

Sustainable Tourism Management System

Submitted By: Group 11

Overview:

The Sustainable Tourism Management System is a detailed database project designed to meet the increasing demand for responsible and sustainable tourism practices on a global scale. The primary goal of this system is to harmonize tourism's economic advantages with the protection of the environment and preservation of culture, guaranteeing that destinations can prosper without jeopardizing their natural and cultural assets for the benefit of future generations (From Previous Submission P1)

Business Problems that we are going to address with this project :

Data Fragmentation: Information on tourism sustainability is scattered across different sources, creating challenges for stakeholders in accessing complete data for decision-making.

Environmental Impact Tracking: The environmental effects of tourism, including water usage, carbon emissions, and waste generation, should be systematically monitored.

Over-tourism Management: Popular destinations need help to control the number of visitors, leading to the degradation of natural and cultural assets.

Sustainable Transportation: Inefficient tracking and promoting eco-friendly transportation options in tourism hinders efforts to reduce travel-related emissions.

Local Economic Impact: Inadequate data on how tourism revenues benefit local communities make it difficult to ensure fair economic distribution.

Sustainability Certification Monitoring: The tourism industry needs a centralized system for monitoring and verifying sustainability certifications from various providers and destinations.

Tourist Education and Engagement: There is a need for better methods to educate tourists about sustainable practices and measure their involvement with this information.

Real-time Decision Support: Stakeholders need access to real-time data to make informed decisions about sustainable tourism practices and resource allocation.

List of Entities:

1) Destination

- Attributes: DestinationID, Name, Country, Region, Climate, PeakSeason, OffSeason, AverageAnnualVisitors, SustainabilityScore, CarryingCapacity
- Relationships: Has Accommodations, Contains Attractions, Has Local Businesses, Has Carrying Capacity Alerts, Visited by Tourists, Organized by Tour Operators

2) Accommodation

- Attributes: AccommodationID, DestinationID, Name, Type, Capacity, SustainabilityRating, EnergyEfficiencyScore, WaterConservationScore, WasteManagementScore, LocalEmploymentPercentage
- Relationships: Located in Destination, Stayed at by Tourists, Partnered with Tour Operators, Has Sustainability Certifications, Generates Environmental Impacts

3) Tourist

- Attributes: TouristID, Name (FirstName, LastName), Nationality, Age, Email, PreferredLanguage, SustainabilityPreference, CarbonOffsetParticipation
- Relationships: Visits Destinations, Stays at Accommodations, Visits Attractions, Uses Transportation Providers, Writes Visitor Reviews, Engages with Educational Content

4) Tour_Operator

- Attributes: OperatorID, Name, Headquarters, SustainabilityCertification, LocalPartnershipPercentage, CarbonOffsetProgram, SustainablePackagesOffered
- Relationships: Organizes trips to Destinations, Partners with Accommodations, Collaborates with Transportation Providers

5) Attraction

- Attributes: AttractionID, DestinationID, Name, Type, Capacity, AverageVisitDuration, PeakHours, SustainabilityMeasures, AccessibilityFeatures
- Relationships: Located in Destination, Visited by Tourists, Has Cultural Heritage Site

6) Transportation_Provider

- Attributes: ProviderID, Name, Type, SustainabilityScore, EmissionsPerPassengerKm, RenewableEnergyPercentage, AccessibilityFeatures
- Relationships: Used by Tourists, Collaborates with Tour Operators

7) Local_Business

- Attributes: BusinessID, DestinationID, Name, Type, OwnershipType, EmployeeCount, SustainabilityPractices, LocalSourcedProductPercentage
- Relationships: Located in Destination, Contributes to Economic Impact

8) Sustainability_Certification

- Attributes: CertificationID, Name, IssuingBody, ValidityPeriod, CriteriaDescription, AuditFrequency
- Relationships: Certifies Accommodations, Includes Sustainability Metrics

9) Environmental_Impact

- Attributes: ImpactID, DestinationID, Date, CarbonEmissions, WaterConsumption, WasteGenerated, RecyclingRate, BiodiversityIndex
- Relationships: Generated by Accommodations, Measured by Sustainability Metrics

10) Economic_Impact

- Attributes: ImpactID, DestinationID, Year, TourismRevenue, LocalEmploymentRate, AverageWageInTourism, LocalBusinessGrowthRate, EconomicLeakagePercentage
- Relationships: Contributed to by Local Businesses, Measured by Sustainability Metrics

11) Cultural_Heritage_Site

- Attributes: SiteID, AttractionID, Name, Type, YearEstablished, ProtectionStatus, VisitorManagementPlan, CulturalSignificance
- Relationships: Part of Attraction

12) Visitor_Review

- Attributes: ReviewID, TouristID, EntityReviewed, EntityID, Rating, Comment, SustainabilityFeedback, DatePosted
- Relationships: Written by Tourist

13) Sustainability_Metric

- Attributes: MetricID, Name, Description, Unit, BenchmarkValue, DataCollectionMethod, FrequencyOfMeasurement
- Relationships: Included in Sustainability Certification, Measures Environmental Impact, Measures Economic Impact

14) Educational_Content

- Attributes: ContentID, Title, Type, Topic, Language, TargetAudience, EngagementRate, LastUpdated
- Relationships: Engaged with by Tourists

