Integrating Scenarios in Multi-Criteria Decision Module for "Risk-CHANGES" platform

Olyazadeh R. (1), Bakker W. (2), Boerboom L. (2), Van Westen C. (2), Jaboyedoff M. (1), Derron M.-H. (1) (1) Risk-group - ISTE - Institute of Earth Sciences University of Lausanne, Switzerland (roya.olyazadeh@unil.ch), (2) ITC University of Twente, Enschede, Netherlands

Introduction

Multi-Criteria Decision Analysis (MCDA) offers the chance for a better decision on the future so it deserves consideration and attention. Combining MCA and future outcomes will improve the quality of the decision, avoid conflicts and save time



MCDA is defined based on different indicators As a result of changing risk under different scenarios and future years such as land use changes, climate changes or population growth, the indicator values will change. This leads to different results under different scenarios. Application of this study is to facilitate for decision makers the necessary parameters like values and weights using software support. The results of Cost Benefit Analysis and Risk Analysis under different scenarios for different future years will be automatically added to the indicator matrix for Multi-Criteria evaluation and comparison.





http://changes.itc.utwente.nl/CHANGES-SDSS

Contact Details: Roya.olyazadeh@unil.ch





Inputs:

Multi-Criteria Decision						
tudy Area: demo		✓ Project: alt	ernative and scenario		*	
Risk Information						
Risk: test3		✓ Scenario:	Business as usual	✓ Future Year:	2040	✓ Reload Risk Data
Cost Information						
Decision Information						
			Delegation Const			
Add a new Decision session Decision Session:	Business as usual		Reload Decision Sess	ion		
Add a new Decision session Decision Session:	Business as usual		Keload Decision Sess	ion		
Add a new Decision session Decision Session:	Business as usual		Reload Decision Sess	ion		
Add a new Decision session Decision Session: Decision Matrix Add Indicators	Eusiness as usual	ve Indicator	Keload Decision Sess	ion		
Add a new Decision session Decision Session: Decision Matrix Add Indicators Add Indicators Indicatorname	Criteria Definition	ve Indicator	Keload Decision Sess	_8		_9
Add a new Decision session Decision Session: Decision Matrix Add Indicators Add Indicators Indicatorname Conomic_risk_Business as usual_2020	Criteria Definition	ve Indicator _7 14029	Keload Decision Sess	_8 _91284		_9 942702.235
Add a new Decision session Decision Session: Decision Matrix Add Indicators Selection of indicators indicatorname conomic_risk_Business as usual_2020 conomic_risk_Business as usual_2030	Criteria Definition	ve Indicator _7 14029 16119	16.93 14.14	_8 291284 350914.33		_9 942702.235 1176205.805
Add a new Decision session Decision Session: Decision Matrix Add Indicators Add Indicators Indicatorname Conomic_risk_Business as usual_2020 Conomic_risk_Business as usual_2030 Conomic_risk_Business as usual_2040	Criteria Definition Weight Remo _6 698560.06 937767.52 1383314.295	ve Indicator _7 14029 16119 18139	 Reload Decision Sess 6.93 4.14 17.925 	_8 291284 350914.33 426077.175		_9 942702.235 1176205.805 1610512.39
Add a new Decision session Decision Session: Decision Matrix Add Indicators Selection of indicators indicatorname economic_risk_Business as usual_2020 economic_risk_Business as usual_2030 economic_risk_Business as usual_2040 population_risk_Business as usual_2020	Business as usual Criteria Definition ③ Weight ④ Remo 6 698560.06 937767.52 1383314.295 18.595	ve Indicator _7 14029 16119 18139 0.245	 Reload Decision Sess 16.93 14.14 17.925 	_8 291284 350914.33 426077.175 5.89		_9 942702.235 1176205.805 1610512.39 9.35
Add a new Decision session Decision Session: Decision Matrix Add Indicators Selection of indicators indicatorname conomic_risk_Business as usual_2020 conomic_risk_Business as usual_2030 conomic_risk_Business as usual_2040 population_risk_Business as usual_2020 population_risk_Business as usual_2030	Business as usual Criteria Definition ③ Weight ④ Remo _6 698560.06 937767.52 1383314.295 18.595 22.3	ve Indicator7 14029 16119 18139 0.245 0.64	16.93 14.14 17.925	8 291284 350914.33 426077.175 5.89 7.275		_9 942702.235 1176205.805 1610512.39 9.35 11.66

Indicators and alternatives matrix under different scenarios and future year:

Current situation:6, Alternative1:7, Alternative2:8, Alternative 3:9



Standardization

Select the method:	Direct Weight				
Prioritize Criteria	S				
Name		Weight	Normalized Wei		
groupindicator:	: system				
economic_risk_Most realistic_2020		4	0.33		
population_risk_Most realistic_2020		2	0.17		
economic_risk_Most realistic_2030		2	0.17		
population_risk_Most realistic_2030		1	0.08		
economic_risk_Mos	t realistic_2040	2	0.17		
nonulation risk Mo	st realistic 2040	1	0.08		

Prioritize Normalized weights





ernal Rate of Return Business as usual 2020 t Present Value No scenario 204 0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 **Results of WSM**

MCE based on Risk and Cost system indicators under different future years. Cost prioritized as the most important indicator (70%) Alternative 9 called as Relocation and Alternative 7 called as Engineering Solution ranked as the best.



Conclusion

This work shows the effect of Multi Criteria Evaluation for analyzing changing risk over the time for different future scenarios and by comparing the results by means of a numerical and graphical view within the system. We believe that Scenario combined with MCDA helps decision-makers to achieve better solutions by expressing their preferences for strategies within and across future scenarios comparison.



