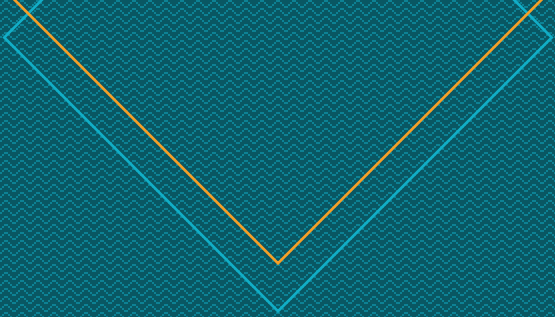




A conceptual model for managing infrastructure projects in countries with high geopolitical risks: the case of Palestine.

Dr. Muwafak Abuzeineh

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- Co-Founder and Managing Director at **ISHBILIA** for Engineering, Management, and Digitalization

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 - ☐ Conceptual model – Anticipated Control Model (CCA)
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The Problem

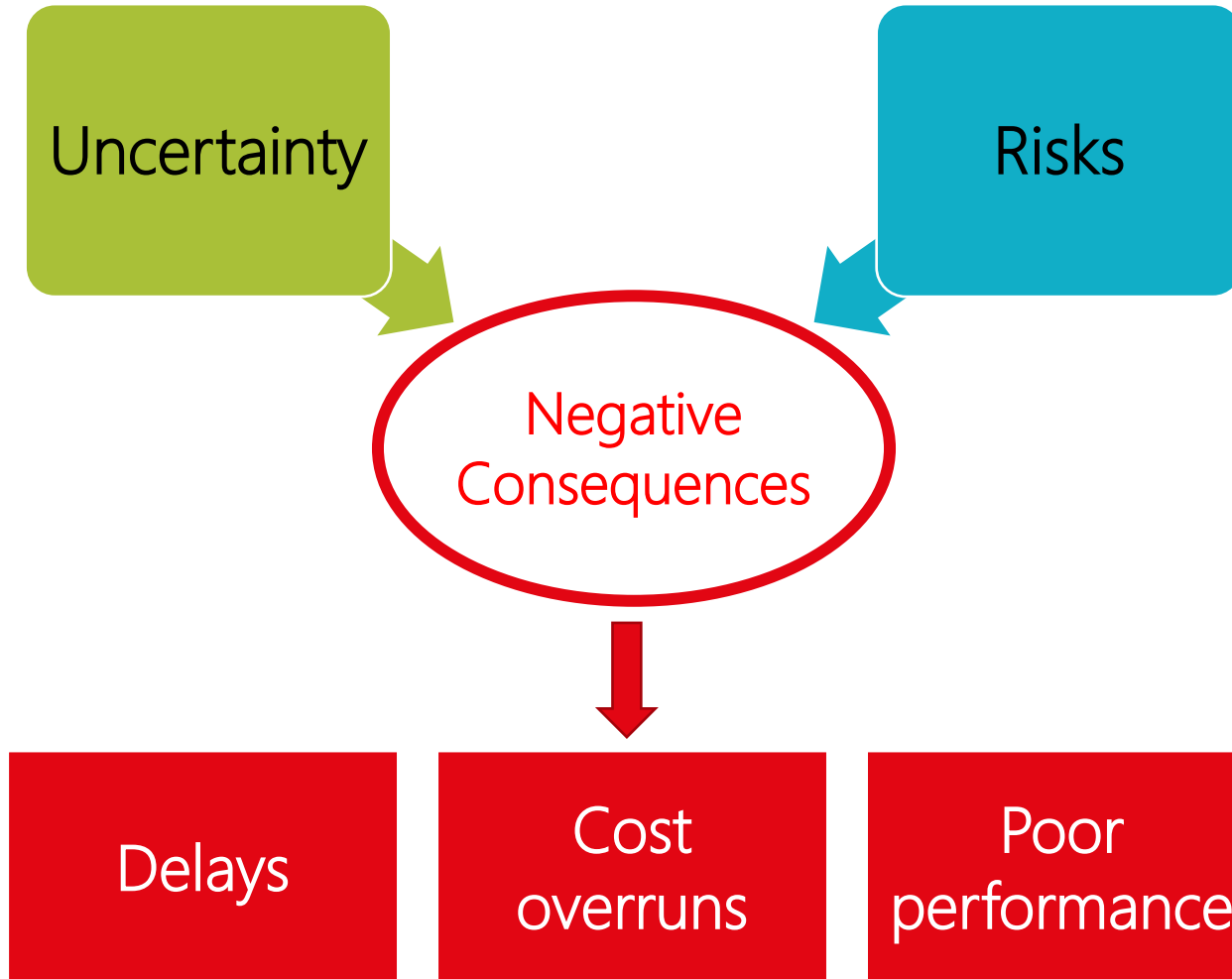
Implementation of project in Countries with high geopolitical risks



- Immature and changeable laws and regulations
- External and internal conflicts
- Corruption
- Weak institutions
- Lack of resources
- Movement restrictions

