

The application of Analytical Hierarchy Process in combination with PESTEL-SWOT analysis to assess the hydrocarbons sector in Cyprus

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PRESENTATION CONTENTS

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2. METHODS

3. RESULTS

4. CONCLUSIONS -
RECOMMENDATIONS

➤ PURPOSE

Application of AHP
and PESTEL – SWOT
combination
method

Cyprus
Hydrocarbons
sector assessment
using AHP
pairwise compared
resulting to a size
for each indicator



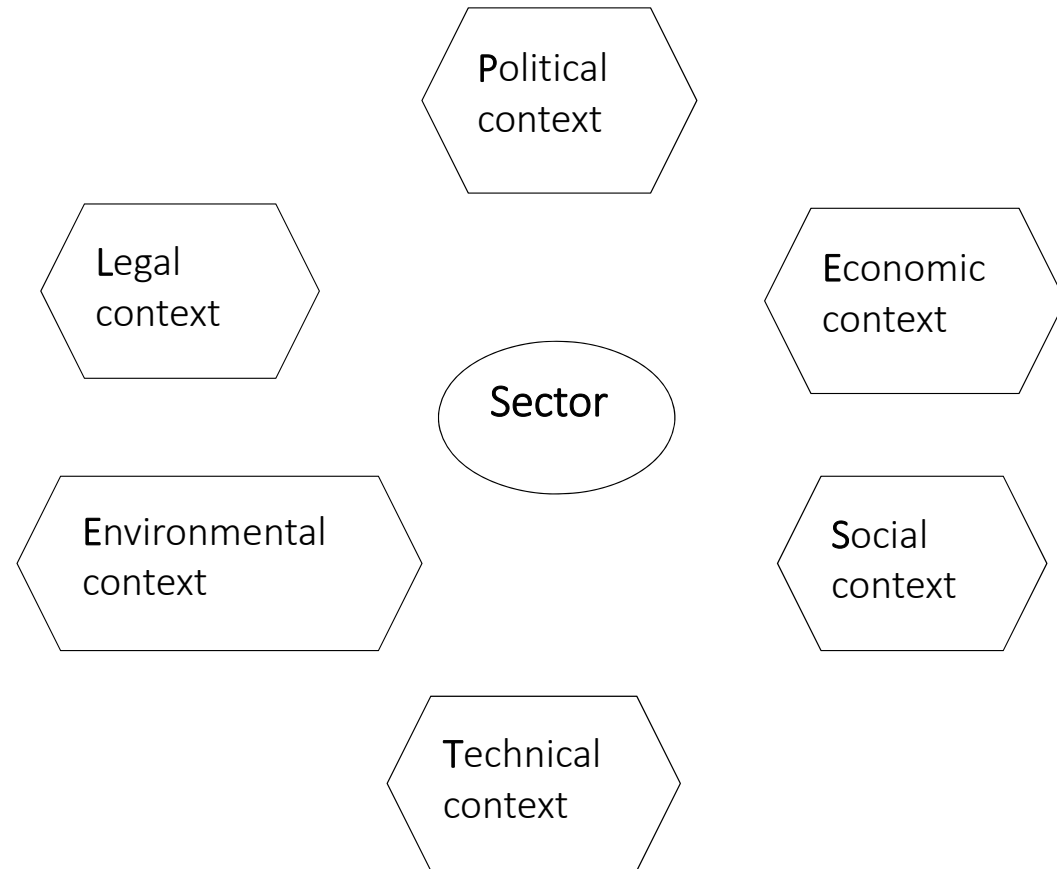
Aphrodite A2a exploration drilling, Cyprus EEZ, plot 12
(Hydrocarbons Service, 2018)

Cyprus is an island whose energy production is almost completely dependent on imported hydrocarbon fuels. Its electricity production sector is more than 80% depended on oil products while the remaining 20 % are covered by imports of coal (5%) and by renewable energy sources (RES) (15%).

