of better living conditions, which include adequate lighting, ventilation, and access to facilities **(Wimalasena et al., 2022)**.Early rural communities in India had enough lighting, ventilation, and housing accessibil ity; however, these services were gradually inadequate as the population increased **(Tyagi et al., 2023a, b).** The overall standard of life and well-being of rural residents are positively impacted by improved housing settings. Reducing energy use, improving access to essen tial services, and improving resource efficiency may all result from higher-quality housing, which helps rural communities live more sustainably. Self-help housing projects are a via ble solution for low-income populations, focusing on empowering communities, affordabil ity, and sustainability **(Jobe & Williams, 2016).**

3.0 METHODOLOGY

3.1 General

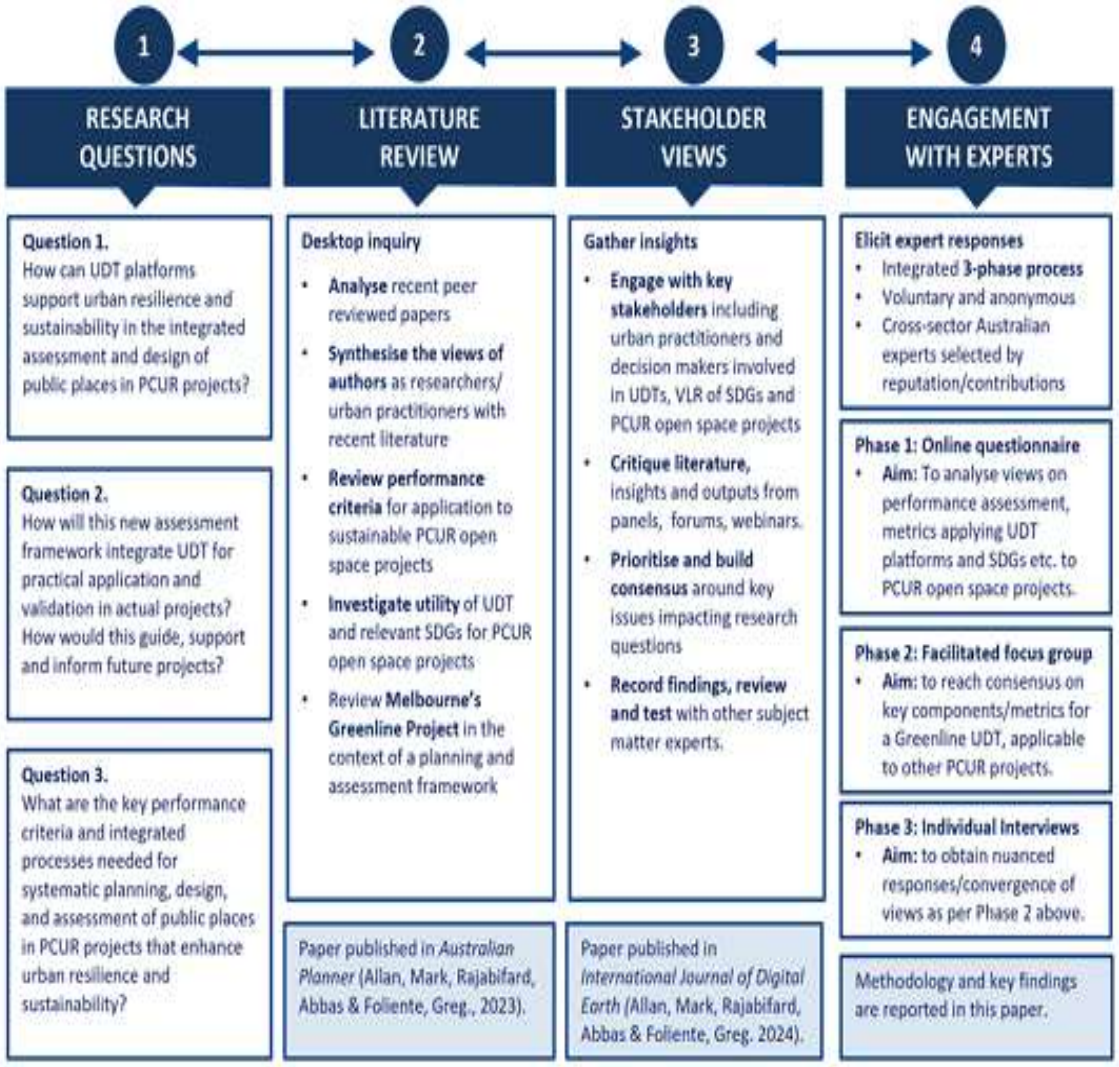
The research methodology selected comprised a comprehensive literature review, a postal questionnaire to the construction industry practitioners, a statistical analysis of the systematic exploration. It is organized in sections covering: the formulation of the objectives of the study, identification of the resource constraint factors and questionnaire design, data collection using the questionnaire survey, data analysis by the descriptive statistical analysis, identification of critical factors using the factor analysis test, its validation, scenario analysis, and findings and conclusion.