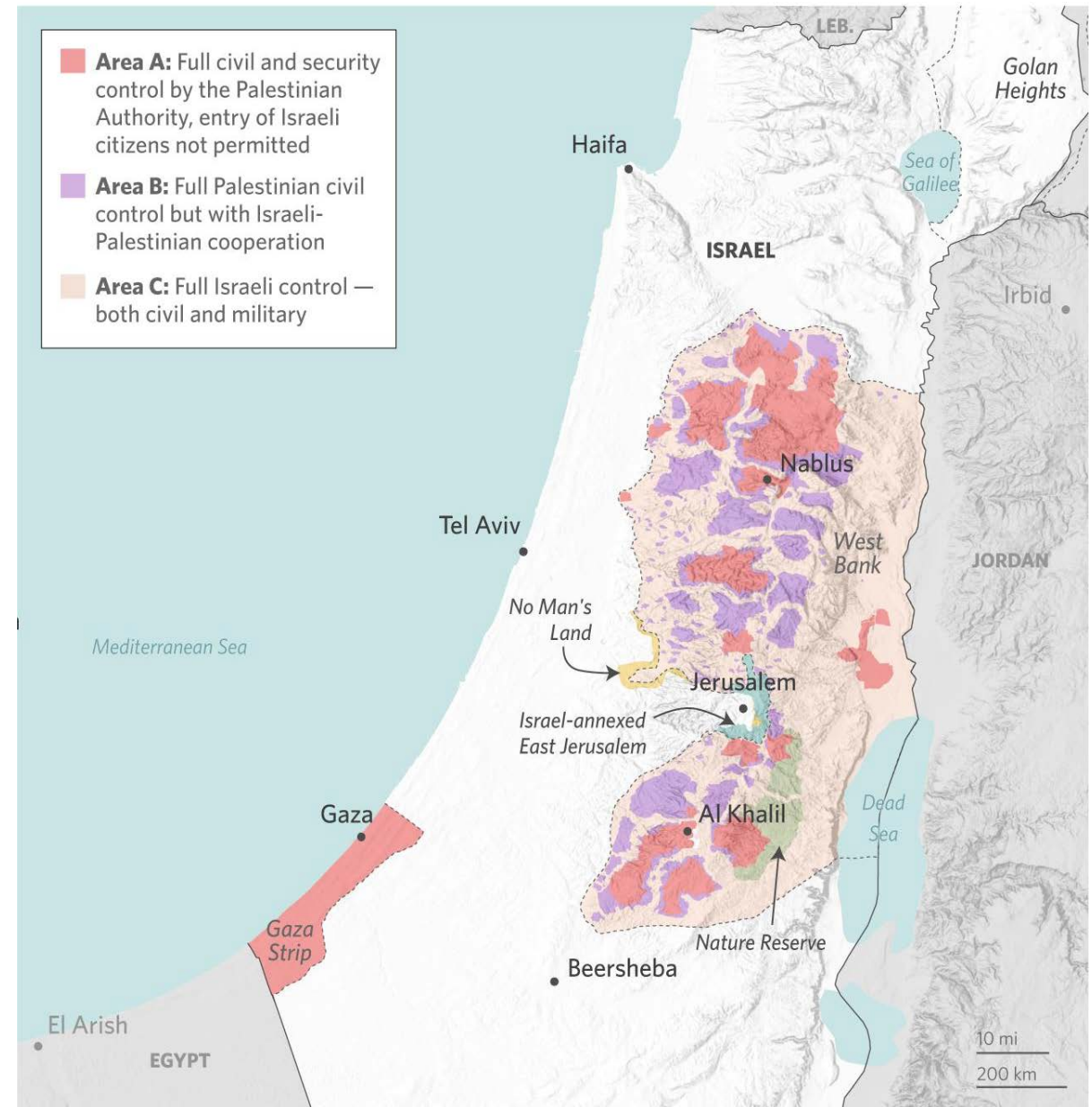
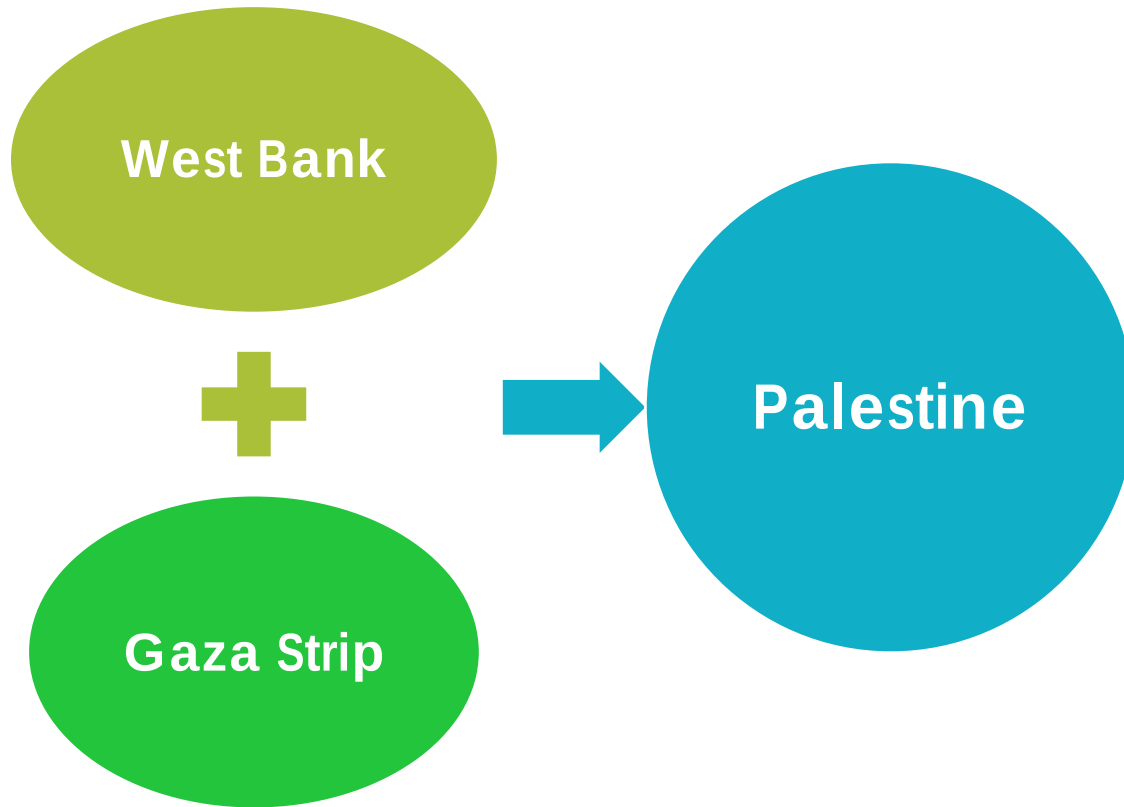
The Problem

