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SELECTING THE BEST PIPELINE OF YEMEN OIL FIELDS & TRANSPORTATION VIA AHP

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Abstract:
Analytic Hierarchy Process (AHP) is a decision-making algorithm developed by Dr. Saaty. It has many applications as documented in Decision Support System literature. The importance of decisions in the oil pipeline industry is reflected in the magnitude and nature of the industry. Worldwide, pipelines transport natural gas, crude oil, and finished oil products over long distances within countries and across borders to meet energy needs. Within this proposal for decision to select the best option between multi-band variable options to arrange pipeline for transportation oil safely with lowest cost from selected point in Shabwah production oil fields S1, S2 by using AHP. In connection with current oil export terminals and pipelines available routs in Yemen, Pipeline to Rass Issa Port via safer Company-Option(1). Shabwah -Safer Mareb, Pipeline Port of Al Shahr (Al Daba) via Petro masila company Option (2). Shabwah - Pipeline to port (Bir Ali) via MOPS block 4 YCOM company Option (3),Shabwah selected point to MOPS, Pipeline to Aden Port Via Aden Refinery Option (4),Shabwah -Aden refinery.
In this study, we trying to select the best way to build a new pipeline for the Shabwah region for transportation of oil from Shabwah production fields to exports safely with lowest cost by using AHP method for comparison and pairwise selection between options and studying the criteria of comparison which was listed with the following Criteria of Pairwise Comparison-according to:-Length and distance,Land nature and uses,Risk assessment, Cost of Construction, Maintenance Operation,Geopolitical parameter.

Keywords:
Oil and gas Industry, Pipeline Construction, Pipeline Route Selection,Yemen Region

1. Introduction
Recent study in the application of integrated decision-support systems (DSS) in the oil pipeline industry utilizes the analytic hierarchy process[1,4] (AHP). Yemen's Crude oil Production was reported at 31.800 Barrel/Day, in Dec 2017. This records an increase from the previous number of 24.200 Barrel/Day, for Dec 2016. Yemen's Crude oil: Production data is updated yearly, averaging 340.300 Barrel/Day, from Dec 1995 to 2017, with 23 observations.The data reached an all-time high of 456.900 Barrel/Day, in 2001 and a record low of 24.200 Barrel/Day, in 2016.Yemen's Crude Oil:Production data remains active status in CEIC and is reported by Organization of the oil Exporting Countries.The data is categorized under World Trend Plus's Association: Oil and Gas Sector. [2,3,5]
Yemen started producing crude oil in 1986 at low levels and gradually increased its production, reaching its peak in 2001, but started declining steadily after 2001 by about 6.8% per year on average during 2001-2014 as a result of maturing fields, limited exploration, and frequent sabotage of oil infrastructure that sustained 78 attacks during 2012-2013, compared with 62 attacks during the preceding 20 years. This had affected oil refining, production and exporting activities. Attraction of foreign oil investments to Yemen has been disrupted as well. Yemen's crude oil production declined in 2015 by 76.8%, compared to 2014, due to the departure of foreign oil companies from Yemen and the suspension of crude oil exports since April 2015. Yemen had plans to produce 61.8 million barrels in 2015, but the preliminary actual data indicates that the total crude oil production in 2015 amounted to only 13.2

million barrels. As a result, the lost opportunity cost of total crude oil production is estimated at about $2.5 billion in 2015 (Not including the cost of physical damage in the oil sector). [6]
Oil production in Yemen declined steadily after peaking in 2001, but beginning in 2009, the country began producing commercial quantities of natural gas for domestic use and for exports as LNG. This development could help the country stabilize its economy even without an extremely high oil export price. However, replacing oil export revenues with LNG export revenues does not reduce the country's dependence on its hydrocarbons sector. Crude Oil Production in Yemen remained unchanged at 16 BBL/D/1K in December from 16 BBL/D/1K in November of 2018. Crude Oil Production in Yemen averaged 281.16 BBL/D/1K from 1994 until 2018, reaching an all-time high of 466.29 BBL/D/1K in February of 2001 and a record low of 11 BBL/D/1K in January of 2017.Consider an AHP decision-maker who is uncertain about his or her preferences. In fact, suppose he or she is only able to specify unbiased estimates of these preferences. Then given the decision-maker's final pairwise comparison matrix having a consistency ratio less than 0.10, is it possible for the reliability of the analysis to be improved by using some artificial means to lower the consistency ratio (i.e. a minimum perturbation of pairwise comparison matrix elements that reduces the consistency ratio by a given amount)? In this paper, we argue that the answer to this question is yes. To make our point, we employ a Monte Carlo simulation of a decision-maker who picks random judgments out of a distribution centered at his or her true judgment. The simulation results suggest that, if the final consistency ratio is less than 0.10, additional artificial manipulation to lower the consistency ratio will improve, on average, the reliability of the analysis. [7]