METHODS

PESTEL analysis

for external
contents



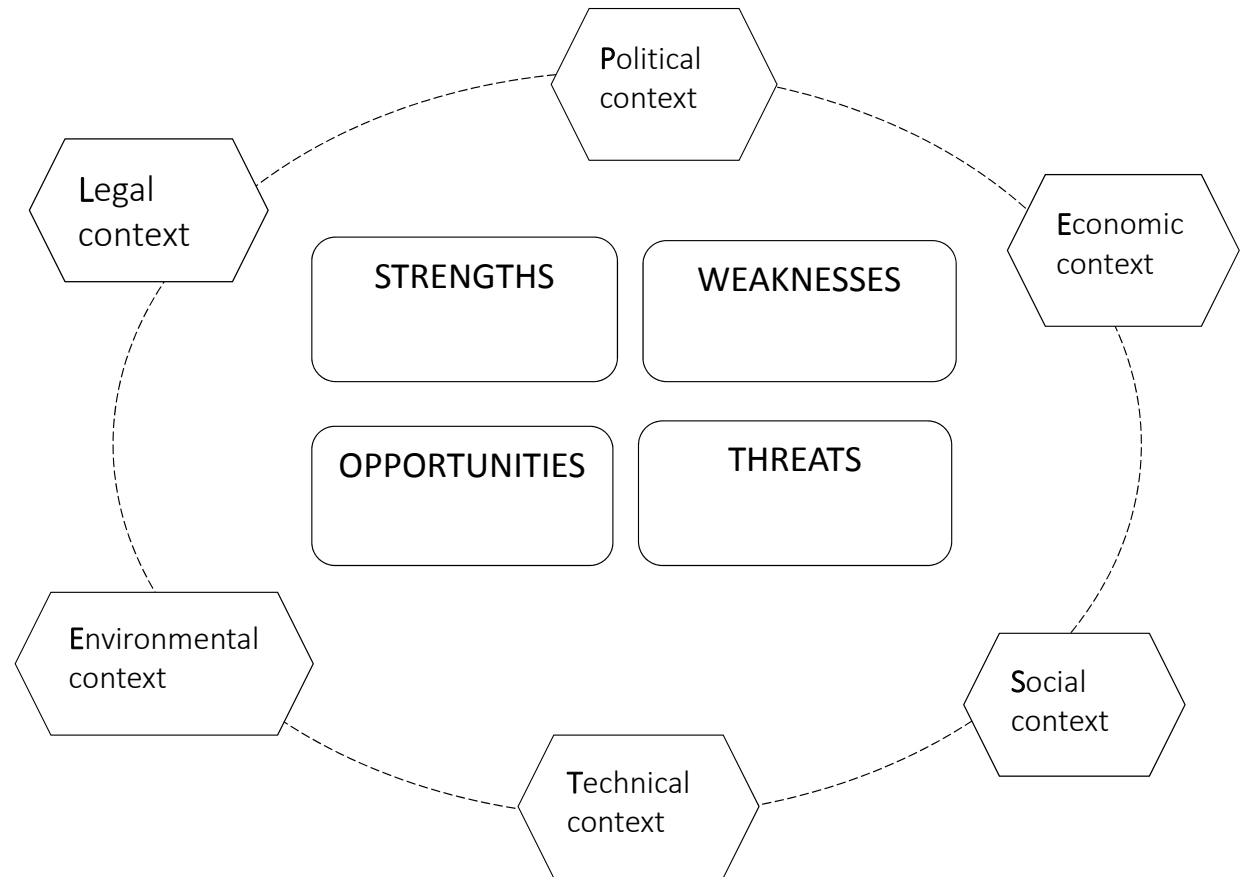
METHODS

SWOT analysis



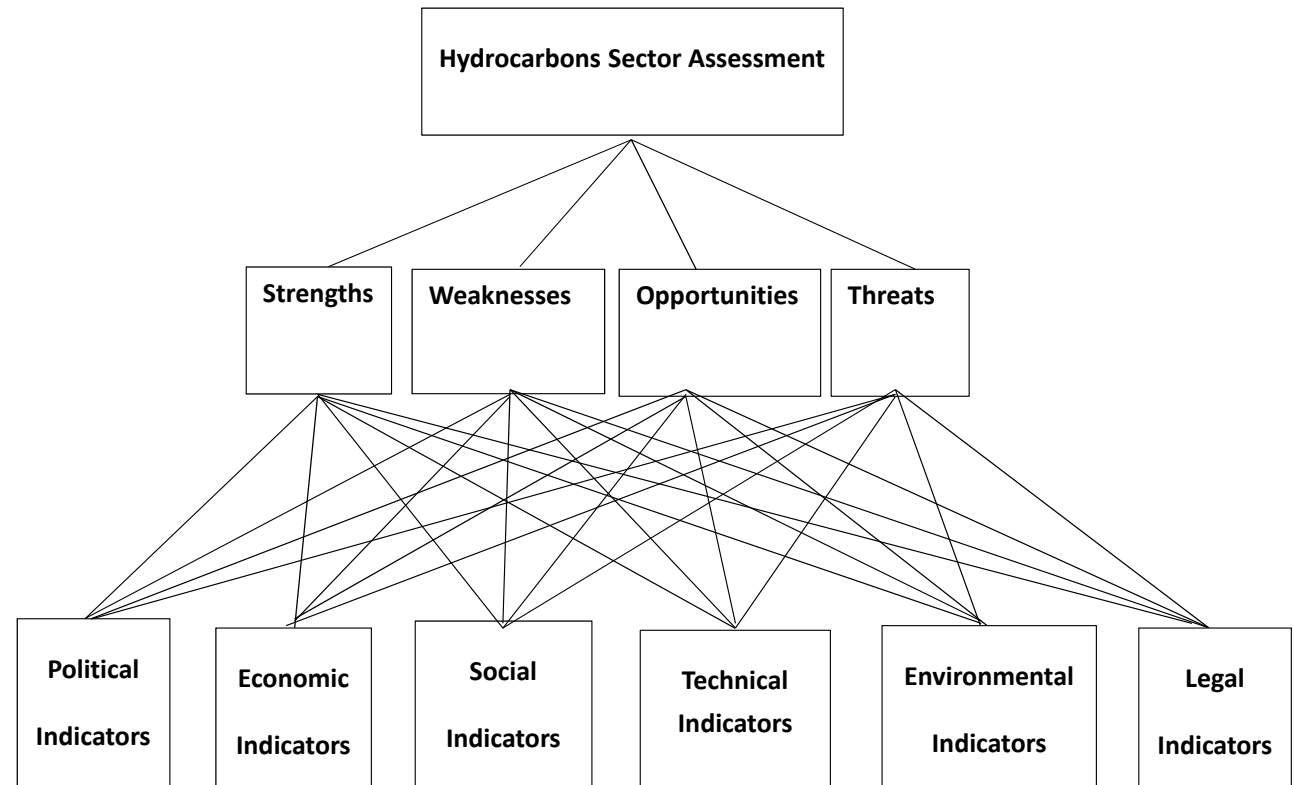
METHODS

PESTEL – SWOT SUSTAINABILITY INDICATORS DEVELOPMENT METHOD



METHODS

ASSESSMENT PROBLEM STRUCTURE



METHODS INDICATORS QUANTIFICATION METHOD

- to weight the alternatives based on the pairwise comparison of the importance

-The indexes quantification method is based on the proposal of AHP where verbal comparison judgments are transformed into numerical quantities in a 1 to 9 scale (1 for equal importance judgements to 9 for absolutely more important judgements). In a similar approach, P-E-S-T-L issues of Cyprus hydrocarbons sector are pairwise compared and evaluated by using the above judgement choices. This produce a quantity for each indicator according to the issue it is related to