Implementation of project in Countries with high geopolitical risks



The Problem

Implementation of project in the Occupied Palestinian Territories



The Problem

Implementation of project in the
Occupied Palestinian Territories

Gaza strip



The Problem

Implementation of project in the Occupied Palestinian Territories

West Bank



Objectives

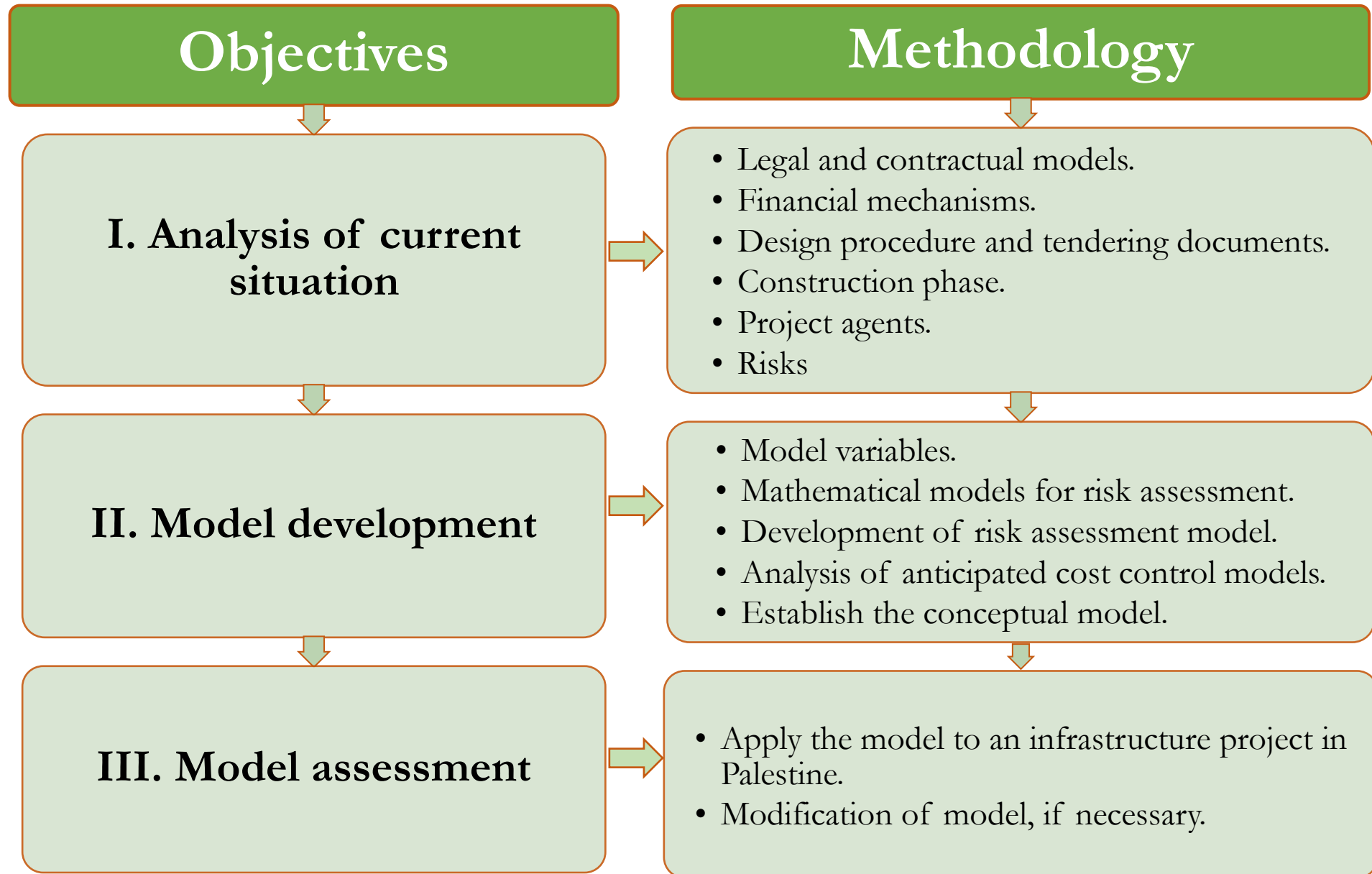
Main objective

To develop an anticipated management and control model for the implementation of infrastructure projects in countries with high geopolitical risks, the case of Palestine

Secondary Objectives

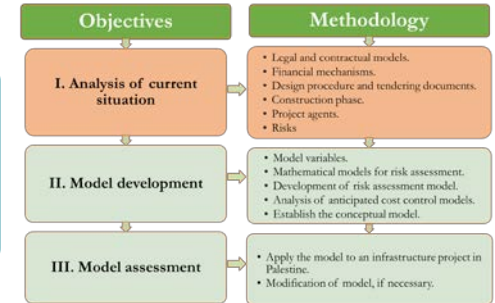
- **Analysis of the current situation for the implementation of infrastructure projects in Palestine.**
- **Development of conceptual model.**
- **Model application.**

Methodology



Results

Phase I: Analysis of the current situation for the implementation of infrastructure projects in Palestine



The concepts of systems theory were used to analyze the implementation process of infrastructure projects. This analysis includes the following:

- Boundaries of “Infrastructure project” System.
- Phases of the system life cycle.
- System agents:
 - Analysis of legal, contractual and project delivery methods.
 - Analysis of financial mechanisms.
 - Analysis of design procedure and tendering documents.
 - Analysis of construction phase.
- Infrastructure interdependency.

Results

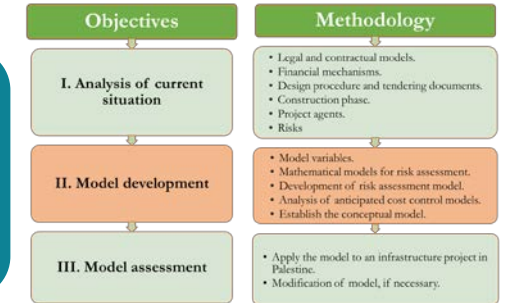
Phase II: Development of the Anticipated Cost Control model

Determination of model variables.

Analysis of mathematical models for risk assessment.

Development of risk assessment model.

Establish the general model.



Results

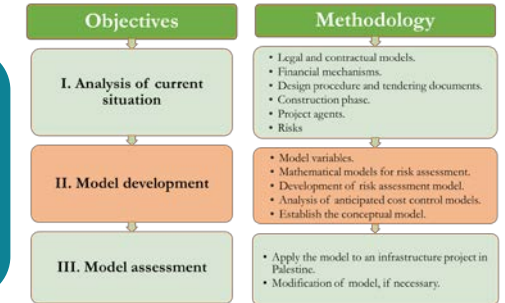
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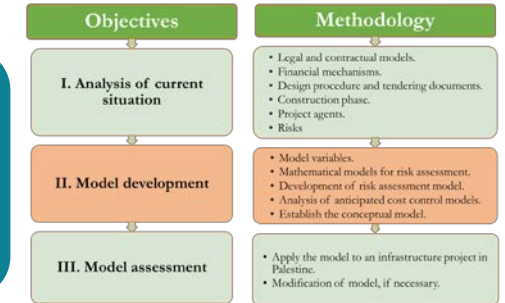


Results

Phase II: Development of the Anticipated Cost Control model

Determination of model variables.

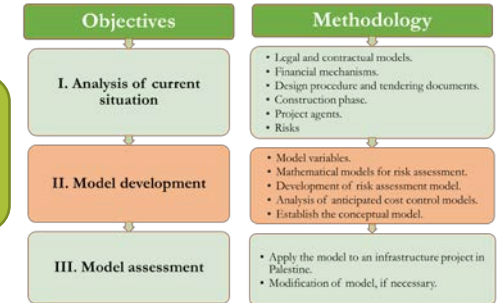
1. Identification and classification of model agents.
2. Identification and classification of risks that affect the implementation of the projects.



Results – Phase II

1. Model agents

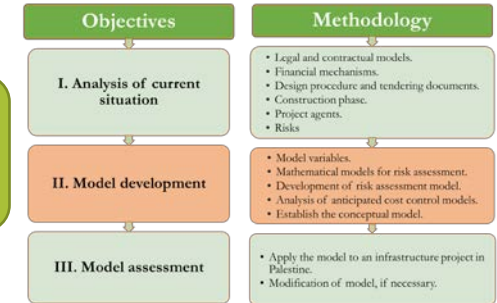
1. Promotors
2. Financing models
3. Legal regulation
4. Contractual models
5. Designers
6. Contractors
7. Project Managers
8. Type of Infrastructure



2. Risks affecting the implementation of construction projects

Methodology used to identify risk factors:

- Literature review:
 - Delays and cost overruns factors.
 - Variations and claims.
 - Contingency.
- Analysis of historical data for a sample of infrastructure projects:
 - 28 projects with 89 variation order.
- Risk classification - Risk Breakdown Structure (RBS).

