Key Partnerships 15% left	Key Activities 8% left	Value Propositions 11% left	Customer Relationships (1) 25% left	Customer Segments 15%
I.Sensor Manufacturers: Providers of loT-based sensors (e.g., accelerometers, strain gauges, vibration sensors) for monitoring structural health.	System Development: Design and build the SHM system, including sensor integration, data collection infrastructure, and dashboard development.	1.Increased Safety: Real-time monitoring of the structural integrity of metro rail systems to identify potential hazards before they cause accidents or service disruptions.	1.Personalized Consulting: Offering tailored solutions for each metro network, with a focus on specific monitoring needs, challenges, and regulatory requirements.	1.Metro Rail Operators: Public and private entities managing metro rateworks, responsible for infrastructure maintenance and passenger safety.
2.AI/ML Software Providers: Companies providing data analytics, machine learning algorithms for anomaly detection, and predictive maintenance S. Telecom/IoT Service Providers: Ensuring data connectivity and cloud ntegration for real-time monitoring 4.CI/VII Engineering Firms: Experts in finsatructure monitoring and design.	2.Sensor Installation & Calibration: Deploy sensors across metro rail networks and calibrate them for accurate readings 3.Data Analytics & Al Modeling: Develop algorithms to detect potential structural failures, wear, or damage. + Add more	2.Cost Savings: Early detection of damage and predictive maintenance help avoid costly repairs and downtime 3.Improved Asset Lifecycle: Maximizing the lifespan of infrastructure components by monitoring their health and scheduling proactive maintenance.	Alamage and predictive maintenance leip avoid costly repairs and lowntime technical support to ensure long-time fracture components by nonlitoring their health and cheduling proactive maintenance. Maintenance: Ongoing system upgrades, sensor recalibration, and technical support to ensure long-term operational success. + Add more	2.Transport Authorities: Governmer bodies responsible for overseeing transportation safety and regulation safety and regulation safety and regulation safety and safety and safety structural inspections, repairs, and preventative maintenance of metroinfrastructure. 4.Insurance Companies: To mitigaterisks associated with damage and
5.Metro Rall Operators: Collaborators in implementing and using the	Key Resources	ability to base operational and maintenance decisions on real-time,	Channels Time to the state of	failure, offering better policies bas on real-time monitoring data.
monitoring system. 6. Government Regulatory Bodies: Ensuring compilance with safety and monitoring standards 7. Maintenance Service Providers: For the upkeep and calibration of	1.loT Sensors: Hardware for real-lime data collection (e.g., strain gauges, accelerometers, temperature sensors). 2.Data Infrastructure: Cloud storage and computing power to handle large volumes of real-time data	data-backed insights. 5. Regulatory Compiliance: Adherence to industry standards and safety regulations, ensuring safe and efficient metro operations. 5. Efficient Resource Allocation: Optimizing repair and maintenance	Direct Sales & Partnerships: Selling the system directly to metro rail operators and maintenance providers. 2.Consultancy & Professional Services: Offering expert advisory services for implementation and	5.Urban Planners/Engineers: Professionals involved in the long term planning and structural integ of metro rali infrastructure. 6.Training & Education: Providing operators and engineers with han on training for managing the SHM
sensors and systems.	3.AI/ML Algorithms: Machine learning models to analyze data, detect anomalies, and predict failures	schedules based on data-driven insights into structural health. + Add more	ongoing system management. 3.Web & Mobile App: For continuous access to the SHM dashboard by stakeholders.	system and interpreting data. + Add more

Cost Structure ①

1.R&D & System Development: Costs for research, software development, and algorithm creation (e.g., Al, machine learning).

2.Hardware Procurement: Purchase of IoT sensors and necessary installation equipment.

 $3. Cloud\ Computing\ \&\ Data\ Storage:\ Costs\ associated\ with\ cloud\ services\ for\ storing\ and\ processing\ data\ from\ the\ monitoring\ system.$

4.Personnel Costs: Salaries for software developers, engineers, data scientists, maintenance staff, and consultants.

5.Sensor Calibration & Maintenance: Regular upkeep and recalibration of sensors to ensure optimal performance.

6.Sensor Calibration & Maintenance: Regular upkeep and recalibration of sensors to ensure optimal performance.

7. Customer Support: Cost of providing ongoing customer support, maintenance services, and training.

+ Add more

Revenue Streams ①

1.Subscription Fees: Ongoing payments for software licenses and access to the real-time SHM dashboard

 $2. Hardware\ Sales: Revenue\ from\ selling\ loT\ sensors\ and\ associated\ infrastructure\ (e.g.,\ data\ collection\ units,\ edge\ devices).$

3. Consulting Fees: Charging for system design, customizations, and consulting services.

4.Maintenance Contracts: Annual or monthly contracts for system maintenance, sensor recalibration, and updates.

 $5. {\sf Data}$ Analytics Services: Offering premium predictive analytics, reporting, and insights for decision-making.

decision-making.
6.Training & Certification: Charging for training programs, workshops, and certification for metro

operators and engineers.

 $\label{thm:programs:offering post-sale services, including system training and ongoing technical support$

8.