9	First issues are of absolutely higher importance
7	First issues are of very strongly or demonstrably higher importance
5	First issues are of strongly higher importance
3	First issues are of higher importance
1 (-1)	The compared issues are of equal importance
- 3	Latter issues are of higher importance
- 5	Latter issues are of strongly higher importance
- 7	Latter issues are of very strongly or demonstrably higher importance
- 9	Latter issues are of absolutely higher importance

METHODS IMPORTANCE PAIRWISE COMPARISON

The assesment is based on the judgements of four evaluators who pairwise compare the importance of the Political, Economic, Social, Technical, Environmental and Legal issues of the hydrocarbons sector in Cyprus

EVALUATORS

Political vs Economic
Political vs Social
Political vs Technical
Political vs Environmental
Political vs Legal
Technical vs Environmental
Technical vs Legal
Legal vs Environmental

Economic vs Social
Economic vs Technical
Economic vs Environmental
Economic vs Legal
Social vs Technical
Social vs Environmental
Social vs Legal

**Environment
Expert**

**Hydrocarbons
Expert**

**Economy
Expert**

**Environmental
Expert**

RESULTS

CYPRUS HYDROCARBONS SECTOR PESTEL ANALYSIS

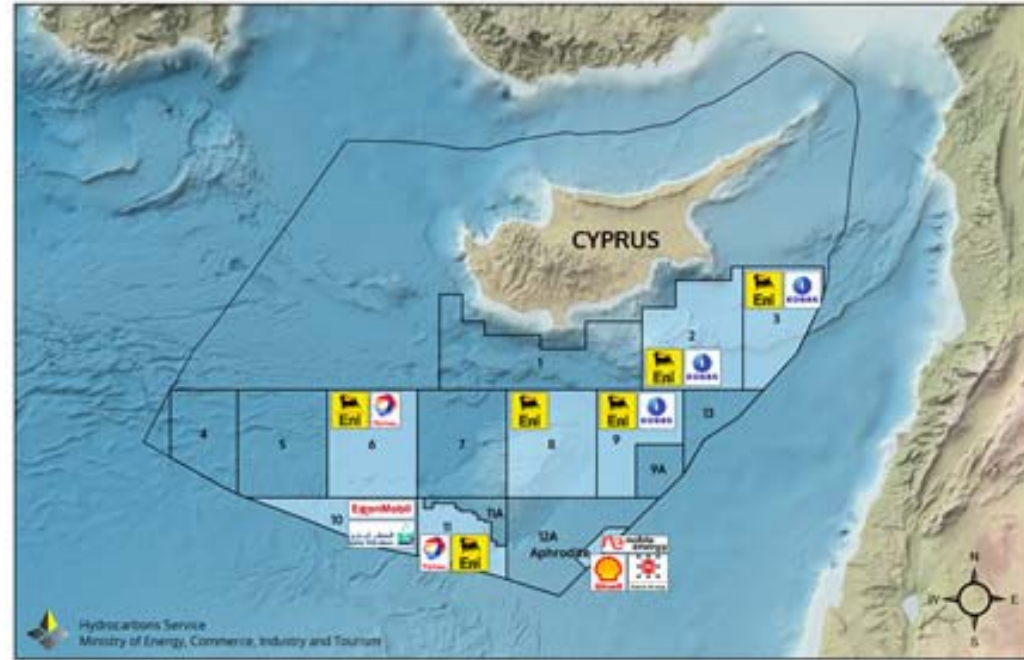
P=Cy is divided

Ec= Cy is in euro zone, GDP increase
+3.3% in 2017, NG price

Tec= EEZ consist of 13 blocks, East
Med Pipeline is EU project

En= Marine pollution, Toxicity, H&S

L= Laws in place



Hydrocarbons Exploration licenses and licensed companies map
(Hydrocarbons Service, 2018)