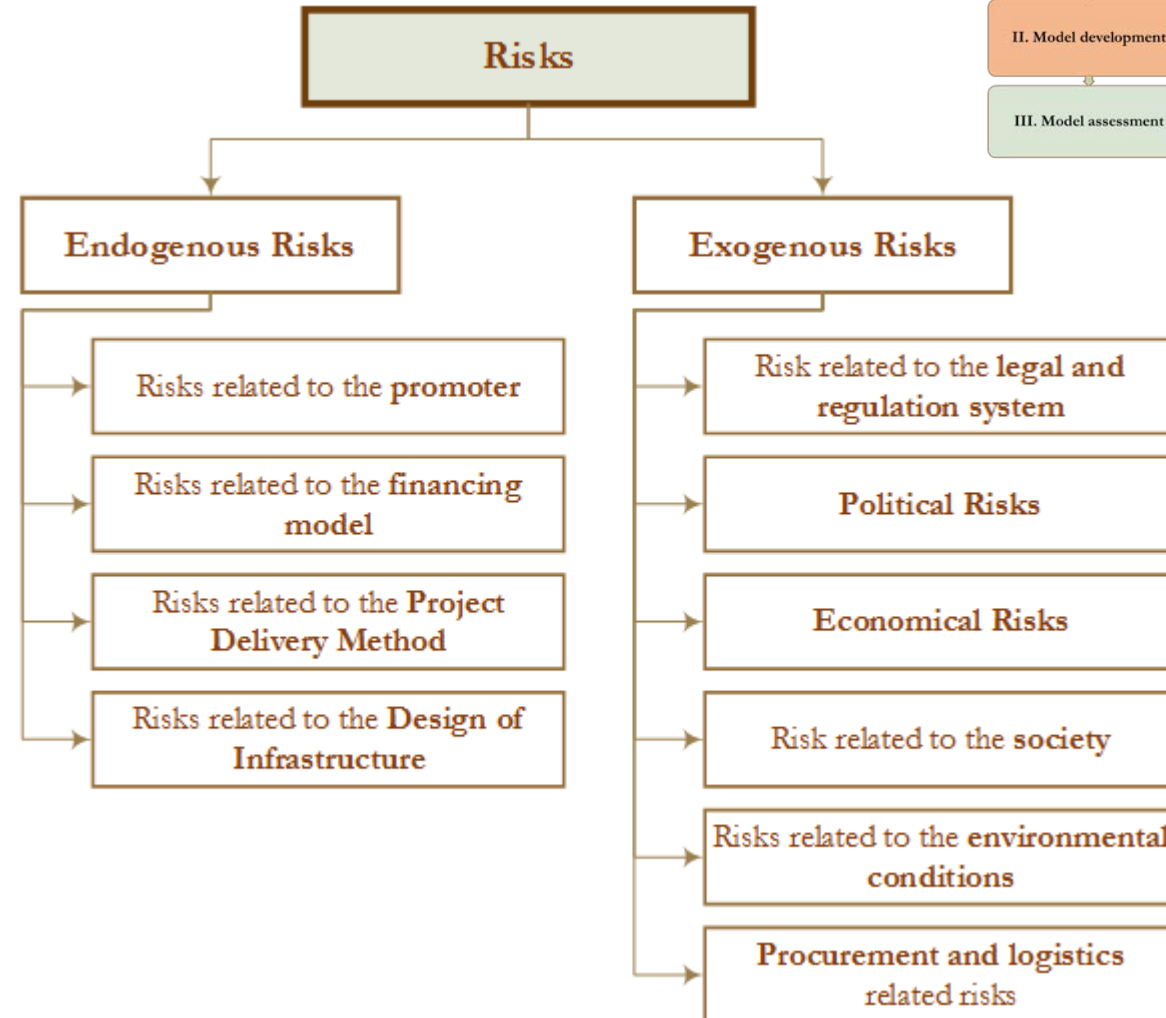


Results – Phase II

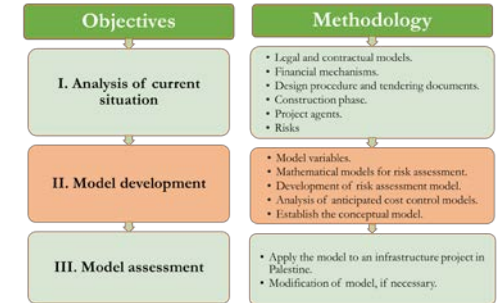
- Risk Breakdown Structure (RBS).**

Level 1 - System theory:
Endogenous and exogenous risks

Level 2 – Source of risk

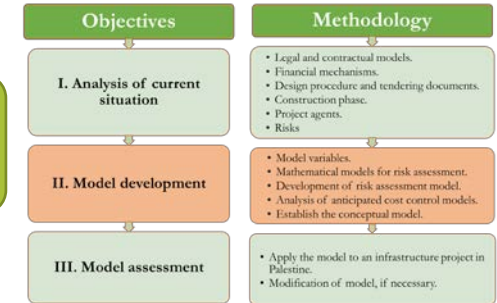
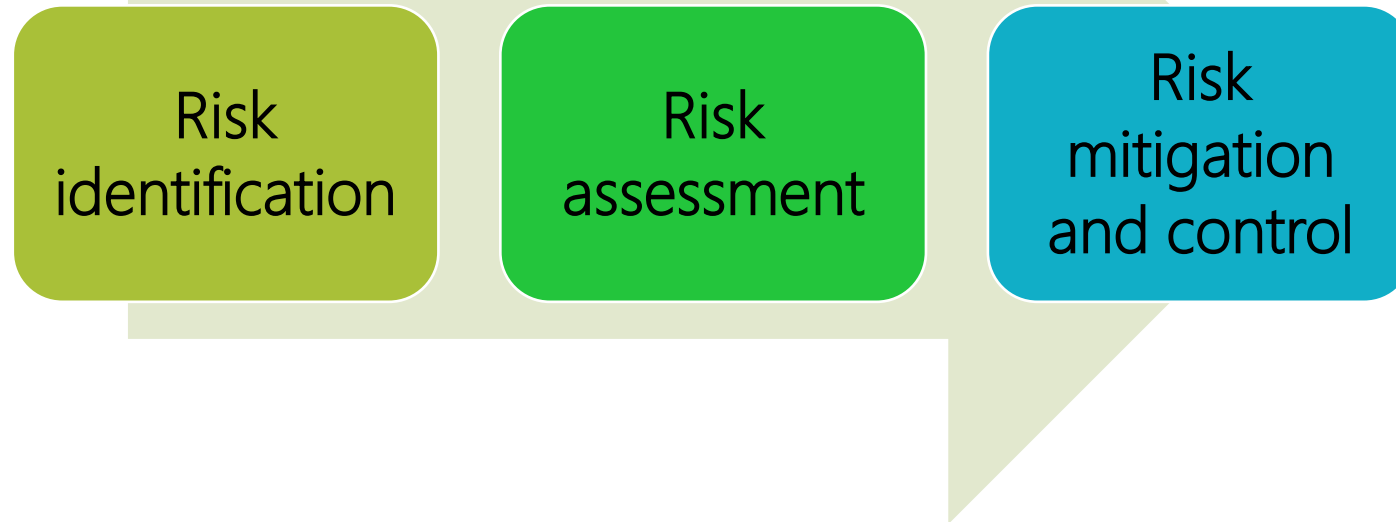