2. Literature Review

In Yemen there are lots of production oil sites were stable produced and transportation of production are continuing by trucks /pipeline. Then due to the country situation and civil war was suspended and all people in Yemen started looking for best way for transportation safely with sustainable flow,There are four available pipeline in Yemen :-

1. Pipeline Safer Option (1),	**2. Pipeline to Al Shahr Option (2),**	**3. Pipeline to Bir Ali Option (3)**	**4. Pipeline to Aden Refinery Option (4).**

During this study and case use Analytic Hierarchy Process used as a decision-support system in the oil pipeline industry and studied the six parameters, which gives more contribution and effect in the decision of the best selection from available options

1. Length and distance	2. Land nature and uses	3. Risk assessment
4.Cost of construction	5. Maintenance operation	6. Geopolitical parameter's

All above factors interact with all according to the following basis:-Geography, demography, Religion, History, tribes, Economic development, government and political policy , Yemen oil policy and all available transportation service and judicial and legal system of the country and welfare in addition to Health and safety and security, CSR and all other parameters. Result of AHP method indicates that Shabwah region is the best route for pipe construction.Many reserchers are writting about oil and gas pipelines situations worldwide? Some of them writes about pipelines construction in the oil and gas business ,and there are too many reserchers writing about the using of Analytic hierarchy process as decision-support system in the oil pipeline industry, Sam Nataraj, Ph.D., Morehead State University, Evaluation of the Construction and Investment Process of a High-Pressure Gas Pipeline with Use of the Trenchless Method and Open Excavation Method. Analytic Hierarchy Process (AHP).Urszula Kwast-Kotlarek and Maria Heldak Operator Gazoci was identifedd all factor listed as refence for such projects worldwide ,At the end after studing all factor with all avialble optioion recheing to select the best way of piplines for transportion oil safely .

The following factors are involved in the oil investment legislation

Geography, demography, religion, history, tribes and tribalism, economic development, government and political system, Yemen oil policy diversify the source, legal &judicial system, and welfare, the importance of HSSE CSR importance, environment, workers& employees and business principles &social responsibility.

Table.1 All availble oil transport terminal -Yemen

Pipe lines	Specification
Pipeline to Rass Issa Port via safer Company-**Option (1).** Shabwah –Safer Mareb.	This port is located on the Red Sea in hot areas as a suitable floating reservoir for networks of area 439, approximately 9 kilometers in the Mangalore to connect with the ship saffron in the Red Sea, its capacity is 3 million barrels, diameter 24-26 inches. Rass-Issa Offshore Terminal and Mareb-Rass Issa Pipeline Rass Issa Offshore export terminal lies in the Red Sea and is connected to the Mareb-Rass Issa Pipeline.
Pipeline Port of Al Shihr (Al Daba) via Petro masila company **Option (2)**. Shabwah -Masila - Hadramout	The port is located on the Arabian Sea with its presence in the Middle East, East Shabwah (Sector 10), oil 32 and other neighbouring fields (53) and (51), The port has 5 tanks with a total capacity of 5 thousand barrels. It also has the largest reservoir with a capacity of one million barrels and the port's capacity in 1993. Ash Shahir Export Terminal and Masila-Ash Shahir pipeline The Masila-Ash Shahir pipeline is 145 km long and has a capacity of 300,000 barrels per day. It terminates at the Ash Shahir Export Terminal in the Gulf of Aden.
Pipeline to port (Bir Ali) via MOPS block 4 YCOM company **Option (3)**. Shabwah selected point to MOPS	This port is located on the Arabian Sea in the qualified area of Shabwah in the West Ayad area (Sector 4) in 1990. Bir Ali Terminal and Shabwah-Bir Ali pipeline. The Shabwah-Bir Ali pipeline is 209.3 km long and terminates at the Bir Ali Terminal in the Gulf of Aden. It has a capacity of 135,000 barrels per day Option 3. S1, S2 –BLOCK 4 MOPS Rout.
Pipeline to Aden Port Via Aden Refinery **Option (4).** Shabwah - Aden refinery	This port located at Aden city south of Yemen, located at Aden refinery area. Option 4 to transfer from block S1, S2 to Aden Refinery.