RESULTS

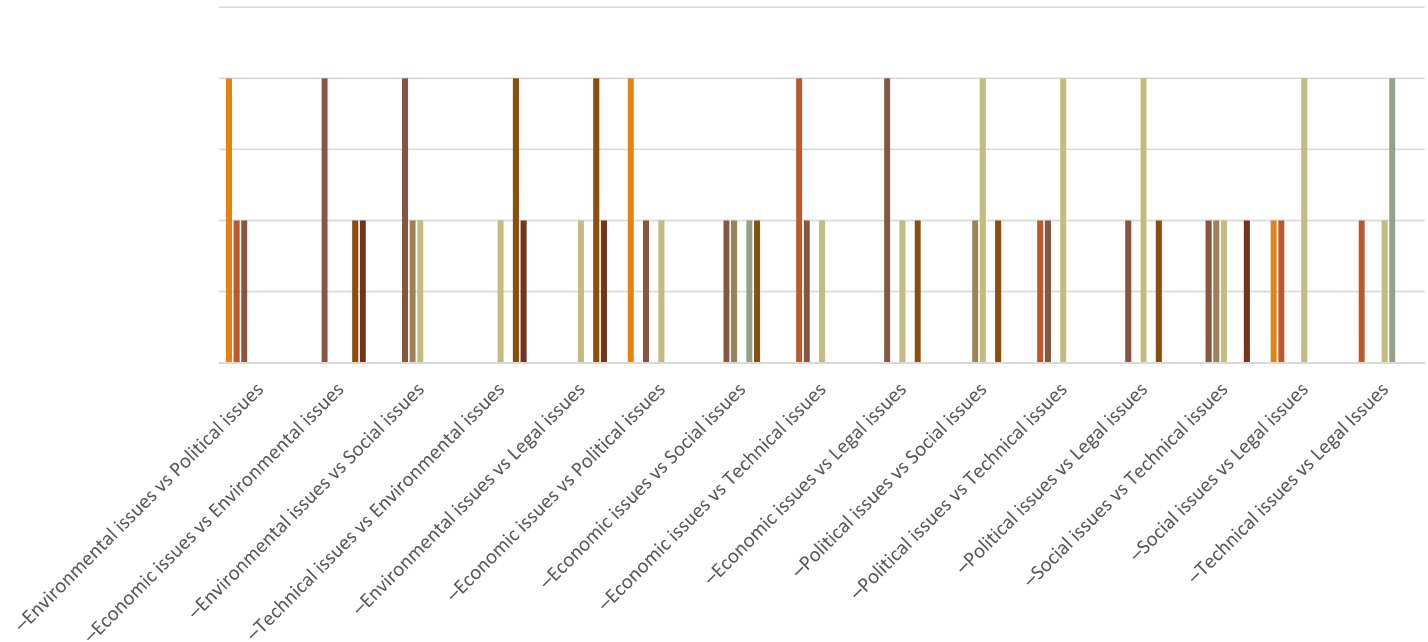
FORMED SUSTAINABILITY INDICATORS

Indicators	Strengths	Weaknesses	Opportunities	Threats
Political			P1. EU membership	P2. Cyprus Problem
Economic	E1. NG price		E2. Cyprus GDP growth	
Social	S1. Sector Employment needs	S2. H&S risks		S3. Social Acceptance
Technical	T1. Interconnection pipeline		T2. Energy Demand rise	
Environmental	EN1:NG environmental benefits as fossil fuel	EN2: NG extraction Environmental Impacts		
Legal	L1. Legislative context			

RESULTS

PAIRWISE COMPARISONS

Pairwise comparison results



- FIRST ARE OF ABSOLUTELY HIGHER IMPORTANCE
- FIRST ARE OF VERY STRONGLY OR DEMONSTRABLY HIGHER IMPORTANCE
- FIRST ARE OF STRONGLY HIGHER IMPORTANCE
- FIRST ARE OF HIGHER IMPORTANCE
- THESE ARE OF EQUAL IMPORTANCE
- LATTER ARE OF HIGHER IMPORTANCE
- LATTER ARE OF STRONGLY HIGHER IMPORTANCE
- LATTER ARE OF VERY STRONGLY OR DEMONSTRABLY HIGHER IMPORTANCE
- LATTER ARE OF ABSOLUTELY HIGHER IMPORTANCE

