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Module: **Project Management**

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BA (Hons) Leadership and Management Skills in the Workplace

Part C (project management plan): 2500 words

Part B (Reflection on Feedback)500 words

Part A (Poster)

NOTE (citation, links, references, and the front page words must not be added to the word count, please thank you)

Part C

project management plan 2500 words

INTRODUCTION

This Project Management Plan (PMP) serves as the primary communication and execution tool for the Smart City IoT Network Project. Developed for the project sponsor, key municipal stakeholders, and the core delivery team, this document outlines the management processes, methodologies, and controls that will be used. The goal is to provide a comprehensive roadmap from project initiation through execution to final operational handover. This PMP incorporates standard project management methodologies (such as PRINCE2 and PMBOK). It defines how the project will be executed, monitored, controlled, and closed, ensuring alignment with municipal strategic objectives, particularly in enhancing urban data analytics and public safety.

2. Project Description

The Smart City IoT Network Project involves the procurement, installation, and integration of a city-wide Internet of Things (IoT) sensor network designed to monitor environmental conditions, traffic flow, and waste management in real-time.

- **Problem Statement:** Rapid urbanization has led to increased traffic congestion, poor air quality, and inefficient municipal service delivery.
- **Objective:** To deploy 5,000 smart nodes across the municipality over 18 months, reducing municipal carbon emissions by 15% and optimizing city service routes.
- **Project Location** Birmingham, UK (City Center and surrounding districts).
- **Deliverables:** A fully operational IoT hardware network, a central data analytics dashboard for municipal operators, and comprehensive staff training.

- **1. Environmental Monitoring**

Air & Water Quality Real-time sensors track pollutants like particulate matter (PM2.5), nitrogen dioxide, and ozone levels, allowing authorities to issue pollution alerts or regulate traffic in heavily affected zones. Climate Resilience Continuous monitoring helps manage urban heat islands, identify flood risks, and track energy usage, directly aligning with global sustainability goals. Emission Reduction: By reducing urban gridlock and optimizing trash routing, cities see significant drops in harmful greenhouse gases.

Warne, S. (2024). Working Smarter with Microsoft Project : Implement Effective Project Control Techniques to Maximize Efficiency and Drive Successful Outcomes. 1st edition. Birmingham: Packet Publishing, Limited

2. Traffic and Mobility

Dynamic Traffic Control: Smart intersections adjust green light durations in real-time based on vehicle density, reducing congestion and cutting down driver commute and idling times. Reduced Fuel Consumption: Smoother traffic flow means vehicles burn less fuel, limiting both personal expenses and city-wide carbon footprints. Informed Route Planning: Live data feeds can update digital road signs and navigation applications with accident reports or road closures, balancing the load across the city's road networks.

3. Waste Management

Dynamic Collection Routes: Fill-level sensors in public bins and dumpsters alert city fleets only when containers reach capacity. Cost Efficiency: Trucks are dispatched only when necessary, saving municipalities up to 30% to 40% on operational costs, fuel, and labor. Cleaner Public Spaces: Prevents overfilling and littering, ensuring higher standards of public hygiene and citizen satisfaction. By leveraging the Internet of Things, the city can continuously measure, analyze, and allocate public funds based on

actual daily demand rather than guesswork. This connectivity serves as the backbone for creating a safer, cleaner, and more responsive community for residents

3. A clearly defined scope is critical to prevent scope creep and ensure team efforts remain focused on core deliverables. In-Scope: Procurement and physical installation of 5,000 IoT sensor nodes. Development of a cloud-based Central Management System (CMS) / Dashboard. Integration with existing municipal emergency services and traffic management systems. User Acceptance Testing (UAT) and staff training for 50 municipal employees. Post-installation maintenance and technical support for 24 months. Out-of-Scope: Upgrading the city's overarching electrical grid infrastructure (handled by utility providers). Replacement or upgrading of end-user devices (e.g., city employee smartphones). Development of public-facing mobile applications.

Eckart, P. et al. (2023) *Mobility Design : Shaping Future Mobility Volume 1: Practice*. 1st ed. Berlin: JOVIS Verlag GmbH,. Available at:

1.0 Project Management

Project management is the application of processes, methods, skills, knowledge and experience to achieve specific project objectives according to the project within agreed parameters. Project management has final deliverables that are constrained to a finite timescale and budget.