Risk Breakdown Structure



Results – Phase II

Risk Management process



Results

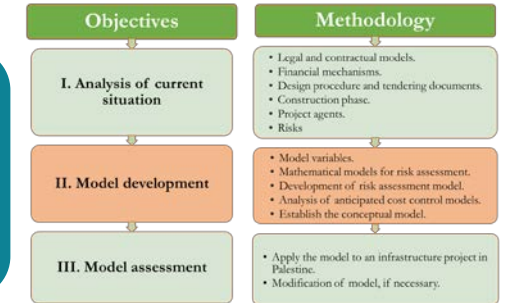
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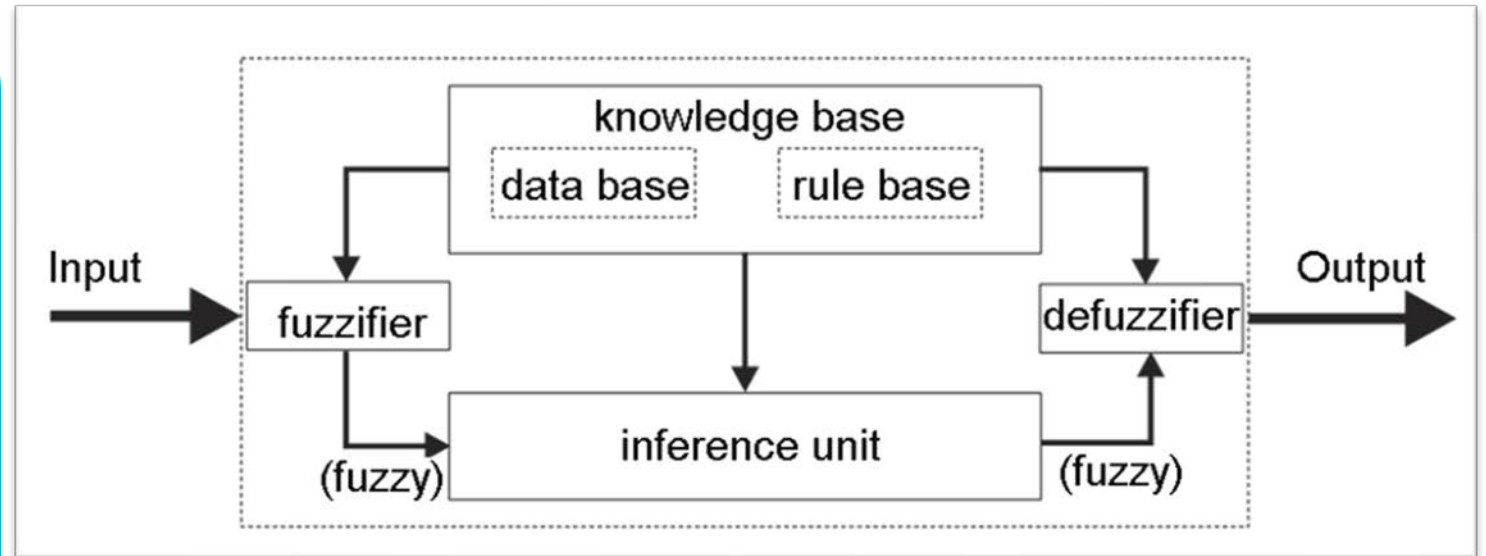
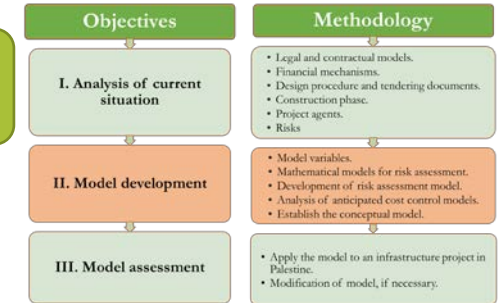


Fuzzy Contingency Estimator (FCE)

2. Fuzzy expert model

A fuzzy expert system consists of :

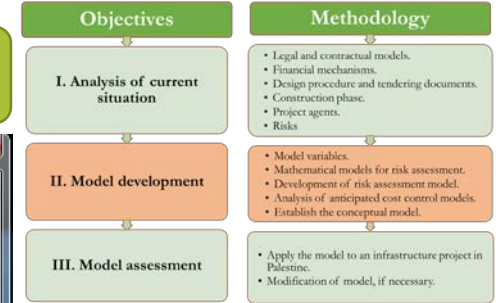
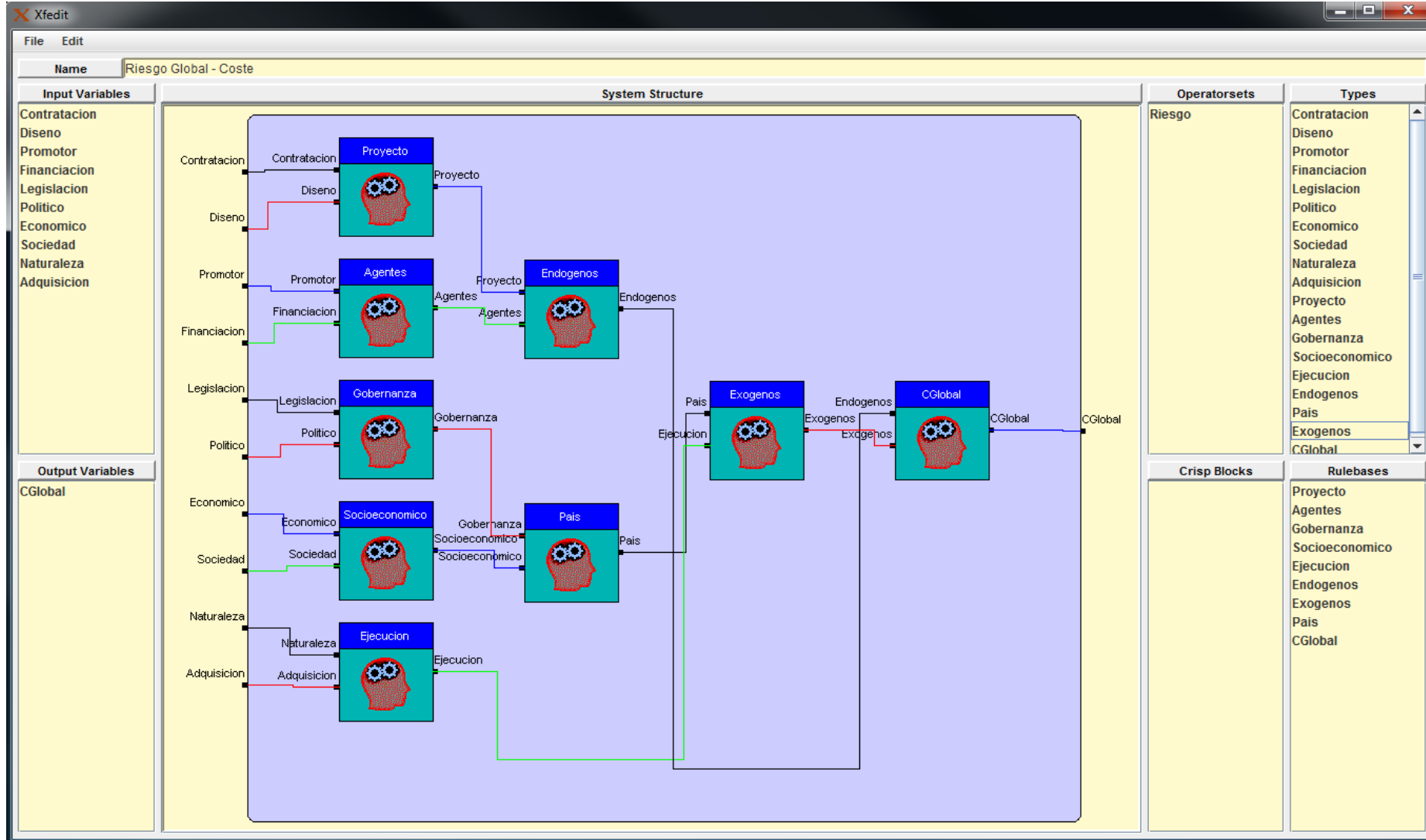
- A **fuzzification** interface that accepts input from the user.
- A **knowledge base** that consists of a rule base and a database;
- An **inference engine**.
- A **defuzzification** interface that provides output to the user.