3.1.1 Study Area selection

In this section, we will show a substation renovation engineering project to illustrate the proposed approach to solving the problem. And we try to investigate the impact of the risk interdependence on the expected utility, costs of implementing strategies selection over specific area through planning and design. For validation and application, the proposed hybrid model is applied to a buildings, bridges and various infra structure construction project located around in India especially at Maharashtra. The residential construction project is selected because of two reasons. Firstly, the project information is much detailed, thereby providing data support for the proposed model. Secondly, the project complexity is moderate, thereby helping in discovering problems in the model.

3.2 Strategic Project Management for Planning and Design

Construction project management comprises strategic project management and operational project management. Strategic project management is centered on system design and provides a basis for determining major targets. Therefore, it is the management actions that are incorporated into a project in order to meet a strategic objective of a project by adjusting time, cost, resources and target. In contrast, operational project management is concerned mainly with the steps.



Research workflow (adapted from Ameen and Mourshed, 2019; Researcher Life, 2024)

Research workflow Methods and findings are part of broader applied research into performance-based sustainable urban regeneration programs and the SDGs applying spatial data analytics. The four-stage research workflow illustrated, adapts published research processes (Ameen and Mourshed, 2019; Researcher Life, 2024). The aim is to gather theoretical and practical insights relevant to the research questions and to identify a convergence of perspectives. The workflow involves four integrated stages, 1) Research Questions, 2) Literature Review, 3) Stakeholder Views and 4) Engagement with Experts. This article presents only findings from stage 4 to avoid duplicating earlier outcomes already covered in previous publications (Allan et al., 2023; Allan et al., 2024). The fourth stage engages experts across three integrated data collection phases; capturing stakeholders and experts' views via: phase 1: an online questionnaire, phase 2: a facilitated focus group and phase 3: a series of individual interviews. Participation in all three activities was voluntary, adopting non-identifying personal information

processes to maintain privacy and data security. Invited experts were identified through publications, professional contributions and or by reputation, most participants were from Australia. They included industry practitioners, Greenline Project stakeholders and those involved in applied research from private and public sector firms and institutions and gov ernment and Nongovernment Organisations (NGOs). The majority of respondents to all three phases held a high level of seniority, for the questionnaire over 74% indicating they were either at the level of CEO/ Owner/Director/Professor or Senior Executive/Senior Officer/Associate Professor. Table 2 summarises the number of participants, their sector and professional/specialist disciplines involved across all three phases of stage 4. Not all participants had the same level of familiarity with UDT technology or expertise in PCUR projects. To facilitate participation by individuals from different backgrounds in all three phases (survey, focus group and interviews) concise descriptions of exemplar UDTs and PCUR projects were provided at each session. Participation in any previous phase was not a precondition of involvement, and this background in formation also assisted here. Background descriptions and examples of PCUR projects (Q13) and UDTs (Q7) and links to further information were included in the online questionnaire.

Phase 1: Online questionnaire

An invitation to complete an anonymous online questionnaire was received by 186 practitioners. Participants were asked to self-identify their sector and professional discipline/specialty from a list of options provided or specifically nominate one (other) if their expertise was not included. The online survey was open for a total of 4 weeks (22- February-22 March 2024) it took approximately 15 minutes to answer 22 questions. The questions were a combination of multiple choice, dichotomous (yes-no), scaling (extent of agreement-disagreement),ranking (in priority order) and open questions. A total of 86 participants commenced, 79 fully or partially completed the questionnaire with a total of 70 answering all 22 questions. For consistency only those (70) responses containing answers to all (22) questions are presented here. The questionnaire sought respondents' views on UDTs, the SDGs and applications to sustainable design and assessment of PCUR projects. The published questions are provided in full in Appendix B. Based on the response we received, the following are the rating and ranking:

1.Are there differences between the site area and the construction project plan area?	Yes	Yes	Yes	High	3
2. Are there discrepancies between the design plans and the actual implementation on the site?	Yes	Yes	Yes	High	4
3. Is the road leading to the site not present, as indicated in the project plan?	No	No	Yes	Moderate	15
4. Lack of a previously approved plan for reference in the construction project?	Yes	No	No	Moderate	16
5. The project site does not have MRTP rules available?	No	No	No	Low	22
6. During construction, non-availability of resource on site?	No	Yes	No	Moderate	17
7. Does the construction process fail to take into account structural considerations, or structural norms?	Yes	Yes	Yes	High	7
8. The site does not have a water connection facility available?	No	Yes	No	Moderate	18
9. Do the project layout plan and the on-site layout differ from one another?	Yes	Yes	Yes	High	6
10. Does the public not have easy access to construction plans?	No	No	No	Low	20
11. Does the construction not comply with the UDCPR regulations?	Yes	Yes	Yes	High	5
12. Does the site have all the NOCs?	No	No	Yes	Moderate	14
13. Does the process of obtaining building approval take longer than necessary?	Yes	Yes	Yes	High	2
14. Is a risk-based category being built upon according to the correct process?	No	Yes	No	Moderate	19
15. Is the planning not done in accordance with reservations or DP zones?	Yes	Yes	Yes	High	9
16. Do the amenities, ventilation, and availability of all necessities not meet standards and regulations?	Yes	Yes	Yes	High	8
17. Does the building approval process get finished in the allotted time?	No	Yes	No	Moderate	12
18. The online building permission process, which includes online checking standards in accordance with regulations, will facilitate early submission?	Yes	Yes	Yes	High	1
19. Do all of the documents required for building approval get overlooked?	No	No	Yes	Moderate	13
20. Does the location not have the lift installation available as planned?	No	No	No	Low	21
21. Building documents and a No-Objection Certificate (NOC) are not being fulfilled in accordance with the rules, are they?	Yes	Yes	Yes	High	10

22. Are the delays in the construction process causing problems for the citizens?	Yes	Yes	Yes	High	11

Phase 2: Facilitated focus group

Invitations were issued via the Eventbrite platform to 48 expert urban practitioners, researchers and Greenline Project stakeholders located in Melbourne, Australia to attend a facilitated workshop. The session ran for 2.5 hours (9.00am-11.30am) on Thursday 29 August 2024, the venue was the City of Melbourne's onsite Greenline Hub located on River Terrace in central Melbourne, 20 acceptances were received with 17 attending on the day. The workshop utilized a propriety process the Rapid Consensus TM model (Nuttal, K., 2025). The aim for the session was for consensus to be reached as a group on all questions following discussion at tables of 5-6 experts. Questions were discussed in turn in small groups at each table and fed back to the room. The facilitator captured responses from tables on butchers' paper before workshopping with the entire group to reach consensus.

Phase 3: Individual interviews A total of 17 individual interviews were conducted with subject matter experts invited to participate either online or in person. The interviews were voluntary, each took approximately 30 minutes and were completed over 4 weeks in November 2024. Several but not all had participated in phase 1 (questionnaire) and phase 2 (focus group). A concise background briefing was provided at the commencement of each interview using PowerPoint slides. This was to ensure that all attendees had sufficient information to be able to fully participate. Participants were encouraged to express their views freely and to provide in-depth nuanced responses. Ethics approval This research project was undertaken in accordance with Human Ethics Approval dated 19 February 2024 granted by the University of Melbourne, Office of Research and Integrity.

4.0 RESULTS AND DISCUSSION

4.1 General

This chapter deals about the researching an importance of building approval plans and other objective fulfilling factors. To ensure legal compliance and prevent legal liabilities. To maintain standards of quality and safety throughout the construction project. To help identify and mitigate potential risks associated with the project. To facilitate effective communication and coordination among all stakeholders involved in the project. Detailed and comprehensive approval plans help construction projects proceed smoothly and efficiently. To minimize the potential for legal liabilities and other issues. Additionally it shows the direction of how do we get building approval? Preparation of detailed building plans, including design elements, structural requirements, and technical specifications, by architects and engineers. Submission of plans to the local municipality or regulatory authority responsible for building approvals. Review of plans by regulatory authorities to ensure compliance with building codes, zoning regulations, and safety standards. Revisions or modifications of plans, if required, followed by resubmission for further review. Approval of plans by regulatory authorities, leading to the issuance of construction permits. The construction phase begins once the permits are issued, and all requirements are met.

