Evaluation of unused or underutilized railway corridors in urban areas for the implementation of urban or regional railway systems.

A methodology developed for Mexican midsize cities.

Railway systems can help to cope with social, economic and environmental challenges identified in the development of urban settlements and their subsequent mobility needs. Unused or underutilized railway infrastructure in Mexico can be reactivated by implementing urban or regional railway systems prioritizing socio-economic benefits, sustainable development and efficient use of public resources.

This Master’s Thesis performs a literature review on sustainable urban and regional planning, urban and regional railway systems and, standardized evaluation methods. Then, a new methodology is developed to determine the feasibility of the implementation of a railway system in the existing infrastructure using available public information.

The methodology evaluates and measures several indicators grouped in five main parameters: integration with the local and regional spatial development; ridership potential for population and sources of employment; environmental impacts; infrastructure costs; and, potential for local or regional freight service.

The results of the evaluation allow to describe and rank the analyzed railway corridors and thus select the most suitable for implementation.

### Appraisal Summary

**Name of the corridor:** Xalapa, Mexico

**General Information:**
- The railway corridor crosses the Xalapa region from north-west to south-east, it consists of a single track laid on a 1.9% slope. The preliminary route runs from the Valseca settlement, north of the city of Xalapa, to the southern edge of the city.

**Measurements:**
- Length of the corridor: 15.07 km
- Catchment area: 3.112.26 ha
- Population in catchment area: 217,165
- Urbanized area in catchment area: 71.9
- Average population density in catchment area: 86 in/ha
- No. of workplaces in catchment area: 60,342
- No. of hospitals in catchment area: 10
- No. of medium-high level schools in catchment area: 1.71
- No. of large stores in catchment area: 51
- No. of important intersections along the corridor: 32

**Final Score:** 0.70

**Viability Ranking:** Considerably Suitable

**Ratios:**
- Population in catchment area per km: 13,627 in/ha
- No. of workplaces in catchment area per km: 4,820 in/ha
- No. of hospitals in catchment area per km: 0.90 in/ha
- No. of medium-high level schools in catchment area per km: 8.36 in/ha
- No. of large stores in catchment area per km: 0.34 in/ha
- No. of intersections per km: 0.76 in/ha

**Table Indicators:**

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicators</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Integration of corridor reactivation in development plans</td>
<td>1.00</td>
</tr>
<tr>
<td>1.2</td>
<td>Supporting strategies in development plans to promote re-development around the corridor</td>
<td>1.00</td>
</tr>
<tr>
<td>1.3</td>
<td>Compatibility of corridor with centroids and/or development areas</td>
<td>0.94</td>
</tr>
<tr>
<td>1.4</td>
<td>Agreement of corridor with city growth</td>
<td>0.99</td>
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<tr>
<td>1.5</td>
<td>Considers the implementation of a PTTS and transfers to other modes in development plans</td>
<td>0.99</td>
</tr>
<tr>
<td>2.1</td>
<td>Population density in catchment area</td>
<td>1.00</td>
</tr>
<tr>
<td>2.2</td>
<td>Proportion of highly marginalized areas</td>
<td>0.94</td>
</tr>
<tr>
<td>2.3</td>
<td>Integration of corridor with existing transport infrastructure and PTTS times</td>
<td>0.91</td>
</tr>
<tr>
<td>2.4</td>
<td>No corridor is isolated</td>
<td>1.00</td>
</tr>
<tr>
<td>3.1</td>
<td>Proportion of households who own a private vehicle within the catchment area</td>
<td>1.00</td>
</tr>
<tr>
<td>3.2</td>
<td>Suitability of the corridor to integrate rail with roads</td>
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</tr>
<tr>
<td>4.1</td>
<td>Passenger service already operates in the corridor</td>
<td>1.00</td>
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<tr>
<td>4.2</td>
<td>Available land located along the corridor</td>
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</tr>
<tr>
<td>4.3</td>
<td>If existing EODV is available for a double-track railway</td>
<td>1.00</td>
</tr>
<tr>
<td>5.1</td>
<td>The corridor connects a corridor with distributors of goods</td>
<td>1.00</td>
</tr>
</tbody>
</table>

**Available Information for the Evaluation:**

The implications in public, official resources and provided by the ARTF were appropriate and sufficient in terms of quality and quantity.

**Recommendations:**
- Special care has to be taken into the implementation of a PTTS and the inter-modality of the system.
- Additional policies regarding the affordability of the system should be implemented, for example, tariff discounts for low-income users.
- The integration of the system with other transport infrastructure such as the airport should be further studied.
- Further studies on capacity demand should be done to successfully implement a system with mixed rail operations.
- It should be evaluated whether upgrades in the railway track geometry are needed.
- The integration of the system with distributors of goods for a freight service should be further studied.

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**Master’s Thesis from Ing. Víctor Manuel Ríos Villalba**

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