A key factor that distinguishes project management from just 'management' is that it has a final deliverable and a finite timespan, unlike management, which is an ongoing process. Because of this, a project professional needs a wide range of skills; often technical skills, and certainly people management skills, and good business awareness.

- 1.1 Develop and finalize Project Management Plan
- 1.2 Establish project governance and stakeholder councils
- 1.3 Monthly progress reporting and quality audits

2.0 Procurement & Hardware Acquisition

- 2.1 Finalize vendor contracts (Sensors and Data Center)
- 2.2 Quality assurance testing of initial hardware batch
- 2.3 Shipping and localized inventory storage

3.0 Infrastructure Deployment

- 3.1 Secure municipal permits and wayleave agreements

3.2 Install physical network gateways and base stations

3.3 Deploy 5,000 smart nodes across target zones

4.0 Software Development & Integration

4.1 Configure Cloud Data Architecture

4.2 Develop CMS Dashboard interface

4.3 Integrate with existing municipal legacy systems

5.0 Testing, Training & Handover

- 5.1 System Integration Testing (SIT)
- 5.2 User Acceptance Testing (UAT)
- 5.3 Conduct end-user training workshops
- 5.4 Final project closure and transition to operations

5. Quad Chart

A quadrant chart is a visual data tool that plots information on a two-dimensional grid, dividing the space into four equal sections. It evaluates data points against two specific metrics (one on the X-axis and one on the Y-axis) to categorize and prioritize them briefly. Here is a breakdown of how they work and where they are applied:

How It Works

The Axes: The chart features an X-axis (horizontal) and a Y-axis (vertical). Each axis represents a specific variable or performance metric. **The Intersect:** The axes usually cross at the median or average value of the data, naturally splitting the graph into four quadrants. Each of the four sections represents a unique combination of the two variables, grouping items that share common traits.

Common Examples & Applications

Business & Marketing: The Boston Consulting Group (BCG) Matrix is a classic quadrant chart that sorts a company's products by market growth and relative market share, categorizing them as *Stars*, *Cash Cows*, *Question Marks*, or *Dogs*.

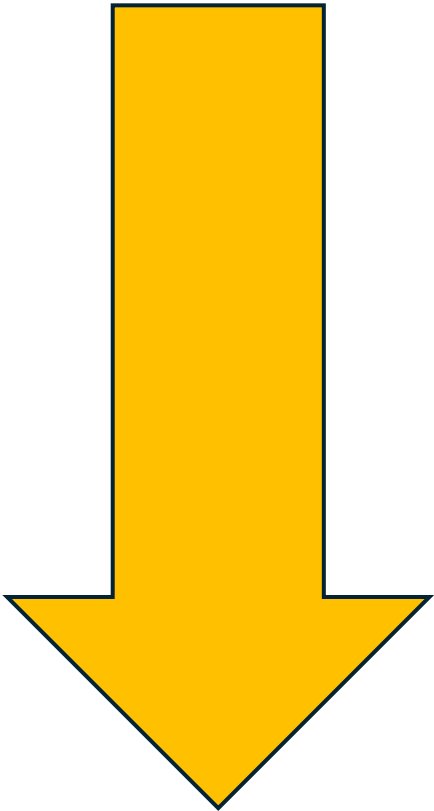
Product Management: Used for feature prioritization, plotting features by *User Value* versus *Implementation Effort* (X-axis) to decide which to build first. **Time Management:**