The documents to be required for building permission are listed: Key Plan (Location Plan), (to be shown on first copy of the set of plans). Site Plan showing the surrounding land and existing access to the land proposed to be developed; (to be shown on first copy of the set of plans). A detailed building plan showing the plan, section/s and elevation/s of the proposed development. Work along with existing structure to be retained / to be demolished, if any; Particulars of development in Form enclosed (excluding individual Residential building); Copy of sanctioned layout plan if any; An extract of record of rights(7/12), property register card (any other document showing ownership of land to be specified). Attested copy of receipt of payment of scrutiny fees; Latest property tax receipt; No Objection Certificate(s), wherever required i.e Fire NOC, Environment clearance. Non Agriculture permission from collector. **Ameen and Mourshed, 2019; Researcher Life, 2024** The research results offer insights into developing a UDT framework to enhance the sustainable performance of PCUR projects, using the Greenline Project as a case study. A summary of results from the questionnaire and observations from the focus group highlights perspectives from government, research and industry practitioners to the following aspects. Contributions and usefulness of environmental, social, economic, mobility and governance factors relating to sustainability. Overall contributions of an UDT to sustainable performance during each project phase. Barriers/constraints to UDT implementation and key actions to address these. The comparative results of the questionnaire are represented as bar graphs illustrating the top responses and priority rankings. Focus group commentary on these comparative results (Environmental, social, economic and governance factors) and Table 4(UDT capabilities, barriers/constraints and actions).

4.2 Planning and design along with Management factors

4.2.1. Environmental factors

For the five environmental factors presented, the majority of respondents rated physical environmental attributes (ecosystem, habitat, trees and water conservation management) as extremely important, ahead of energy related factors. These results, respondents also nominated some other factors which were primarily socio-economic. Responses regarding the usefulness of real time environmental data to support sustainable design and project assessments. There was limited variance across factors identified as 'extremely useful.' The relatively low rating for 'biodiversity and habitat' likely reflects an absence of readily available data in this category.

4.2.2. Social factors

The results in relation to the importance of social factors. Accessibility for all and rates of accidents or crime rated as more important than physical and mental health, and culture and First Nations connections. The comparative usefulness of real time social data in support of sustainable design and assessment of projects. The results indicate that real time data related to the movement of people associated with public transport and events is considered most useful, noting existing infrastructure is already in place across the City of Melbourne to collect and publish this data.

4.2.3. Economic factors

The importance of the four economic factors is shown comparatively. The two most significant economic factors, investment and activity and property values, rated as less important than accessibility to public transport and event space.

4.2.4. Governance factors

The top three priority rankings for governance factors deemed most important for the sustainable performance of PCUR public open space projects are summarised with 'stakeholder engagement' as the top priority. Next most important were people-centric processes directly affecting or involving citizens and stakeholders, with factors related to policy and advice seen as less important. A

summary of focus group observations and commentary on expert participants' comparative responses regarding environmental, social, economic and governance factors.

4.2.5. Contributions of an UDT to PCUR public open space projects

The comparative priority rankings of UDT contributions to six common project phases. The largest contributions were identified at both ends of the project lifecycle, with the feasibility, planning and design phases ranked first, followed by the operations and management phase. In contrast, the mid-project phases, such as, post- completion evaluation and completion and hand-over, were identified as making significantly lower contributions. Illustrates those outputs from a UDT considered by respondents to have the highest contribution to the overall sustainability of PCUR public open space projects. Those applications rated as most impactful related to the interactive human related activities, engaging, simulating and collaborating, with more technical focused uses making a lessor contribution.

4.2.6. Contributions, barriers, constraints and actions

The comparative survey results for barriers (obstacles or challenges) constraints (limitations or restrictions). Respondents identified 'Data availability' as the biggest barrier to UDT implementation with 'communications and engagement,' least challenging. 'Awareness of the benefits and limitations' of UDT deployment was identified as the largest constraint with project related factors (deadlines and benchmarks) least restrictive. Summarizes a convergence of views from the focus group in relation to comparative contributions, barriers, constraints and actions related to the Greenline Project as a UDT case study.