Source: Oil Pipelines available in Yemen [8]

2.1. Method of decision making with the analytic hierarchy process (AHP)

Analytic Hierarchy Process is a decision-making technique developed in the 1970s by mathematician Thomas L. Saaty[9], Analytic Hierarchy is one of Multi Criteria decision making method that was originally developed . In short, it is a method to derive ratio scales from paired comparisons. Analytic Hierarchy Process (AHP) is one of Multi Criteria decision-making method that was originally developed by Prof. Thomas L. Saaty. In short, it is a method to derive ratio scales from paired comparisons. The input can be obtained from actual measurement such as price, weight etc., or from subjective opinion such as satisfaction feelings and preference. AHP allow some small inconsistency in judgment because human is not always consistent

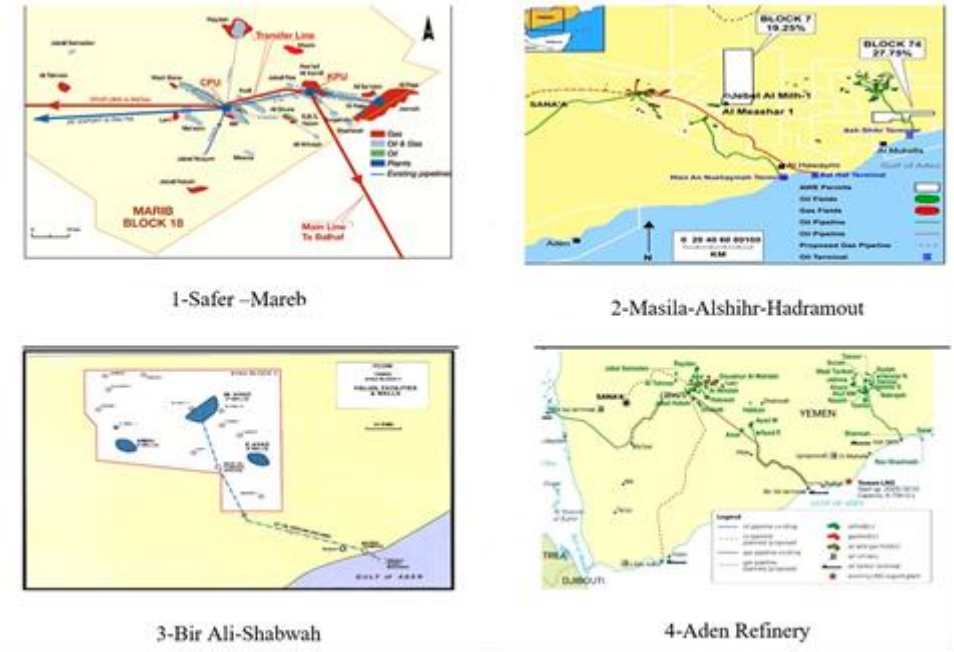

Fig1. All availble oil transport terminal -Yemen

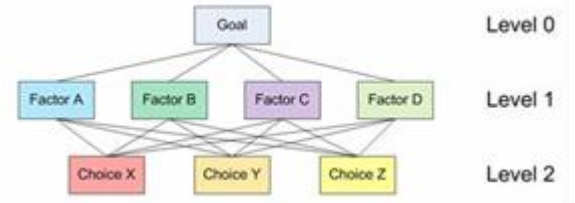

Fig.2.The Analytic Hierarchy Process

2.2. How the AHP works

The AHP considers a set of evaluation criteria, and a set of alternative options among which the best decision is to be made. It is important to note that, since some of the criteria could be contrasting, it is not true in general that the best option is the one, which optimizes each single criterion, rather the one that achieves the most suitable trade-off among the different criteria.