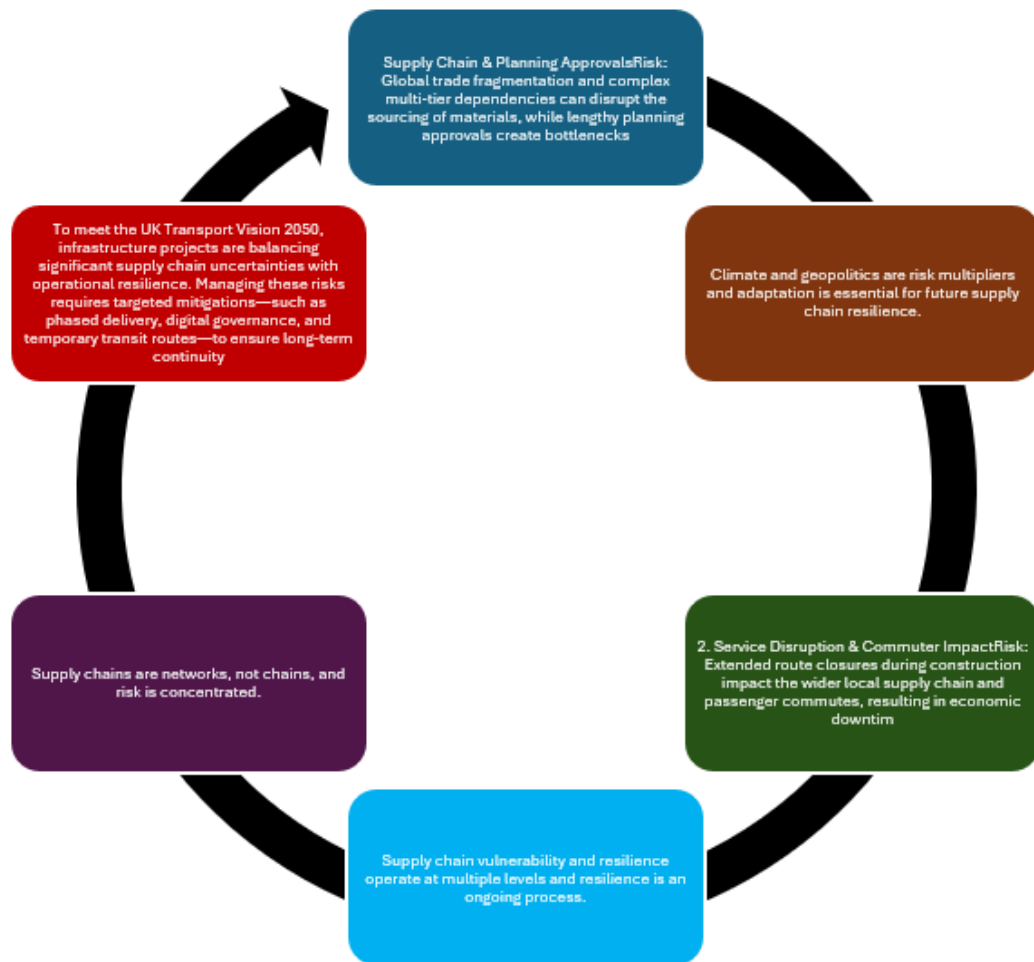
The Eisenhower Matrix divides tasks by *Urgency* and *Importance* into four actionable buckets: Do, Schedule, Delegate, and Delete

Reeve, N. (2013) "Turnaround for OMGI as quant funds top the charts,"

The Quad Chart provides a high-level, one-page snapshot of the project’s vital signs, essential for executive stakeholder briefings.

Project Overview	Schedule & Budget
Title: Smart City IoT Implementation Manager: [UNKNOWN] Sponsor: City Council Objective: Deploy 5,000 smart nodes to monitor environmental data, traffic, and waste management, achieving a 15% reduction in municipal emissions.	Timeline: 18 Months (Q1 2026 – Q2 2027) Budget: 1,500,000 Current Phase: Planning Phase Key Milestone: System Architecture Approval (Month 3)
Key Accomplishments (To Date)	Major Risks & Issues
- Project Charter approved - Procurement tenders issued - High-level stakeholder map finalized - Site survey (Zone A) completed	- Risk: Delays in wayleave (permit) approvals - Risk: Supply chain disruptions for microchips - Issue: Data privacy concerns from citizens - Mitigation: Proactive engagement with regulatory bodies.





6. Gantt Chart

A Gantt chart is a visual project management tool that maps out a project schedule on a timeline. It helps teams easily see what tasks need to be done, when they should occur, and how they relate to one another.

How It Works

A standard Gantt chart has two main sections

- Vertical axis (Left): Lists individual tasks, project phases, or milestones.
- Horizontal axis (Top/Bottom): A timeline displayed in days, weeks, or months.

Each task is represented by a horizontal bar. The position and length of the bar indicate the task's start date, duration, and end date.

Key Components

Beyond basic timelines, Gantt charts often include:

- **Milestones:** Diamonds or symbols marking crucial deadlines, meetings, or major phase completions. **Dependencies:** Arrows or lines connecting tasks, indicating which jobs must be finished before the next one can begin. **Progress tracking:** Shading or percentages inside the bars that show how much work is completed. **Resource assignments:** Labels or colors identifying who is responsible for each specific task.