A typical fuzzy expert system. Source: Thesis page 165

Results – Phase II

Fuzzy Contingency Estimator (FCE)



Results

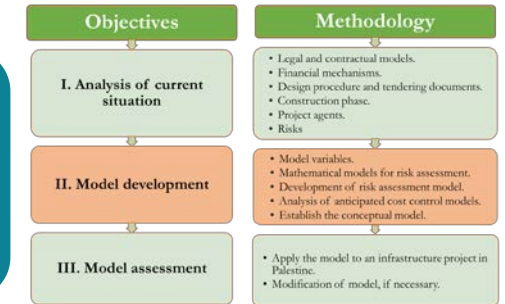
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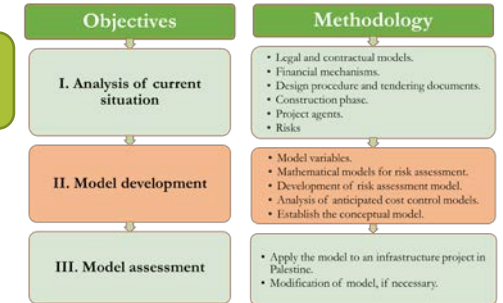


Results – Phase II

Establish the general model.

1. Model philosophy

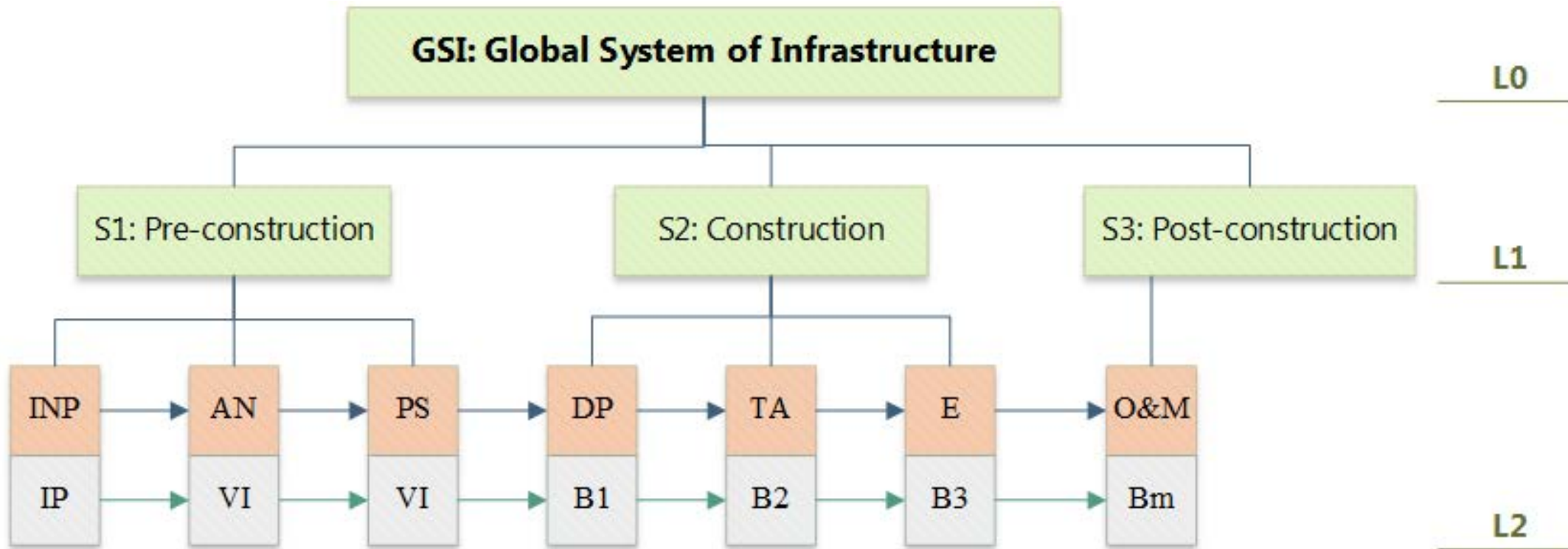
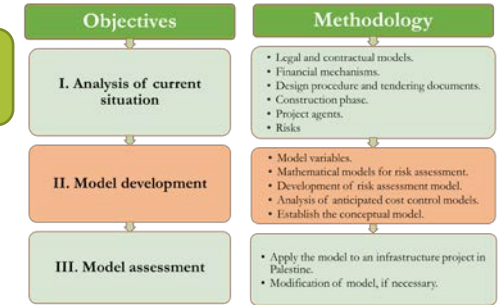
- **Easy to apply.**
- **Anticipate risks before they occur.**
- **Quantify, in advance and subjectively, the negative impacts of risks on project objectives - cost and time.**
- **Propose measures to avoid the negative impacts of risks.**
- **Establish mechanisms to mitigate the negative effects of uncontrollable risks.**