RESULTS

PAIRWISE COMPARISON RESULTS

According to the AHP weigh of each criteria obtaining method based proposed process As comparison value is used the rounded average value for each comparison. (+) for the first and (–) for the latter issue compared

Indicators from the same category are considered as of equal importance

Average evaluation is rounded

Average 0 is rounded to 1

	FIRST ARE OF ABSUTELY HIGHER IMPORTAN CE	FIRST ARE OF VERY OR DEMONST RABLY HIGHER IMPORTAN CE	FIRST ARE OF STRONGLY HIGHER IMPORTAN CE	FIRST ARE OF HIGHER IMPORTAN CE	THESE ARE OF EQUAL IMPORTAN CE	LATTER AR E OF HIGHER IMPORTAN CE	LATTER AR E OF STRONGLY HIGHER IMPORTAN CE	LATTER AR E OF VERY OR DEMONST RABLY HIGHER IMPORTAN CE	LATTER AR E OF ABSUTELY HIGHER IMPORTAN CE	AVERAGE EVALUATIO N
	9	7	5	3	1 (-1)	-3	-5	-7	-9	
–Environmental issues vs Political issues	2	1	1	0	0	0	0	0	0	8
–Economic issues vs Environmental issues	0	0	2	0	0	0	1	1	0	-1
–Environmental issues vs Social issues	0	0	2	1	1	0	0	0	0	3
–Technical issues vs Environmental issues	0	0	0	0	1	0	2	1	0	-4
–Environmental issues vs Legal issues	0	0	0	0	1	0	2	1	0	-4
–Economic issues vs Political issues	2	0	1	0	1	0	0	0	0	6
–Economic issues vs Social issues	0	0	1	1	0	1	1	0	0	1
–Economic issues vs Technical issues	0	2	1	0	1	0	0	0	0	5
–Economic issues vs Legal issues	0	0	2	0	1	0	1	0	0	1
–Political issues vs Social issues	0	0	0	1	2	0	1	0	0	-1
–Political issues vs Technical issues	0	1	1	0	2	0	0	0	0	3
–Political issues vs Legal issues	0	0	1	0	2	0	1	0	0	1
–Social issues vs Technical issues	0	0	1	1	1	0	0	1	0	1
–Social issues vs Legal issues	1	1	0	0	2	0	0	0	0	4
–Technical issues vs Legal Issues	0	1	0	0	1	2	0	0	0	1