Common Uses

Gantt charts are invaluable for tracking progress in complex, multi-phase projects. They are frequently used in construction, software development, event planning, and marketing to keep teams aligned, spot scheduling bottlenecks, and prevent delays. To explore or build your own, you can easily use online templates and digital tools available on platforms. The Gantt Chart maps WBS activities against an 18-month calendar to visualize the timeline, dependencies, and the Critical Path.

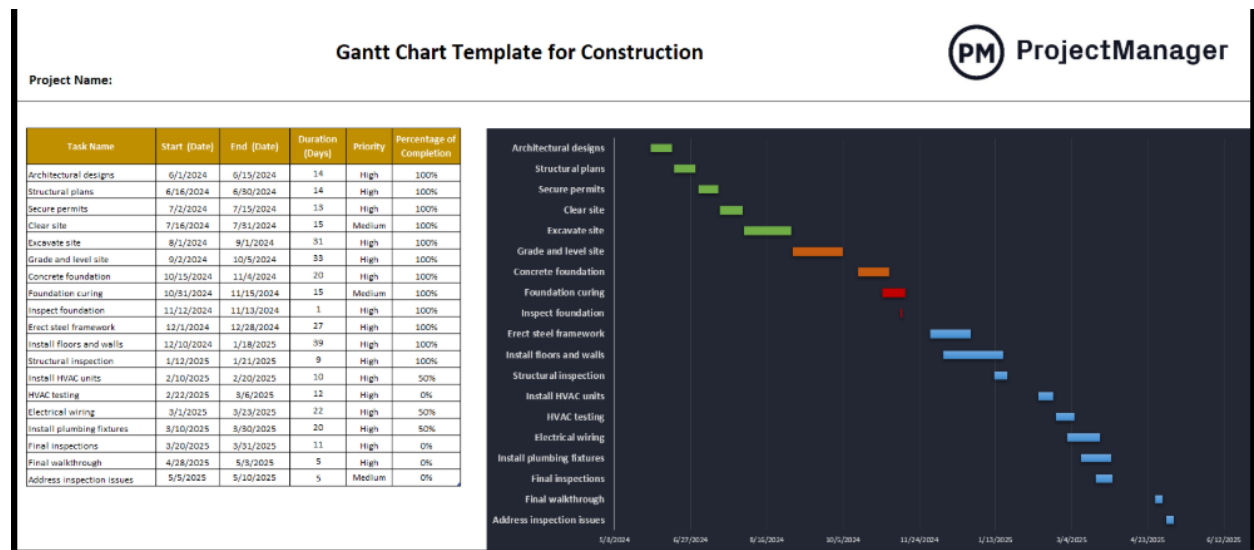
Sharon, A. and Dori, D. (2017) "Model-Based Project-Product Lifecycle Management and Gantt Chart Models: A Comparative Study," *Systems engineering*, 20(5), pp. 447–466

Note: Dates are calculated using the theoretical Q1 2026 project start.

WBS Task	Task Name	Start Month	End Month	Duration (Months)	Dependencies
1.1	Finalize PMP	1	2	2	-
1.2	Procurement	2	4	3	Finish to Start (1.1)
1.1.4	Permits/Wayleaves	3	7	5	Start to Start (1.2)
3.2	Gateway Install	6	9	4	Finish to Start (3.1)
3.3	Node Deployment	8	15	8	Finish to Start (3.2)
4.2	CMS Dashboard	6	12	7	Finish to Start (2.1)
5.1	Integration Test	13	14	2	Finish to Start (4.2)
5.2	UAT	14	15	2	Finish to Start (5.1)

5.3	Training	15	16	2	Finished to Start (5.2)
5.4	Project Closure	17	18	2	Finish to Start (5.3)

Critical Path Analysis: The critical path consists of WBS 1.2 (Procurement) → 3.1 (Permits/Wayleaves) → 3.2 (Gateway Installation) → 3.3 (Node Deployment) → 5.1 (Integration Testing) → 5.2 (UAT). Any delay in procuring hardware or securing municipal permits will directly delay the final operational handover date.