Results – Phase II

Establish the general model

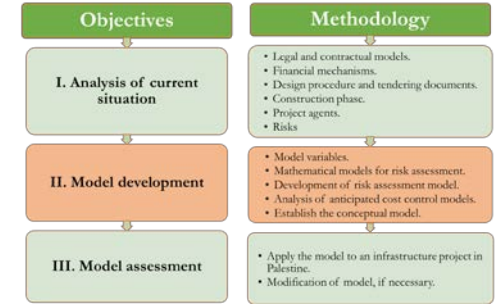
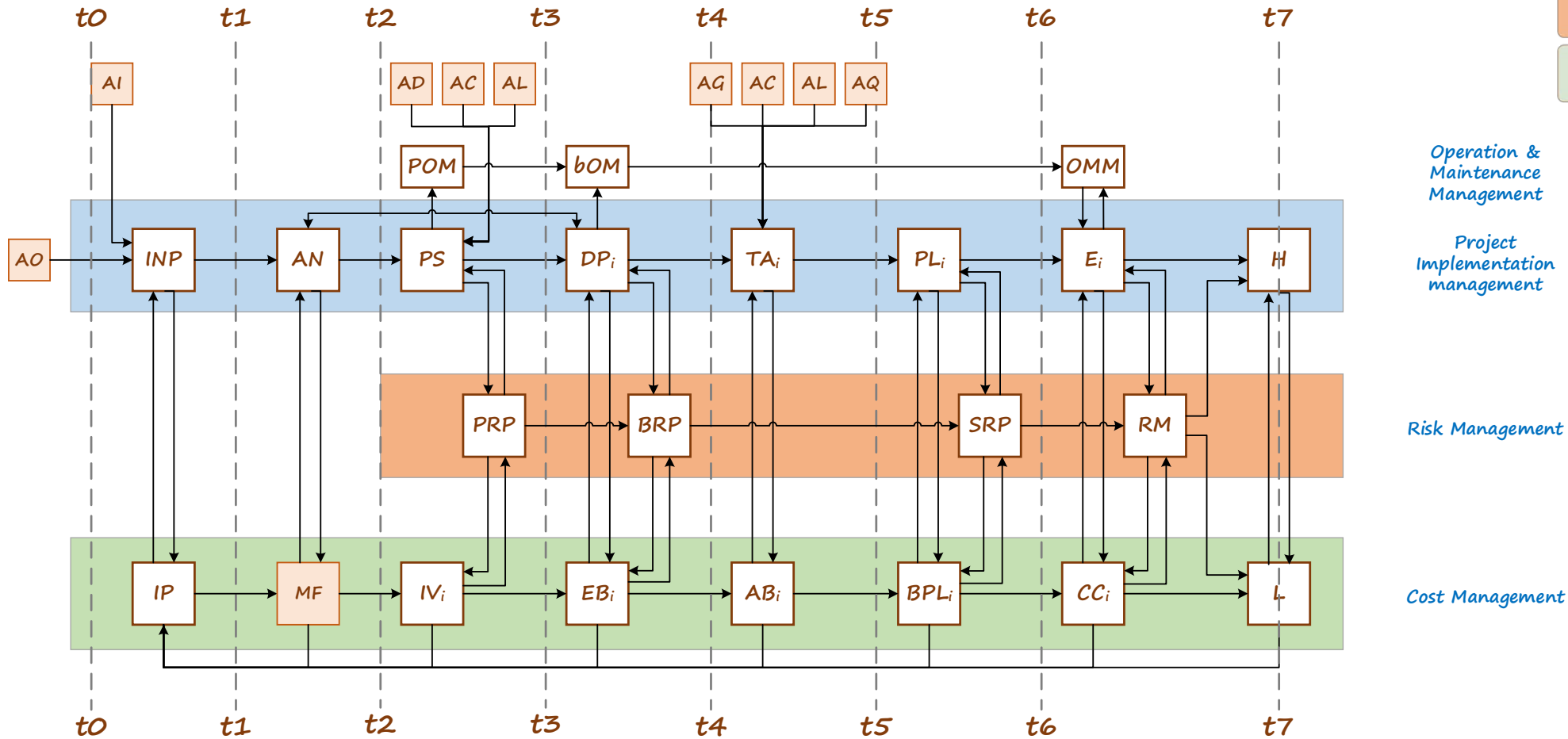
2. Systemic approach of the model



Systemic approach for CCA model.

Results – Phase II

4. Model description - diachronic analysis



Operation & Maintenance Management

Project Implementation management

Risk Management

Cost Management

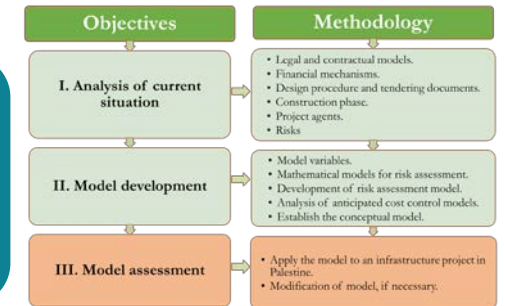
Results

Phase III: Model application

Construction of Reservoirs and Pumping Facilities Package I (GAZI):

Subproject 1: Construction of **Al Atatrah** Reservoir and Pumping Facilities”.

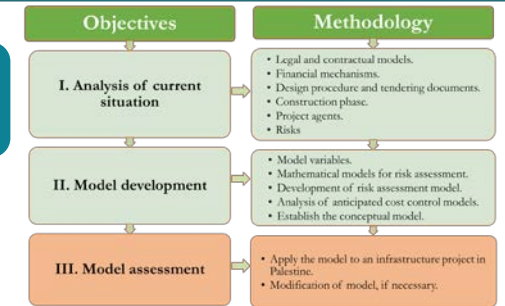
Subproject 2: Construction of **Nuseirat** Reservoir and Pumping Facilities.



Results

Phase III: Model application

Risk quantification

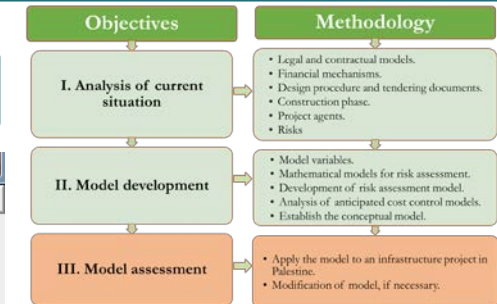
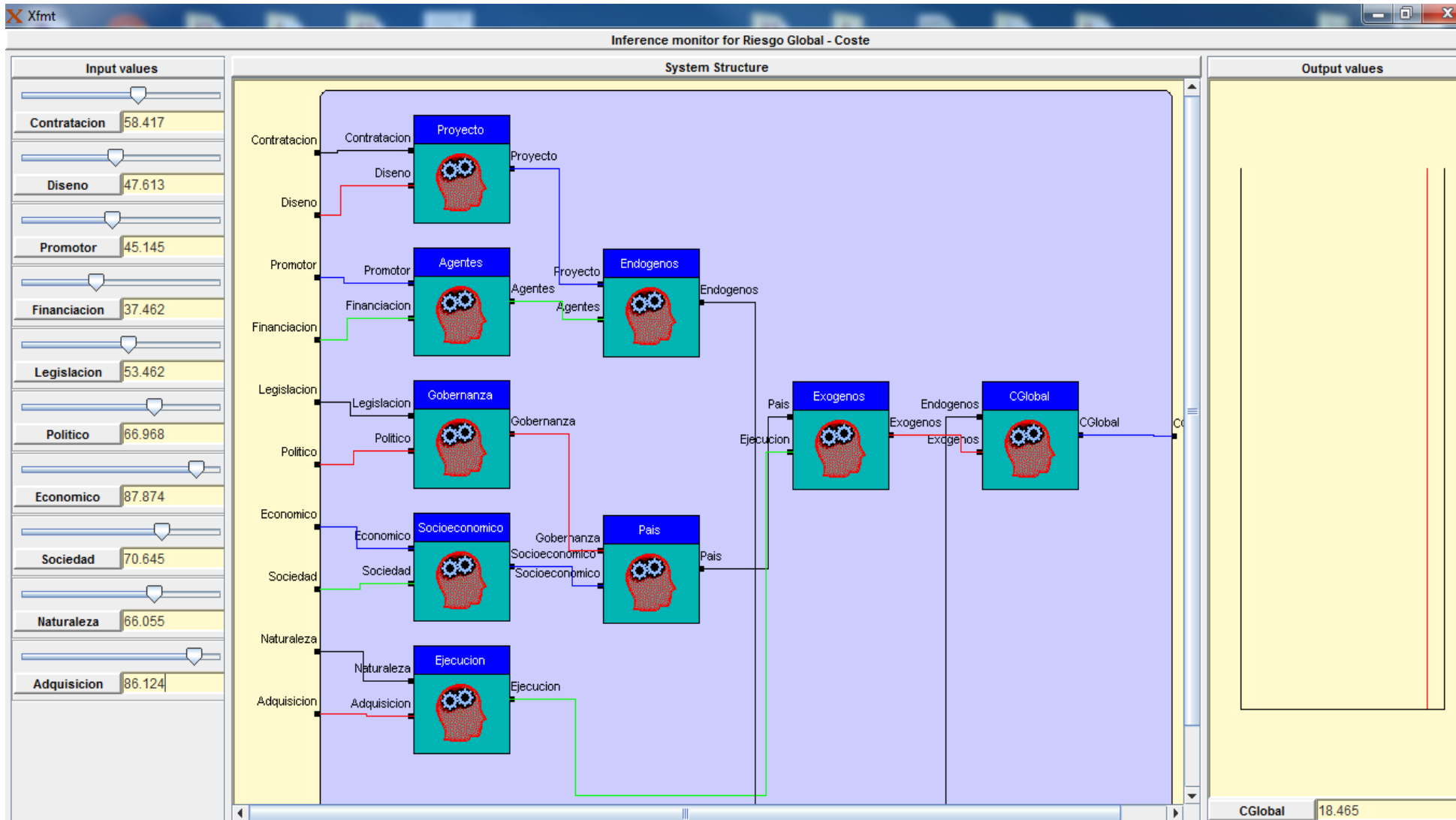