2.3. Using AHP to select the better way for oil transportation from Shabwah region

The best way to select good option between multiband variable options to arrange pipelines for transportation oil safety by using AHP.The Analytic Hierarchy Process (AHP), is an effective tool for dealing with complex decision-making, and may aid the decision maker to set priorities and make the best decision.

2.4. Checking the consistency

When many pairwise comparisons are performed, some inconsistencies may typically arise. One example is the following. Assume that 4 criteria are considered, and the decision maker evaluates that the first criterion is slightly more important than the second criterion, while the second criterion is slightly more important than the third criterion. An evident inconsistenc.

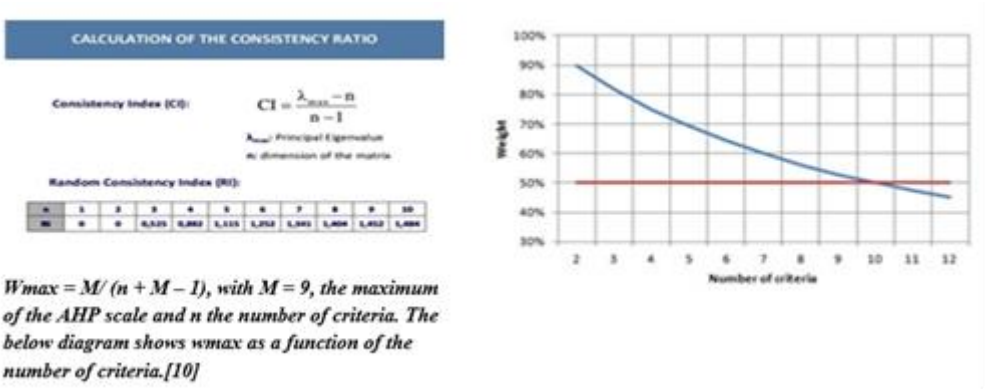

Fig.3.The Analytic Hierarchy Process

For instance, that the first criterion is more important than the third,forth criterion,

λ_{max} =4.2692, CI = 0.0897, CR = 9.97% < 10% (acceptable)

Application of the case study -AHP selection from multicriteria with available options

Table.3. Data and Sample related comparison and pairwise of selection best pipeline of transportation Pairwise Comparison-according

Sr.	Criteria
(1)	Length and distance
(2)	Land nature and uses
(3)	Risk assessment
(4)	Cost of construction
(5)	Maintenance operation
(6)	Geopolitical parameters

Note: AHP Scale: 1- Equal Importance, 3- Moderate importance, 5- Strong importance, 7- Very strong importance, 9- Extreme importance (2,4,6,8 values in-between).