7. Stakeholders' Involvement

Proactive stakeholder management ensures expectations are aligned, resistance is minimized, and necessary approvals are granted efficiently. Failure to identify the right stakeholder at the right stage of your project and you run the risk of your project failing. Additionally, some stakeholders may have their own personal agendas that are at odds with the project and may need to be incentivized to accept a stake in the project. However, without stakeholder support, it's unlikely you'll deliver the project as they have access to information, an appreciation of politics, and they know who to speak to and why. They are also providers of resources, materials, and funding. It's through engagement with stakeholders that support can be gained, but for this to be successful, the right stakeholders must be identified. It's not just about identifying a person or department or group but also identifying their relationships, their motivations, and their interest. Some may force themselves on you while others remain hidden until it's too late. Unfortunately, stakeholders can have an effect on most areas of project delivery. They could provide the wrong information, which could affect delivery estimates, product quality, and the wrong

risk mitigation. If those with power and influence aren't identified, it could lead to delays in the release of funds. Your detailed and carefully planned schedule can quickly unravel if the right stakeholders are not identified and successfully engaged

Ross Hughes (2022) *ENVIRONMENTAL IMPACT ASSESSMENT AND STAKEHOLDER INVOLVEMENT*.

Stakeholder Engagement & Communication Plan:

- **City Council (Project Sponsor):** Requires high-level executive summaries and budget/ROI metrics. *Engagement: Monthly executive dashboards and quarterly in-person reviews.*
- **Municipal Operations Team (End-Users):** Requires operational training and input on dashboard UI. *Engagement: Bi-weekly workshops during software development phase.*
- **Local Citizens & Community Boards:** Require transparency regarding data collection and privacy. *Engagement: Bi-annual public forums and dedicated project website updates.*
- **Telecommunications & Hardware Vendors:** Require clear technical specifications and delivery schedules. *Engagement: Weekly status meetings via project management platforms.*
- **Project Team / Delivery Staff:** Responsible for daily execution and issue resolution. *Engagement: Daily stand-up meetings and weekly progress reports.*
- Tsogt, B. et al. (2025) "The role of stakeholder mapping and engagement in Mongolia during the implementation of the STREAM clinical trial for MDR-TB,"

8. Allocation of Resources

Resource allocation defines both the human capital and the financial budget required to execute the WBS packages.

- **Human Resources:**

Project Manager (1): Oversees overall budget, schedule, and stakeholder communication. Lead Systems Architect (1): Responsible for IoT hardware selection and CMS software integration. Deployment Technicians (5): Field deployment of gateways and sensor nodes. Data Analyst (1): Configures data mapping and dashboard reporting. Change Management Lead (1): Handles training and stakeholder transition.

- **Financial Budget Breakdown (1,500,000 Total):**

Hardware & IoT Nodes: 650,000

Software & Dashboard Development: 300,000

Installation Labor (Contractors): 250,000

Project Management & Admin: 150,000

Contingency Fund (10%): 150,000

9. Risk Analysis

Risk analysis involves identifying, assessing, and developing strategies for potential threats that could impact the project's baseline cost, scope, or schedule.

Identified Risks & Mitigation Strategies:

1 Supply Chain Disruptions for Hardware

Impact: High. Could delay the Node Deployment phase.

Mitigation: Establish secondary vendor agreements and pre-order critical hardware early in the procurement phase.

Avoidance & Mitigation:

Diversify your supplier base to spread risks across regions and avoid relying on a single vendor. Establish pre-negotiated secondary vendor agreements so you can instantly pivot to backup suppliers. Map your supplier network for critical components and pre-order essential equipment early in the procurement phase

2: Delays in Municipal Permit / Wayleave Approvals

Impact: Medium. Threatens the critical path of infrastructure deployment.

Mitigation: Assign a dedicated liaison to work directly with the city's public works department to fast-track approvals.

<https://www.apm.org.uk/resources/whitepapers/project-risk-analysis-and-management/>

Avoidance & Mitigation:

Assign a dedicated local liaison (or a small team) to work directly with Birmingham City Council's Public Works and Highways departments. Establish joint permitting agreements and align local planning teams with statutory authorities to fast-track approvals. Utilize the

Birmingham City Council Planning and Infrastructure portal to track applications and local regulations

3: Data Privacy and Security Breaches

Impact: Could result in regulatory fines and loss of public trust.

Mitigation: Implement end-to-end encryption for all data packets. Ensure full compliance with relevant data protection acts (GDPR).