Risk Identification and Coding						Risk assessment and quantification during the Project Design stage													
						Risk Impact on Cost							Risk Impact on Time						
						Very Low	Low	Medium	High	Very Low	Low	Medium	High	Very Low	Low	Medium	High	Very Low	High
	Level 1		Level 2		Level 3														
RA	Procurement and Logistics related Risks	RA1	Restrictions on the movement of goods and personnel	RA11	Restrictions on the movement of goods														
				RA12	Restrictions on the movement of people		30								30				
		RA2	Resource acquisition restrictions as per Donors regulations	RA21	Delay in the Supply of Resources Due to the Requirements of the Procurement Procedure		30								40				
				RA22	Origin and Nationality restrictions		30								40				

Sample of risk impact evaluation during the design phase.

Results

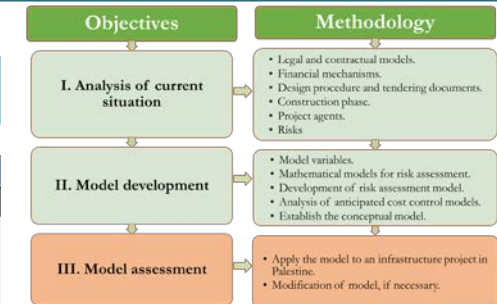
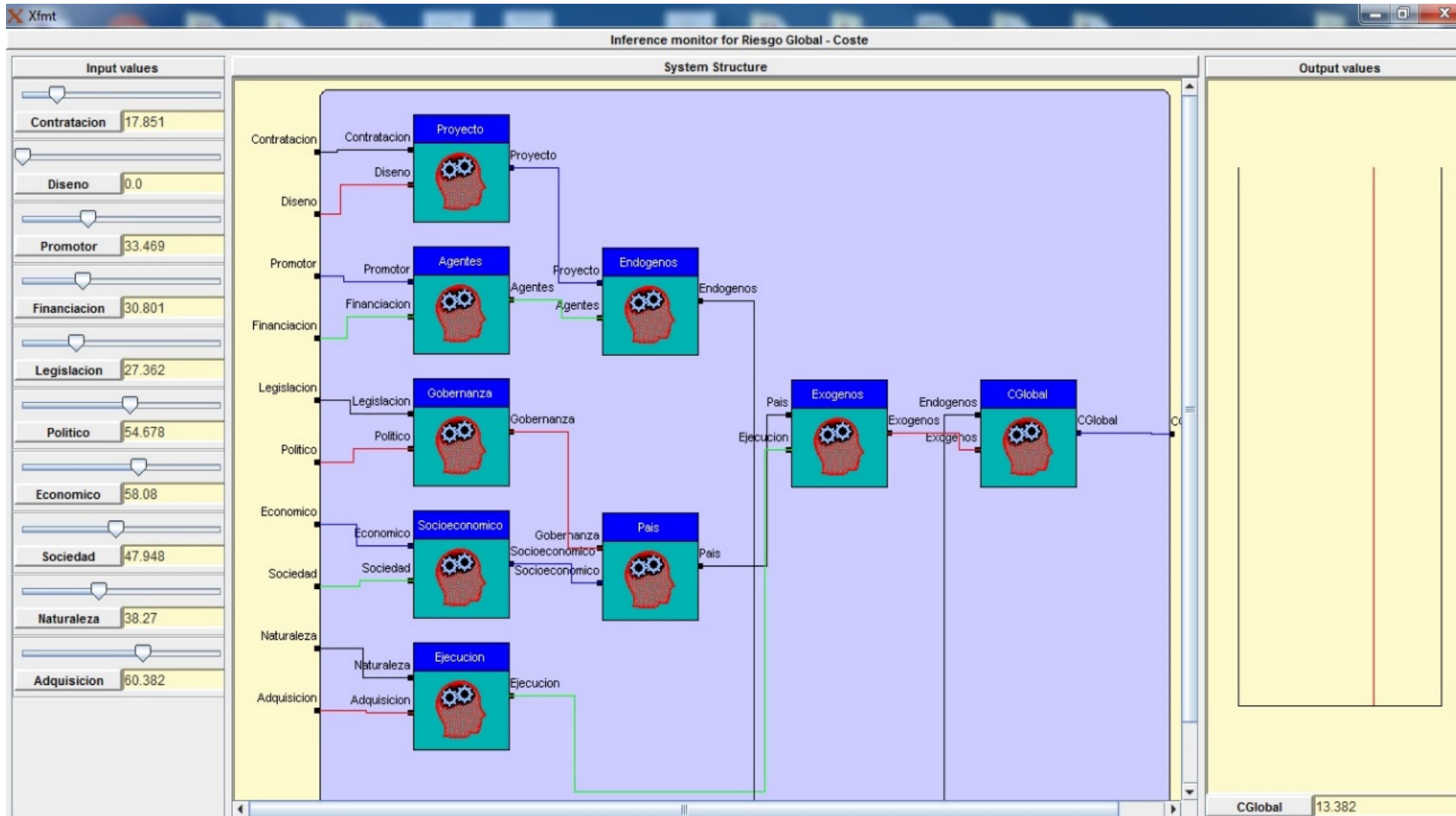
Phase III: Model application



Sample of risk impact assessment using FCE during the **design** phase.

Results

Phase III: Model application



Sample of risk impact assessment using FCE during the **Pre-liquidation** phase.

Future research

- **Development of anticipated cost control platform (software) for the implementation of infrastructure projects in countries with high geopolitical risk.**
- **Development of conceptual model for the analysis and assessment of infrastructure needs.**
- **Analyze the governance of infrastructures in Palestine.**
- **Development of cost estimation model and detailed cost index for construction projects in Palestine.**
- **Study the integration of System dynamics with fuzzy logic for assessment of risks and compare results with FCE model.**



THANK YOU