15) Carrying_Capacity_Alert

- Attributes: AlertID, DestinationID, Date, CurrentVisitorCount, ThresholdPercentage, AlertLevel, RecommendedActions
- Relationships: Associated with Destination

Relationships and Cardinalities between Entities:

Destination

- Accommodations: One-to-Many (A destination can have multiple accommodations)
- Attractions: One-to-Many (A destination can contain multiple attractions)
- Local Businesses: One-to-Many (A destination can have multiple local businesses)
- Carrying Capacity Alerts: One-to-Many (A destination can have multiple alerts)
- Tourists: Many-to-Many (Multiple tourists can visit multiple destinations)
- Tour Operators: Many-to-Many (Multiple tour operators can organize trips to multiple destinations)

Accommodation

- Destination: Many-to-One (Multiple accommodations can be located in a single destination)
- Tourists: Many-to-Many (Multiple tourists can stay at multiple accommodations)
- Tour Operators: Many-to-Many (Multiple accommodations can partner with multiple tour operators)
- Sustainability Certifications: Many-to-Many (An accommodation can have multiple certifications)
- Environmental Impacts: One-to-Many (An accommodation can generate multiple environmental impacts)

Tourist

- Destinations: Many-to-Many (A tourist can visit multiple destinations)
- Accommodations: Many-to-Many (A tourist can stay at multiple accommodations)
- Attractions: Many-to-Many (A tourist can visit multiple attractions)
- Transportation Providers: Many-to-Many (A tourist can use multiple transportation providers)
- Visitor Reviews: One-to-Many (A tourist can write multiple reviews)
- Educational Content: Many-to-Many (A tourist can engage with multiple educational contents)

Tour_Operator

- Destinations: Many-to-Many (A tour operator can organize trips to multiple destinations)

- Accommodations: Many-to-Many (A tour operator can partner with multiple accommodations)
- Transportation Providers: Many-to-Many (A tour operator can collaborate with multiple transportation providers)

Attraction

- Destination: Many-to-One (Multiple attractions can be located in a single destination)
- Tourists: Many-to-Many (Multiple tourists can visit multiple attractions)
- Cultural Heritage Site: One-to-One (An attraction can have one cultural heritage site)

Transportation_Provider

- Tourists: Many-to-Many (Multiple tourists can use multiple transportation providers)
- Tour Operators: Many-to-Many (Multiple transportation providers can collaborate with multiple tour operators)

Local_Business

- Destination: Many-to-One (Multiple local businesses can be located in a single destination)
- Economic Impact: One-to-Many (A local business can contribute to multiple economic impacts)

Sustainability_Certification

- Accommodations: Many-to-Many (Multiple certifications can be held by multiple accommodations)
- Sustainability Metrics: One-to-Many (A certification can include multiple sustainability metrics)

Environmental_Impact

- Accommodation: Many-to-One (Multiple environmental impacts can be generated by a single accommodation)
- Sustainability Metrics: Many-to-Many (Multiple environmental impacts can be measured by multiple sustainability metrics)

Economic_Impact

- Local Businesses: Many-to-Many (Multiple economic impacts can be contributed to by multiple local businesses)

- Sustainability Metrics: Many-to-Many (Multiple economic impacts can be measured by multiple sustainability metrics)

Cultural_Heritage_Site

- Attraction: One-to-One (A cultural heritage site is part of one attraction)

Visitor_Review

- Tourist: Many-to-One (Multiple reviews can be written by a single tourist)

Sustainability_Metric

- Sustainability Certification: Many-to-Many (Multiple metrics can be included in multiple certifications)
- Environmental Impact: Many-to-Many (Multiple metrics can measure multiple environmental impacts)
- Economic Impact: Many-to-Many (Multiple metrics can measure multiple economic impacts)

Educational_Content

- Tourists: Many-to-Many (Multiple educational contents can be engaged with by multiple tourists)

Carrying_Capacity_Alert

- Destination: Many-to-One (Multiple alerts can be associated with a single destination)

Some reasoning for design decisions made along the way :

- We have created separate entities for Environmental_Impact and Economic_Impact instead of combining them into a single Impact entity. This decision enables stakeholders to analyze environmental and economic factors independently or in combination, allowing for more detailed and focused tracking of each aspect.
- Instead of embedding sustainability metrics into other entities, a flexible Sustainability_Metric entity has been created. This approach allows for the addition or modification of metrics without impacting the database structure, providing flexibility as sustainability standards evolve.
- Educational_Content has been linked to Tourist interactions, enabling the system to measure the effectiveness of sustainability education efforts and customize content to tourist preferences by tracking engagement rates as a derived attribute.

- We have included a Local_Business entity to track the economic impact of tourism at the local community level, aligning with our goal of ensuring tourism benefits are distributed to local economies.
- The Tour_Operator entity has been designed to have relationships with multiple entities (Destination, Accommodation, Transportation_Provider) to reflect the real-world role of tour operators in coordinating various aspects of sustainable tourism.
- Cultural_Heritage_Site has been incorporated as a distinct entity linked to Attraction to monitor specific preservation needs and visitor impacts on culturally significant sites while balancing tourism with cultural preservation.
- We have designed Sustainability_Certification as a many-to-many relationship with other entities (such as Accommodation and Tour_Operator) to track multiple certifications per entity and vice versa, acknowledging the complexity of sustainability certifications in the tourism industry.