Avoidance & Mitigation:

Implement strict end-to-end (E2E) encryption for all data packets transmitted across the hardware nodes. Ensure full compliance with the UK General Data Protection Regulation (UK GDPR) and the Data Protection Act 2018. Review the Information Commissioner's Office (ICO) resources to map your data processing activities and ensure all baseline security requirements are met

4 Budget Overruns

Impact: Risk of depleting contingency funds.

Mitigation: Conduct stringent Earned Value Management (EVM) tracking every month.

4. Budget Overruns

Risk Impact: Medium. Rapid depletion of project contingency funds.

Avoidance & Mitigation:

Implement stringent Earned Value Management (EVM) tracking monthly to measure how much value you are getting for your spent budget.

Track the three core EVM variables: Planned Value (PV): The authorized budget assigned to the scheduled work. Earned Value (EV): The actual physical work completed, expressed in monetary terms. Actual Cost (AC): The total financial outlay was incurred to complete the work.

Society for Risk Analysis (1981) *Risk analysis*. Malden, MA: Blackwell Publishers.

10. Conclusion

The Smart City IoT Network Project presents an opportunity for the municipality to modernize its infrastructure, improve operational efficiencies, and leverage data-driven decision-making. By following this Project Management Plan, the project team will adhere to a defined scope, closely track the critical path outlined in the WBS and Gantt chart, and manage potential risks efficiently. Continuous stakeholder engagement will ensure the network directly addresses municipal needs while maintaining strict data privacy standards. With a well-structured resource plan and dedicated contingency controls, the project is positioned to deliver \$1.5M in value within the 18-month baseline schedule, establishing a foundation for a modern, digitally connected urban environment.

Part B feedback 500 words

Stakeholder matrices

A stakeholder matrix is a crucial project management tool that maps everyone involved in or affected by your project, making it easy to see who needs the most communication and who holds the most power. It ensures project resources are focused where they matter most, minimizing conflict and preventing costly delays

Manage Closely. These are your key decision-makers and primary project sponsors.

Actionable Strategy: Involve them deeply in decision-making. Engage through regular one-on-one meetings, detailed status reports, and continuous collaboration

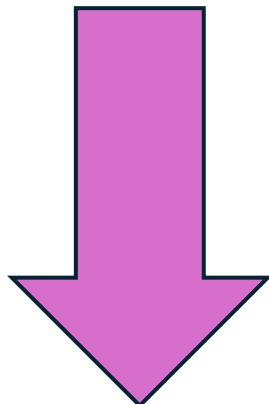
Keep Satisfied. These stakeholders can significantly impact the project but do not engage in day-to-day operations. **Actionable Strategy:** Keep them happy and updated on major milestones so they don't block progress. Provide high-level executive summaries rather than granular data.

Keep Informed. These are individuals affected by the project (like end-users, team members, or specialized departments) who want to know what is going on but lack decision-making authority.

Actionable Strategy Consult with them and listen to their feedback. Engage them through newsletters, town halls, or surveys to maintain their support

Why This is Vital for Project Success Improves Communication: Prevents wasted time by tailoring the exact type and frequency of communication to the right people. Enhances Risk Management: Proactively identifies stakeholders who might cause bottlenecks or block progress, allowing you to build buy-in early. Resource Prioritization: Ensures limited time, budget, and resources are allocated where they deliver the maximum positive impact on project deliverables

<https://www.gov.uk/government/publications/global-supply-chains-a-foresight-report-e>





Key Infrastructure Risks & Mitigations

governance frameworks,

Top Supply Chain Disruptors

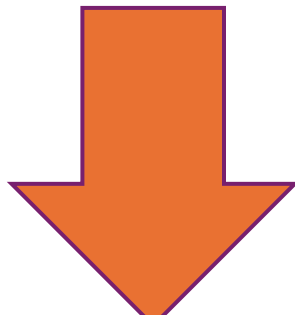
Tariffs & Geopolitical Fragmentation: Unpredictable trade policies, especially between the US and China, are altering landed costs and forcing supply chains to re-route via secondary ports. Thomson Reuters tax and accounting **Critical**
Material Scarcity: Global competition for AI-dependent infrastructure is driving shortages and high prices for metals like copper. Severe shortages also persist in agricultural commodities, like beef, due to past droughts and livestock pest outbreaks. **Regulatory Compliance Overload:** Companies are facing increased scrutiny over country-of-origin claims and environmental compliance (ESG), which delays customs clearances