4.2.7Approvals of Building Permission Based on Risk Based Categorization

Sr. No.	Parameters to be considered for Risk Base	Risk Category	
		Low Risk Category	Moderate Risk Category
1.	Plot area	Building on a Plot Area upto 150 Sq.m	Buildings on a Plot Area more than 150 Sq.m. and upto 300 Sq.m
2.	Plot status	Plot should be from sanctioned layout released for construction or regularised under Gunthewari Act, if plot is from congested area / gaothan it should have undivided original City Survey Number / original Property Card Number / Independent 7/12 abstract. (Plot should not be from unauthorised sub-division.	Plot should be from sanctioned layout released for construction or regularised under Gunthewari Act, if plot is from congested area / gaothan it should have undivided original City Survey Number / original Property Card Number / Independent 7/12 abstract. (Plot should not be from unauthorised sub-division.)
3.	Buildability of Plot	Plot should be buildable in view of the provisions	Plot should be buildable in view of the provisions
4.	Zone in Development Plan	Residential or Commercial Zone or in a zone wherein Residential development is allowed.	Residential or Commercial Zone or in a zone wherein Residential development is allowed.
5.	Type of Building	Residential or Residential with shop on ground floor.	Residential or Residential with shop on ground floor or mixed use.
6.	Front, side and rear open spaces, access, parking and other requirements.	As per the provisions of UDCPR.	As per the provisions of UDCPR.
7.	Storeys allowed	G. F. + 2 or Stilt + 3 floors.	G. F. + 2 or Stilt + 3 floors.
8.	FSI	Construction should be within basic FSI + Premium FSI along with ancillary area FSI thereon	Construction should be within basic FSI + Premium FSI along with ancillary area FSI thereon

9.	Submission of Application for approval.	Applicant shall submit the intimation letter as per Appendix K-1 along with i) Ownership document. ii) Copy of approved layout showing plot / measurement plan of plot. iii) Building plan showing periphery of construction (P-line) floor wise and details of property, FSI calculation as mentioned in Proforma-I with the signature of owner and licensed personal. iv) Copy of receipt of development charges including labour cess paid to Authority, if any v) The certificate of licensed personal stating that the proposal is strictly in accordance with the provisions of UDCPR. No more details shall be necessary.	Applicant shall submit the application as per UDCPR and all required document shall be certified and signed by the licensed personal. The licensed personal shall also submit the certificate stating that the proposal is strictly in accordance with the provisions of UDCPR.
10.	Issue of Commencement Certificate/ Approval	The receipt of application along with the required documents and fees / charges mentioned in 9 above, by the authority shall be treated as permission for development.	After receipt of the application, the Demand Note regarding payment of Development Charges and other Charges based on the proposed Plans/ Drawing submitted, shall be given by the concerned Engineer of the authority within 10 days. After the receipt of payment, the Authority shall issue Commencement Certificate within 10 days from receipt of such plans without any scrutiny, solely based on the certificate of the licensed personal.
11.	Plinth Checking	Plinth Checking shall not be required	Plinth Checking shall not be required
12.	Occupation Certificate	After completion of the work, the owner shall intimate to the Authority about the occupation of the building.	Licensed personal shall submit the completion certificate in Appendix - H to the Authority. The licensed personal shall not issue the completion certificate unless the construction is completed strictly as per plan. The Authority shall issue the occupation certificate within 10 days after site inspection.
13.	Other Stipulations.	----	Any deficiency of documents or payments as per UDCPR shall amount to unauthorised construction and shall be liable for action under the provisions of the Act.

4.3 Maharashtra Regional and Town Planning Act, 1966

These regulations shall apply to the building activities and development works on lands within the jurisdiction of all Planning Authorities and Regional Plan areas except Municipal Corporation of Greater Mumbai,other Planning Authorities / Special Planning Authorities / Development Authorities within the limit of Municipal Corporation of Greater Mumbai, MIDC, NAINA, Jawaharlal Nehru Port Trust, Hill Station Municipal Councils, (1) Chikhaldara notified area (consisting Chikhaldara Hill Station M.C. & four villages) Ecosensitive / Eco-fragile region notified by MoEF & CC, and Lonavala Municipal Council in Maharashtra.