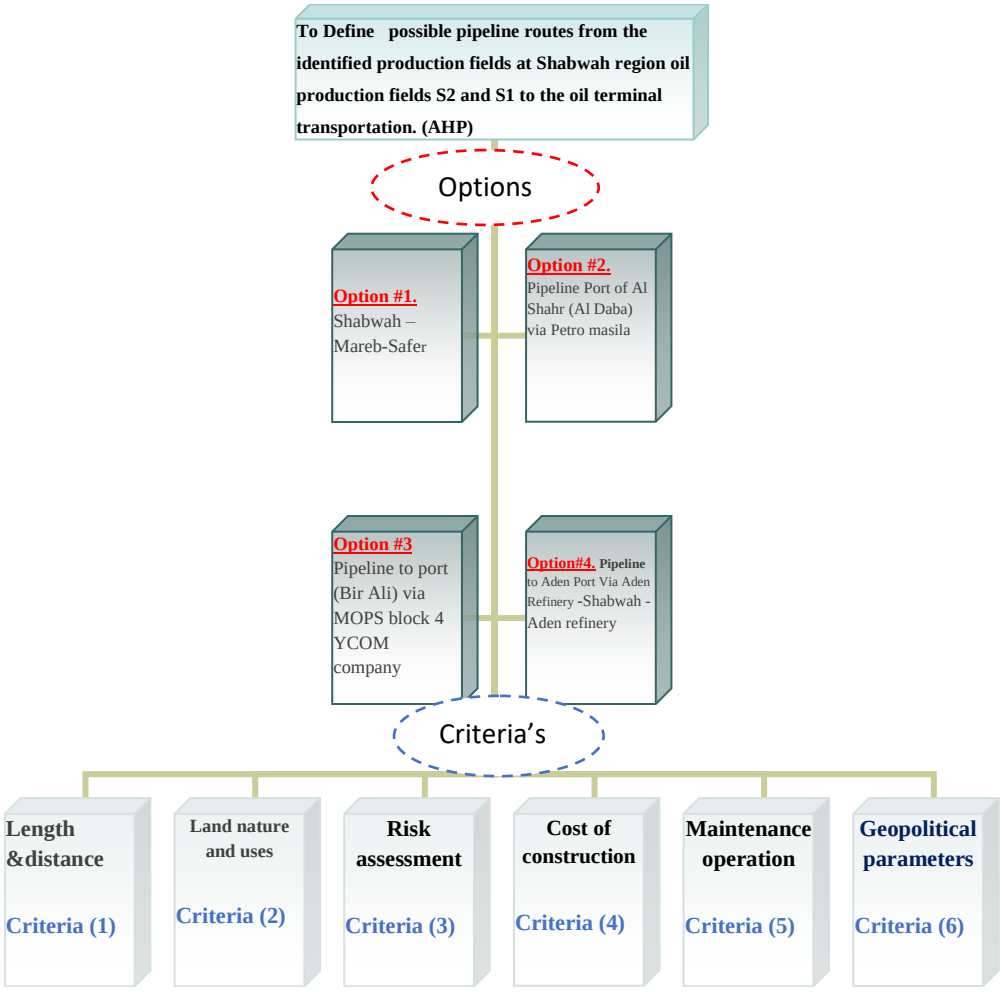

Table.4.Comparison of the six creteria used with AHP

Criteria		Priority	Rank	(+)	(-)
1	Length and distance	13.4%	3	5.5%	5.5%
2	Land nature and uses	6.8%	6	3.1%	3.1%
3	Risk assessment	27.7%	2	11.9%	11.9%
4	Cost of construction	38.2%	1	13.2%	13.2%
5	Maintenance operation	7.0%	4	2.6%	2.6%
6	Geopolitical parameter's	6.9%	5	1.8%	1.8%
Number of comparisons = 15 , Consistency ratio CR = 5.9%					

Pairwise Comparison-according to length and distance

Table.5. Six Pairwise Comparison-according to length and distance

Criteria		*Priority*	*Rank*	*(+)*	*(-)*
1	**Pipeline safer Option (1)**	**15.4%**	**3**	**6.3%**	**6.3%**
2	**Pipeline to Al Shahr Option (2)**	**6.4%**	**4**	**3.6%**	**3.6%**
3	**Pipeline to Bir Ali Option (3)**	**49.3%**	**1**	**19.9%**	**19.9%**
4	**Pipeline to Aden Refinery Option (4)**	**28.9%**	**2**	**5.5%**	**5.5%**
Number of comparisons = 6 , Consistency Ratio CR = 9.4%					

These are the resulting weights for the criteria based on your pairwise comparisons, Maintenance &Operation was considered in this part of comparison.