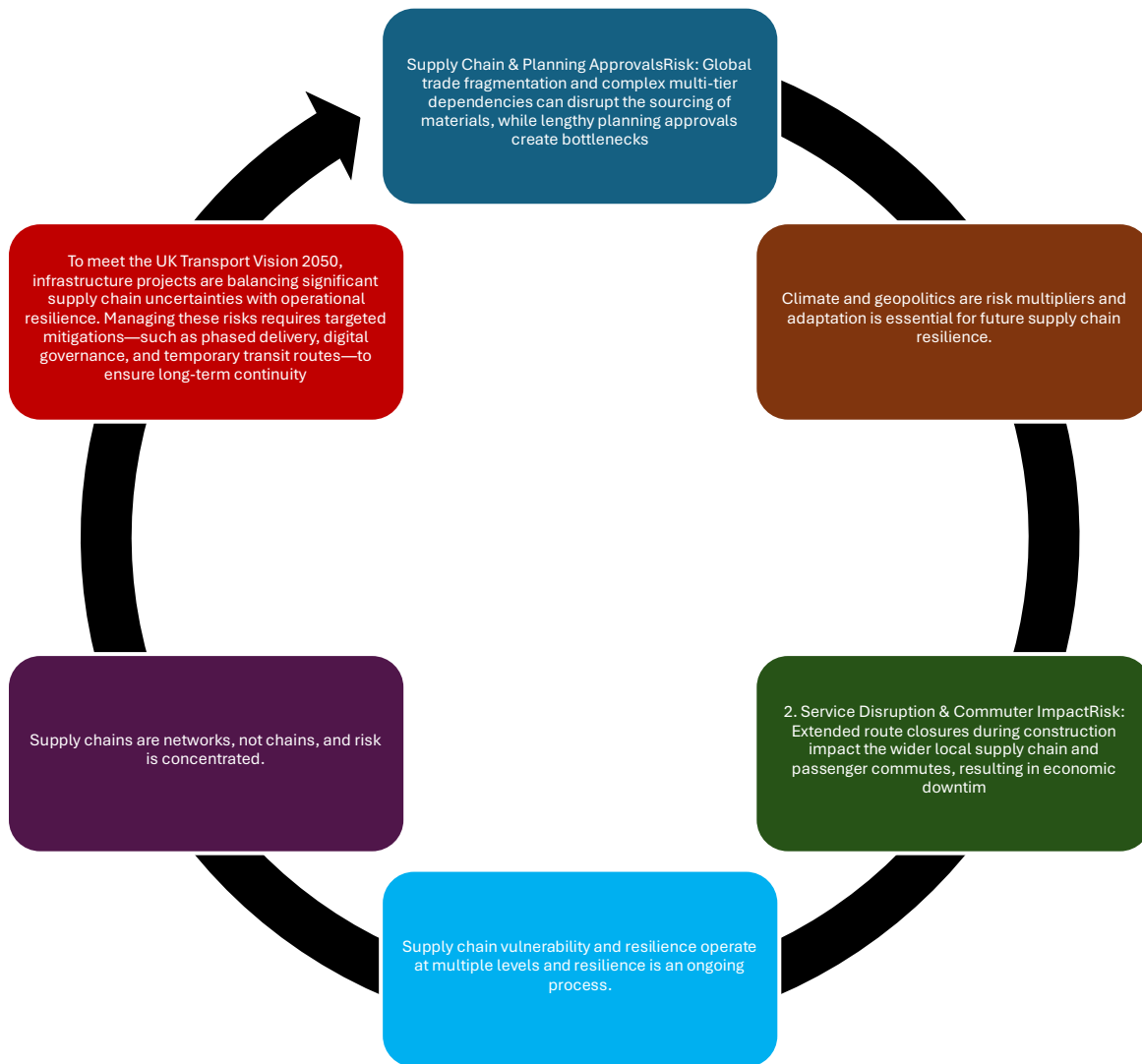
Strategic Responses

Technology Adoption: Supply chains are moving from static historical data models toward connected, autonomous environments. Platforms like Agentic AI automate tasks such as contract review, risk monitoring, and RFP generation. **Global Business Services (GBS):** Major operators are centralizing supply chain transactions under a single operational roof to leverage scale, cost efficiencies, and AI analytics. **Dynamic Scenario Planning:** Organizations rely heavily on continuous risk modeling and "what-if" simulations on trade data to manage the sudden impacts of border duties