Following other zones shall be treated as equivalent to Residential zone.

i) Residential Zone - (R1)
ii) Residential Zone with Shop line - (R-2)
iii) General Residential Zone.
iv) Residential Zone - R-2 (1) (----)
v) Residential Zone - (2) R-3 and R-4, with payment of (2) infrastructure cost as decided by the Authority.
vi) Urbanisable Zone.
vii) Special Residential Zone.
viii) Pre-dominantly Residential Zone.
ix) Slum Improvement Zone.
x) Low Density Residential Zone in Development Plan of Jalgaon.
xi) Mix use Zone.
II) Low Density Residential Zone.
III) Future Urbanisable Zone

RESIDENTIAL ZONE - R-1

(Residential Zone R1 includes Residential plots abutting on roads below 9.0 m. in width in congested area shown on the Development Plan and on roads below 12.0 m. in width in outside congested area (i.e. in non-congested area)). (In case of C Class M.C.s, Nagarpanchayats and R.P. areas, the above road width of 12.0 m. shall be 9.0 m. in non-congested area).

RESIDENTIAL ZONE R-2

(Residential Zone R-2 includes Residential plots abutting on roads having existing or proposed width of 9.0 m. and above in congested area and 12.0 m. and above in non-congested area). (In case of C Class M.C.s, Nagarpanchayats and R.P. areas, the above road width of 12.0 m. shall be 9.0 m. in non-congested area).

Following is the time limit for approval

1. Building permission/Commencement certificate -60 DAYS
2. Plinth certificate -07 DAYS
3. Full Occupancy -21 DAYS
4. Zone plan -07 DAYS
5. Part plan -03 DAYS

4.4 Procedure for Building Permission

Procedure:

 Register Applicant/Architect logs into the system and fill in the application form (Appendix F-1) and submits the form
 E-KYC of Owner is then done by sending the OTP number on registered mobile number.
 Application is generated which needs to be printed and signed and scanned as pdf for further uploading in the system
 Applicant/Architect then fills in details of the proposal, upload the necessary documents/credentials needed for the proposal and submits the proposal.
 Applicant then pays the scrutiny fees/processing fees required for scrutiny.
 This proposal now goes in for two levels of scrutiny. First Level scrutiny will be done by Assistant Town Planner/Municipal Engineer and second will be done by the Chief Officer.
 The ATP/Municipal Engineer verifies the documents uploaded by the applicant.
 Once the documents/drawings are verified, site visit is done for the proposal. Engineer/ATP himself go for site visit inspection and fill in the questionnaire drafted for site visit of Building Permission.
 Consolidated Scrutiny is also performed based on the comparison of drawings uploaded, the proposal details and the DC rules.
 On successful inspection, the application is verified with remarks and then is forwarded to the Chief Officer (CO) for further round of inspection.
 CO will re-verify all the documents and the Scrutiny inspection report of the proposal.
 CO will check for any concession/relaxation requested and check whether to allow for any concession/relaxation on the proposal.
 Once the proposal is approved, the applicant needs to pay the other approval charges (Development charges, labour cess etc.)
 On post approval payment, the CO will check and digitally sign the Building Permission certificate.
 Applicant can print the digitally signed Building Permission Certificate online through the portal.
 This procedure right from application to approval of building permission should take 30 working days as per the government regulations

4.5 Online System for Building Permission

4.5.1 Document Checklist

Document List	Mandatory / Optional
XML File	Mandatory
TP File	Mandatory
Original Sale Deed /Lease Deed/Power of attorney/enabling ownership document	Mandatory
V.F. No 7/12 extract or CTS Card show of area holding	Mandatory
Tax Receipt / Assessment copy of current year	Mandatory
Certified copy of approved Sub Division /Amalgamation/layout of land from concerned authority	Mandatory
Certified Copy of Measurement Plan of Plot /Layout plan	Optional
Statement of area of holding	Optional
Affidavit From Owner Regard To Area on plan	Optional
Affidavit From Architect/Engineer/Supervisor/Structural Designer	Optional
NA Order	Optional
Third party interest created by way of agreement of sale or mortgage etc.	Optional
Is land leased by Government or local authorities? If YES, Attached NOC of Government or local authority	Optional
Proposed Plan	Mandatory

4.5.2 Checklist for Site Visit

 After receiving the application Online, the file will be transmitted to Assistant Town Planner or Municipal Engineer, who is assigned randomly by computer from the pool of inspectors for Site Inspection.

 The inspector will “plan a site visit” schedule.

 The date and time will be intimated to the applicant through SMS. On the scheduled date and time, the Site Inspector shall conduct the inspection as per the checklist enclosed and upload the Inspection Report within 24 hours.

 The inspector will check the lat-long co-ordinates mentioned in the application and verify the same on-ground.