RESULTS

QUANTIFIED INDICATORS

After
Consistency Ratio
improvement

Processing with AHP
Online System – BPMSG
Software

<https://bpmsg.com/academic/ahp.php>

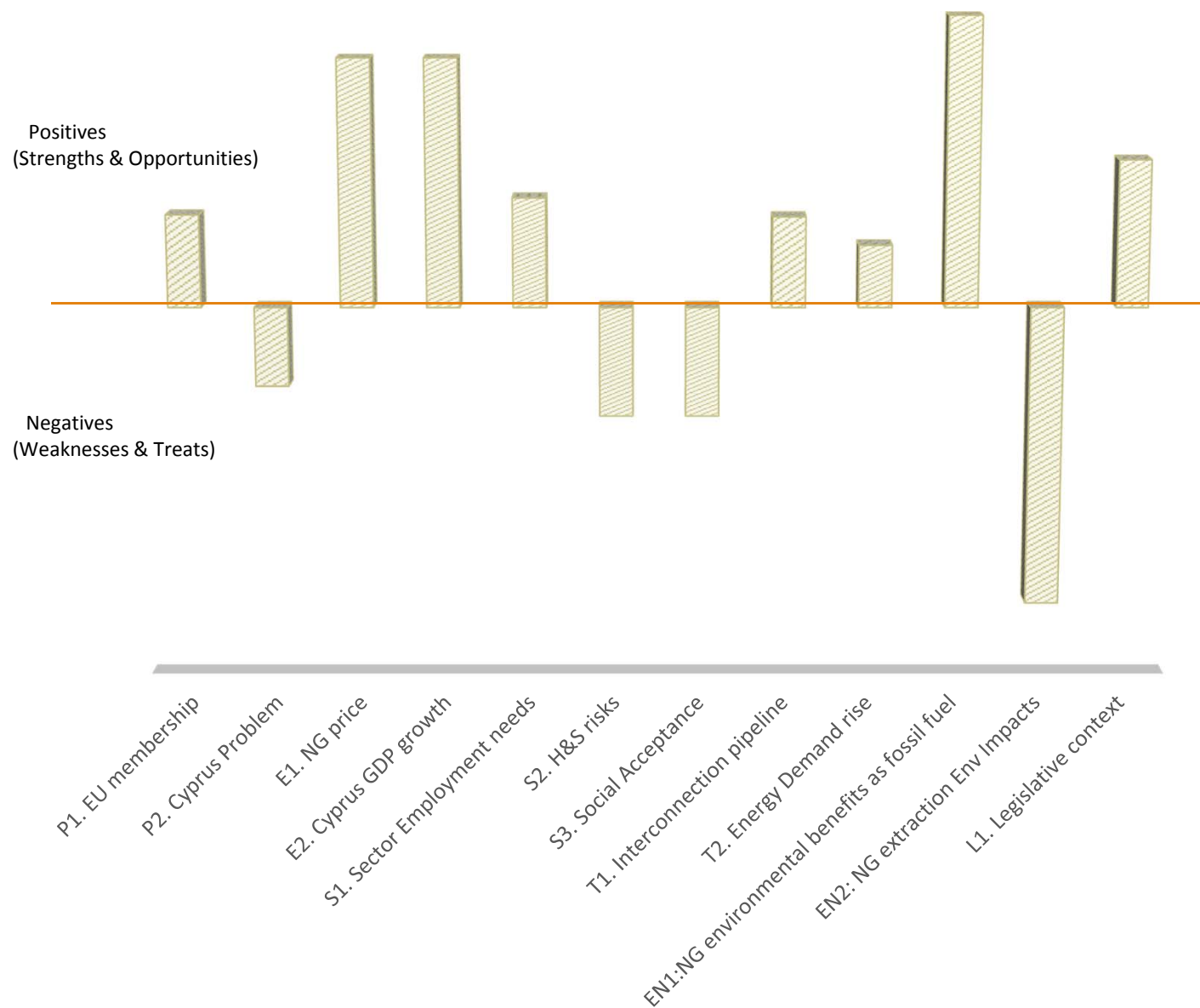
Category		Priority	Rank
1	P1. EU membership	4.9%	9
2	P2. Cyprus Problem	4.2%	11
3	E1. NG price	13.1%	3
4	E2. Cyprus GDP growth	13.1%	3
5	S1. Sector Employment needs	5.8%	6
6	S2. H&S risks	5.8%	6
7	S3. Social Acceptance	5.8%	6
8	T1. Interconnection pipeline	4.8%	10
9	T2. Energy Demand rise	3.3%	12
10	EN1:NG environmental benefits as fossil fuel	15.3%	2
11	EN2: NG extraction Env Impacts	16.0%	1
12	L1. Legislative context	7.8%	5