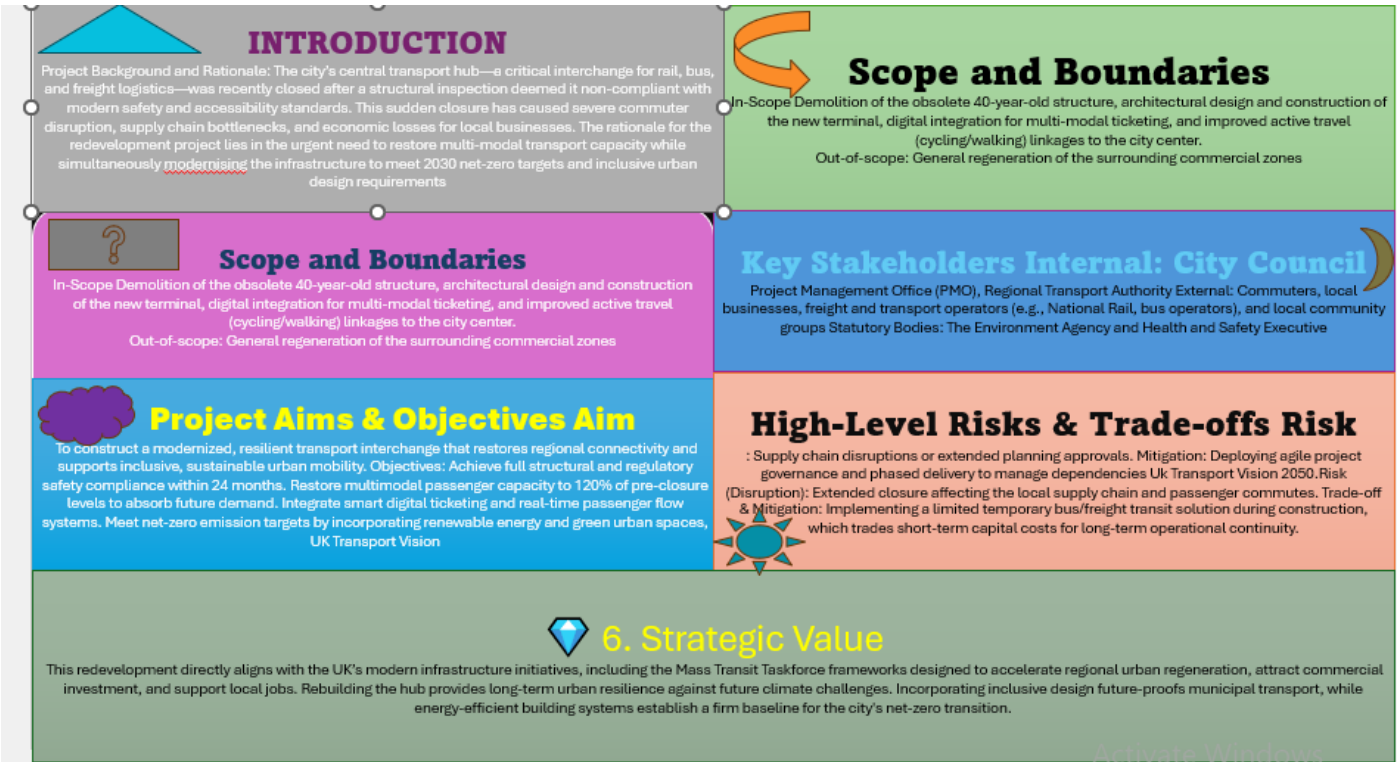
1. Supply Chain & Planning Approvals Identified Risk: Delays stemming from multi-tier geopolitical uncertainty, raw material scarcity, or prolonged planning and grid connection approvals. Targeted Mitigation: Deploying agile project governance and phased, vision-led delivery to manage dependencies. Quantitative Impact: Modular project phasing and advanced monitoring reduce financial exposure by breaking multi-decade projects into distinct operational stages. This decreases the risk of sunk costs, which typically account for up to $\text{15-20\%}$ of mega-project budget overruns.

<https://kpmg.com/xx/en/our-insights/operations/supply-chain-trends-2026.html>





PART A POSTER



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