 The inspector shall take photographs of the site and surroundings and the report has to be uploaded into BPMS within 24 hours.

 The applicant can view the site visit report at any time by clicking the “site visit report” button available in his/her console. Even the citizens can also view this from the Dashboard of BPMS Website.

 The Inspection has to be completed within 3 working days from the date of receipt of application. The Inspector will use the prescribed checklist.

 Model Site Inspection checklist is given below for the reference of the applicant.

 Site Visit Checklist for Building Permission.

Sr. No.	Scrutiny Questions	Answer Options		Remarks
BUILDING PERMISSION				
1	Is the location as per approved layout of Town and Country Planning Department	Yes	No	
2	Verification of the boundaries as per plan & as on ground position	Tally	Not Tally	Remarks if Not Tallied
3	Ownership of Approach Road	Public Road	Private Road	
4	Nature of Approach Road:			
	a) Kaccha	Yes	No	
	b) Water Bound Macadam (WBM)	Yes	No	
	c) Bituminous (BT)	Yes	No	
	d) Cement Concrete (CC)	Yes	No	
5	Are there any Services over approach road			
	a) Drains	Yes	No	
	b) Storm Water drains	Yes	No	
	c) Telephone wires	Yes	No	
	d) Electricity	HT Lines (33 KV)	LT Lines (11 KV)	
6	Nature of Proposed Site:			
	a) Site Topology: Slope of the site?	1.5	more	

Sr. No.	Scrutiny Questions	Answer Options		Remarks
	b) Plain Land	Yes	No	
	c) Undulated	Yes	No	
	d) Rocky Terrain	Yes	No	
7	Are there any old structures existing on site:			
	a) No Structures	Yes	No	
	b) Temporary Structure	Yes	No	Remarks if Yes
	c) Permanent Structure	Yes	No	Remarks if Yes
8	Is site within the vicinity of structure identified by the archaeological department?	Yes	No	
9	Nature of Water Body:			
	a) Nala	Yes	No	
	b) Canal	Yes	No	
	c) Lakes	Yes	No	
	d) Streams	Yes	No	
10	Does proposed site falls under Restricted Zone like Defence Area/ Air Funnel Zone/ CRZ Area/ Blue line/ Red Flood Line etc.	Yes	No	Remarks if Yes
11	Are there any trees on the site?	Yes	No	
12	Are the trees going to be demolished?	Yes	No	Remarks if Yes
13	Is the site covered by:			
	a) Temple	Yes	No	
	b) Religious Structures	Yes	No	
	c) Open Well	Yes	No	
	d) Graveyard	Yes	No	
	e) Heritage Structure	Yes	No	
14	Is site filled with offensive material like carcasses excreta?	Yes	No	Remarks if Yes
15	Is there proper sanitation on the site?	Yes	No	Remarks if No

A development plan is a document which details the overall strategy of the council for the proper planning and sustainable development of an area and generally consists of a written statement and accompanying maps. The plan usually includes the broad

aims of the council for specific topics, e.g. housing, infrastructure, community facilities which are reinforced by more detailed policies and objectives

5.0 CONCLUSION

This study highlights the critical role of building approval plans, regulatory frameworks, and sustainable planning practices in shaping safe, efficient, and future-ready urban development. The analysis of approval procedures under the Maharashtra Regional and Town Planning Act, reinforced the importance of adhering to zoning norms, land-use regulations, and documentation protocols to ensure legal compliance, safety, and accountability. The comprehensive step-by-step procedure for building permissions, supported by digital platforms and risk-based categorization, demonstrates the government's efforts to streamline the approval process, enhance transparency, and minimize delays.

On the construction side, the thesis also examined structural safety standards, environmental clearances, fire safety norms, and zoning-based FSI regulations, all of which are indispensable in ensuring quality, safety, and resilience of built environments. The integration of recreational and amenity spaces within residential societies further illustrates the shift towards human-centric urban design that promotes health, inclusivity, and community well-being.

In conclusion, the thesis underscores that urban development today must strike a balance between regulatory compliance, technological innovation, and sustainability objectives. Efficient building permission systems coupled with UDT-enabled planning and monitoring frameworks provide a pathway towards resilient, transparent, and sustainable cities. While challenges remain in implementation, the combined efforts of policymakers, practitioners, researchers, and communities can ensure that urban growth aligns with global sustainability goals, delivering safe, livable, and future-ready spaces for all.

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