Table.6. Result of Pairwise Comparison-according to length and distance

Category		**Priority due to length**	**Rank**
1	Pipeline safer Option (1) Shabwah– Safer block 18, 120 Kms., 438 km from Safer to Rass Issa Port	49.9%	**1**
2	Pipeline to Al Shahr Option (2), Shabwah–Petro-masila, 380 km,269 km from Petromasila –Alshihr	28.1%	**2**
3	Pipeline to Bir Ali Option (3), Shabwah–block4 MOPS, 34 km to CPU, (54 km to MOPS Shabwah- block 4, MOPS cpu, 207 km Shabwah- Bir Ali).	8.7%	**4**
4	Pipeline to Aden Refinery Option (4), Shabwah-Aden 498 km. Blacktop road	13.3%	**3**
Number of comparisons = 6 ,Consistency Ratio CR = 8.6%			

Pairwise Comparison-according to Land nature and uses

Table.7. Six Pairwise Comparison-according to Land nature and uses

Criteria		**Priority**	**Rank**	**(+)**	**(-)**
1	**Pipeline Safer Option (1)**	**62.1%**	**1**	**13.3%**	**13.3%**
2	**Pipeline to Al Shahr Option (2)**	**20.1%**	**2**	**3.8%**	**3.8%**
3	**Pipeline to Bir Ali Option (3)**	**12.5%**	**3**	**2.3%**	**2.3%**
4	**Pipeline to Aden Refinery Option (4)**	**5.3%**	**4**	**1.1%**	**1.1%**
Number of comparisons = 6 ,Consistency Ratio CR = 2.3%					

These are the resulting weights for the criteria based on pairwise comparisons with following land uses and the nature of the land, tribes located in these areas. In the following AHP criteria ,These are the resulting weights for the criteria based on your pairwise comparisons.

Table.8. Result of Pairwise Comparison-according to Land nature and uses

Criteria		**Priority due to high uses of land**	**Rank**
1	Pipeline to Ras Isa Port via safer Option (1)	42.4%	1
2	Pipeline Port of Al Shahr (Petromasila)Option (2)	33.9%	2
3	Pipeline to port (Bir Ali) via MOPS bk	19.4%	3

	4 Option (3)		
4	Pipeline to Aden Port -Option (4)	4.3%	4
Number of comparisons = 6 , **Consistency Ratio CR =** 7.9%			

Pairwise Comparison-according to Risk assessment

According to the calculated risk level, specific recommendations have been added in the worksheet, when required; since it is a feasibility phase, recommendations included both risk reduction measures to be implemented in the project and/or further detailed studies to be performed in the following design phases, considered necessary to address in detail the potential risk level related to some specific identified hazards (preventing the cause from occurring, detecting the cause before it develops into a hazard, mitigating consequences and alerting operators so that remedial actions may be taken).The process has been completed once all the guidewords have been applied to all the options. When a guideword has not been considered applicable to the node under analysis, it has not been included in the minute of the meeting (worksheets) pipeline option no. 3 was confirmed to be the best option among the four alternatives under study from all thetechnical points of view. Therefore, it should be taken into account in the next design phases.The possible Option alternatives have been compared each other considering the Risk of the identifiedHazards on the following aspects [11] (criteria):People safety,Environment,Technical challenge, Impact on schedule.Risk Levels of Hazards Identified for all the Options (Option No. 3 is the base case, differenc)

Table.9. Pairwise Comparison-according to risk assessment

Criteria Ranking	**People Safety**	**Environment**	**Technical Challenge**	**Risk on Schedule of constructio n**
Pipeline safer Option (1)	6	8	13	6
Pipeline to Al Shahr Option (2)	13	27	24	26
Pipeline to Bir Ali Option (3)	57	9	57	56
Pipeline to Aden Refinery Option(4)	24	56	6	12

These are the resulting weights for the criteria based on your pairwise comparisons:

Table.10. Result to Pairwise Comparison-according to risk assessment

Criteria		**Priority**	**Rank**	**(+)**	**(-)**
1	Pipeline Safer Option (1)	**71.2%**	**1**	**32.0%**	**32.0%**
2	Pipeline to Al Shahr Option (2)	**15.4%**	**2**	**6.0%**	**6.0%**
3	Pipeline to Bir Ali Option (3)	**8.1%**	**3**	**2.4%**	**2.4%**
4	Pipeline to Aden Refinery Option (4)	**5.3%**	**4**	**1.6%**	**1.6%**

Table.11. Result to Pairwise Comparison-according to risk assessment

	Criteria	**Priority due to high**	**Rank**

		risk	weight
1	Pipeline safer Option (1)	59.1%	1
2	Pipeline to Al Shahr Option (2)	25.8%	2
3	Pipeline to Bir Ali Option (3)	8.8%	3
4	Pipeline to Aden Refinery Option (4)	6.2%	4
Number of comparisons = 6 ,Consistency Ratio CR = 7.4%			