Number of comparisons = 66

Consistency Ratio CR = 9.4%

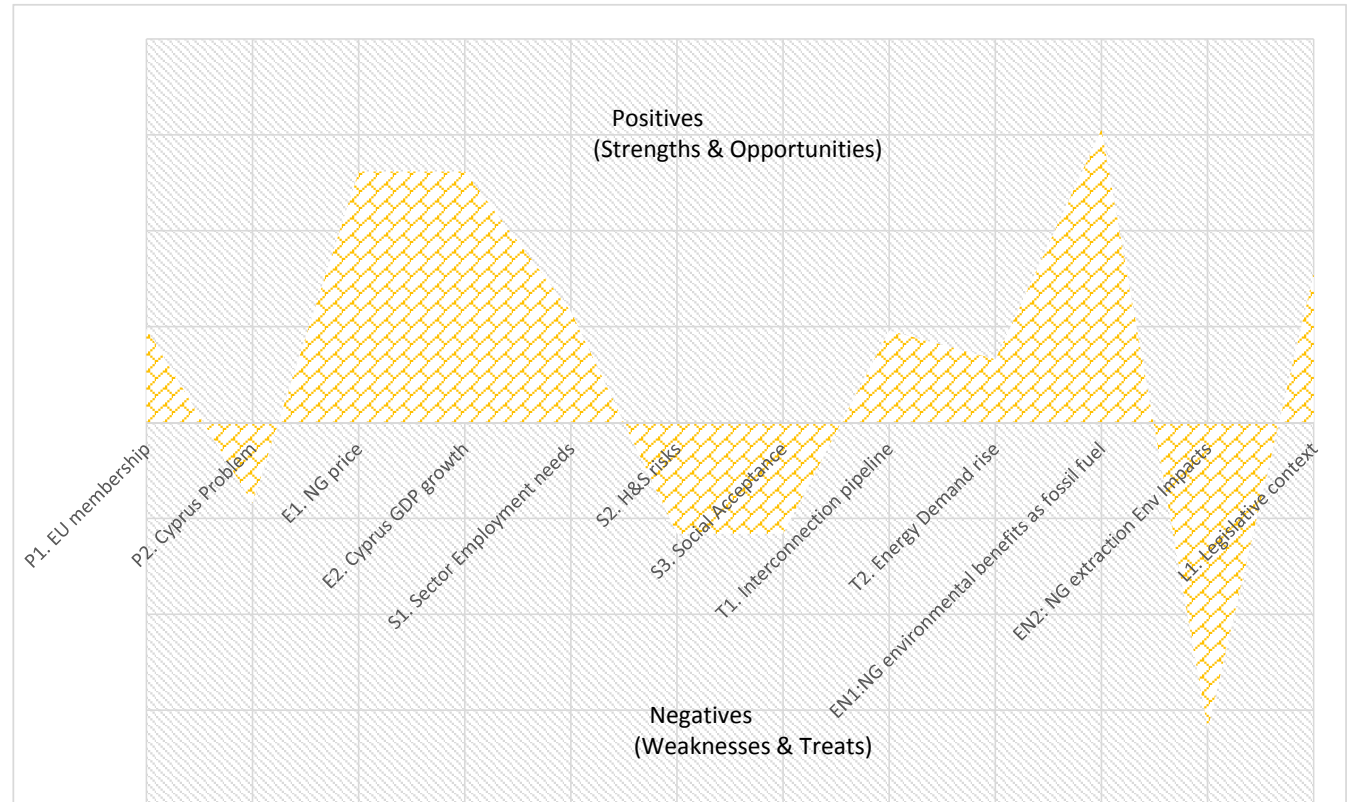
RESULTS

INDICATORS VALUE



RESULTS

POSITIVES VS NEGATIVES



CONCLUSIONS

- ✓ The method is able to extract results
- ✓ Hydrocarbons development positives are more than negatives
- ✓ Protection of the environment is highly evaluated
- ✓ Hydrocarbons economic aspect is considered to be of high importance
- ✓ Low importance of political issues for the sector
- ✓ Technical issues are considered to comparatively be not so important
- ✓ Social and legislative are evaluated as comparatively medium importance issues
- ✓ Comparison of each indicator to others could give more representative results

RECOMMENDATIONS

- ✓ Hydrocarbons development should proceed by ensuring the protection of the environment
- ✓ Environmental impacts should be eliminated as well as Health and Safety risks
- ✓ Natural Gas price as well as Cyprus economic growth should be considered
- ✓ Sector social acceptance needs to be established
- ✓ Must be taken advantage of sector employment needs and Cyprus EU membership
- ✓ Cyprus problem may not comparatively be of major importance but must be managed as a threat
- ✓ Technical aspects could be exploited more intensely

Thanks

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