Pairwise Comparison-according to cost of construction

The construction of a oil pipeline is a complex, extremely capital-intensive project with many decision variables. AHP has been integrated within a decision-support system, creating a framework for the planning phase of pipeline construction. As a response to the limitations of the conventional approaches to project planning, studies have developed a mathematical model for project planning as applied to a oil pipeline project [12]. This model enables project management to "establish an adequate relationship between the essential design parameters (technical requirements, construction schedules, investment planning and related expenditures) and to create reference documents (time schedules, cost estimation and specifications) at the early feasibility states of the project" It is in the work breakdown structure that AHP is applied in this model to measure risk; this value is then Analytic Hierarchy Process as a Decision-Support System in the Oil Pipeline Industry . Each component is a work package, which is then broken down into factors and subfactors relative to that overall goal. In this very each work package is then assigned a high, medium, or low total risk. The work breakdown structure is then combined with the organization breakdown structure that has been defined through a traditional matrix structure. The two together form the project breakdown structure, with the level of risk assigned to each work package defining the degree of control for implementation. Six pairwise comparison(s). Resulting Priorities These are the resulting weights for the criteria based on your pairwise comparisons: Decision Matrix the resulting:

Table.12. Pairwise Comparison-according to cost of construction

Criteria		**Priority to high cost**	**Rank**
1	Pipeline safer (Option #1)	48.5%	1
2	Pipeline to Al Shahr (Option #2)	33.6%	2
3	Pipeline to Bir Ali (Option #3)	5.1%	4
4	Pipeline to Aden Refinery (Option #4)	12.8%	3
Number of comparisons = 6 , **Consistency Ratio CR =** 4.7%			

Pairwise Comparison-according to maintenance operation

Pipeline maintenance is an important aspect of the oil pipeline industry because of the correlation between maintenance with safe and failure-free operations. Historically, maintenance policies have been based on experience, but current trends are toward a more organized, proactive methodology [13]. Pipeline operators are utilizing data analysis and in-house studies to target areas of the pipeline for maintenance. This is a task because of the prevailing system lengths. AHP provides a methodology for risk analysis, which, when applied to pipeline failure potential, creates a "cost-effective, customized, flexible, and logical maintenance plan"The focus of the hierarchy is the probability of failure for a pipeline or pipeline segment. The level I goal is to determine the probability of failure. The level II criteria include likelihood of corrosion, external interference, construction or material defects, or acts of God [14].Following the procedure for applying the analytic hierarchy process, each factor has subfactors identified at level III. The level III subfactors include, but are not limited, to internal or external corrosion, third-party activity or malicious activity, poor construction or low-grade materials, earthquakes, floods, and human or operation error. Pairwise comparisons are made between each level I criterion and then between each level II criterion to establish a risk factor for each pipeline. Level IV is each pipeline segment represented in the analysis. The pipelines are then ranked according to likelihood for failure. At this point, the pipeline identified as most likely to have failure potential

can be broken into segments of equal length and the process repeated to further isolate the location most likely to fail. When dividing the pipeline into segments for further analysis, "the length and number of segments should be based upon the similarity of conditions from the point of view of failure probability, instead of arbitrarily dividing the pipeline into four equal segments". It is evident that this type of analysis that allows for comparisons made on a sequentially smaller area can be valuable in isolating areas most likely to fail, creating a proactive maintenance program.6 pairwise comparison(s).

Table.13. Result to Pairwise Comparison-according to cost of construction

Criteria		**Priority**	**Rank**	**(+)**	**(-)**
1	Pipeline Safer Option (1)	28.5%	2	8.7%	8.7%
2	Pipeline to Al Shahr Option (2)	21.3%	3	4.7%	4.7%
3	Pipeline to Bir Ali Option (3)	8.4%	4	1.9%	1.9%
4	Pipeline to Aden Refinery Option (4)	41.8%	1	12.1%	12.1%
Number of comparisons = 6 , **Consistency ratio cr =** 3.9%					

Pairwise Comparison-according to geopolitical parameters

There are examples of geographical structures, mountains, oceans, rivers lakes, and how these geographical features effect the migration of people. An example is a country landlocked with no natural buffers. The land might have a flat topography and receives intemperate rainfall. The geopolitics of the land,Geopolitical Factors Affecting National Boundaries, [15] Geopolitics refer to the different geographic (either physical or human) influences on political and international relations.Different geographic influences, or geopolitical factors, can affect the way a country handles or even defines its national boundaries.Six pairwise comparison(s).

Table.14. Result to Pairwise Comparison-according to geopolitical parameters

Criteria		**Priority**	**Rank**	**(+)**	**(-)**
1	Pipeline Safer Option (1)	9.7%	4	1.4%	1.4%
2	Pipeline to Al Shahr Option (2)	29.1%	2	4.2%	4.2%
3	Pipeline to Bir Ali Option (3)	49.5%	1	10.7%	10.7 %
4	Pipeline to Aden Refinery Option (4)	11.7%	3	3.2%	3.2%
Number of comparisons = 6 , **Consistency Ratio CR =** 2.2%					

3. Conclusion

Based on the above comparison tables and analysis: Rout Pipeline option 3. Is it the first candidate option to be chosen for its close? Proximity, good maintained relation with locals through the implemented projects. Low cost of construction, low distance, low required maintenance and operation and low risk assessment comparing with other three options, followed by Rout Pipeline option Pipeline 4. Rout Pipelines option 1& 2. These two options are the second candidates in comparison with the Rout Option 4. Which is highly recommended to be excluded for its being highly risky and hazardous. These two options have the same direction with the same advantages and disadvantages, the third option has its own extra advantage: blacktop road until the end of the roadblock 14 though it is 50 km longer than the second option, which have more than a hundred km desert road.The better road is absolutely the first option, which goes through the desert from a CSR prospective.It is expected that road/blocks will be frequent at the beginning of the trucking operations in these new territories due to new tribal demands in which the trucks are passing. Contractor should lead in resolving equipment's hiring demands or issues related to his contract with close monitoring from SHABWAH to interfere when required. Contact with the Governorate officials should be established before the movement of the oil trucks, and new establisment for oil pipline construction then use

BLOCK 4 MOPS pipeline , therefore need to take advantage of this and coordinate with the authorities in Shabwah to ensure their full support. A discussion about the result of problem to perform an alternative ranking meeting based on the Analytic Hierarchy Process just after the Hazard Identification session has been disclosed to be a very powerful approach to select the best alternative when several solutions and different criteria are concerned. The possibility to collect the opinions of many specialists having very different background, already gathered for performing the HAZID, allows to perform a "broad-spectrum" selection, optimizing the schedule, minimizing the costs and, above all, taking advantage to the full of the experience of many several specialists involved in the Project methodology applied to the judgments collected during the Alternative Ranking Meeting, followed by a simple "benefits to costs ratios" analysis, allows to have a complete picture of the situation under analysis, given not only indications on which is the best solution, but also explaining the reasons why it is the most promising one and how another solution can overpass the goodness of the alternative which at the moment seems to be the best one. Especially, the feasibility phase of Oil & Gas Projects, when HAZID session is usually already foreseen, to plan the Alternative Ranking Meeting as the final section of HAZID session is extremely suggested and useful to facilitate the right selection of which solution to be developed during the following design phases, because of an objective and full analysis. Crude oil shipments from Yemen have resumed on a small scale after stalling since early last years because of the continuing civil war. "With the resumption of production and exports from Mas¬ila oil field, the national economy is back on its own two feet.

Table.15. Result to Pairwise Comparison-according to all six createrai and final decision to select best pipline option no#3.

Criteria		**Priority**	**Rank**
1	Pipeline to port (Bir Ali) via MOPS bk 4. Option (3)	50.1%	1
2	Pipeline Port of Al Shahr (Petromasila) Option (2)	27.8%	2
3	Pipeline to Ras Isa Port via safer Company Option (1)	14.9%	3
4	Pipeline to Aden Port Option (4)	7.2%	4

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