

QANT 620-M01
A2-Good

New York Institute of Technology

"Where to work? US, China or Mongolia? "

(The Analytic Hierarchy Process Project)

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The Analytic Hierarchy Process (AHP) is a multi-criteria decision-making approach, which helps decision makers to choose best solution from different options and selection criteria. AHP builds ranking of items using comparisons between different items. Paired comparisons show weighting scores that measure how much importance items and criteria have with each other.

We examined the work condition of the United States, China and Mongolia where our group members grew up. Our team utilized a pairwise comparison matrix to identify which country is better option to work. We compared countries' GDP per capita, safety, unemployment rate and average salary as criteria.

1. Unemployment rate

The unemployment rate is an important indicator to determine work opportunities. The less unemployment is better because there are more chances to people to be hired. According to the US Bureau of National Labor Statistics, the US unemployment rate is 7.2%¹ in the United States while China has a rate of 4.1%². Mongolia, on the other hand, has only 3.6% of unemployment rate according to its National Statistics Office³. In comparison with China to the US, we moderately prefer China (3) since the rate is less. We very strongly prefer Mongolia than the US because the unemployment rate of the US is twice as much compare to Mongolia. Therefore we scaled Mongolia as 7. Finally we moderately to strongly preferred Mongolia than China because Mongolia still has less rate of unemployment according to our data.

	US	Mongolia	China
US	1.000	0.143	0.333
Mongolia	7.000	1.000	4.000
China	3.000	0.250	1.000
Sum	11.000	1.393	5.333

Normalization Comparison

	US	Mongolia	China	Unemployment score	Consistency Measure
US	0.091	0.103	0.063	0.085	3.007
Mongolia	0.636	0.718	0.750	0.701	3.068
China	0.273	0.179	0.188	0.213	3.023
			Consistency Ratio		0.028

¹ US Bureau of National Labor Statistics (2013) <http://www.tradingeconomics.com/united-states/unemployment-rate>

²Ministry of Human Resources and Social Security of PRC (2013) <http://www.tradingeconomics.com/china/unemployment-rate>

³ National Statistics Office of Mongolia (2013) <http://www.tradingeconomics.com/mongolia/unemployment-rate>

2. Annual Minimum Wage

Salary is the one of the most important things to consider when choosing a job. Henceforth, our next criteria would be annual minimum wage comparison between the three countries. US Department of Labor's report states that the annual minimum wage is \$15080¹. China has annual minimum wage with amount of \$2472² while Mongolia has only \$1697³. Based on our research data, we very strongly prefer US (7) since the amount of annual wage is greatly high to compare others. China's amount is almost 6 times less than US. Therefore we moderately to strongly prefer China (4). However, China's minimum wage is still \$775 more than Mongolia. So we equally to moderately prefer China than Mongolia (2).

	US	Mongolia	China
US	1.000	7.000	4.000
Mongolia	0.143	1.000	0.500
China	0.250	2.000	1.000
Sum	1.393	10.000	5.500

Normalization Comparison

	US	Mongolia	China	Salary Scores	Consistency Measure
US	0.718	0.700	0.727	0.715	3.004
Mongolia	0.103	0.100	0.091	0.098	3.001
China	0.179	0.200	0.182	0.187	3.001
			Consistency Ratio		0.002

3. Safety

With consideration of civil war, chemical weapons and violence around the world, we think our safety is an important issue. Therefore we used Global Peace Index to determine which country is most peaceful and safe to work. Each year the Global Peace Index ranks the world's nations by their levels of "peacefulness." GPI tracks 23 indicators, including the level of safety and security, the degree of militarization, and the extent of domestic or international conflict. According to the Global Peace Index 2013, the US was listed 99th out of 159 countries, left China behind at 101st. Mongolia was on 64th on the list. Iceland ranked first as world's most peaceful country⁴.

Based on Global Peace Index, we very strongly preferred Mongolia to China (7) and moderately preferred to US (3). We assigned a scale of 2 in comparison safety to China to US since the countries' ranks almost same position and we equally to moderately prefer.

	US	Mongolia	China
US	1.000	0.333	0.500
Mongolia	3.000	1.000	7.000
China	2.000	0.143	1.000
Sum	6.000	1.476	8.500

¹ U.S Department of Labor (2013) <http://www.dol.gov/dol/topic/wages/minimumwage.htm>

² Ministry of Human Resource and Social Security of the PRC (2013) <http://www.mohrss.gov.cn/>

³ The Ministry of Labor and Social Welfare of Mongolia (2013)

⁴ Global Peace Index (2013) The Guardian <http://www.theguardian.com/news/datablog/2013/jun/11/global-peace-index-2013>

Normalization Comparison

	US	Mongolia	China	Safety Scores	Consistency Measure
US	0.167	0.226	0.059	0.150	3.085
Mongolia	0.500	0.677	0.824	0.667	3.593
China	0.333	0.097	0.118	0.183	3.170
	0.167	0.226	0.059	0.150	3.085

Consistency Ratio 0.243

4. Standard of living

It is imperative to consider standard of living of a country when choosing a job. We used GDP per capita as an indicator of standard of living in these three countries. Higher per capita GDP means interpreted as having a higher standard of living. The U.S. has \$49,965¹ GDP per capita compare to \$9,233² in China. On the other hand, Mongolia has GDP per capita with amount of \$5,492³. Comparing U.S to Mongolia, we very strongly preferred U.S (7). We still strongly prefer (5) U.S than China because the GDP amount of U.S is almost 5 times as much than China's.

	US	Mongolia	China
US	1.000	7.000	5.000
Mongolia	0.143	1.000	0.333
China	0.200	3.000	1.000
Sum	1.343	11.000	6.333

Normalization Comparison

	US	Mongolia	China	GDP scores	Consistency Measure
US	0.745	0.636	0.789	0.724	3.141
Mongolia	0.106	0.091	0.053	0.083	3.014
China	0.149	0.273	0.158	0.193	3.043
			Consistency ratio		0.057

Criteria Weights

Our team members ranked the four selected criteria in according to the importance. Based on our poll, we conclude that 'safety' is the most important. Thus, the safest country is most desirable. Next important criteria to consider turned out to be the salary. We prefer a country with higher average wage. Team members agree that standard of living is not the most important but not least important either. Unemployment rate had a least importance as a result of our rankings.

^{1,2,3}GDP Per capita The World Bank (2012)

http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD?order=wbapi_data_value_2012+wbapi_data_value+wbapi_data_value-last&sort=desc

After ranking all criteria, we calculated the criteria weights, consistency measure and consistency measure. Those are helpful to compare and choose the best option.

	Unemployment	Salary	Safety	Standard of living
Unemployment	1.000	0.200	0.167	0.333
Salary	5.000	1.000	0.250	0.500
Safety	6.000	4.000	1.000	3.000
Standard of living	3.000	2.000	0.500	1.000
Sum	15.000	7.200	1.917	4.833

Normalized Comparison

	Unemployment	Salary	Safety	Standard of living	Criteria Weight	Consistency Measure
Unemployment	0.067	0.028	0.087	0.069	0.063	4.220
Salary	0.333	0.139	0.130	0.103	0.177	4.185
Safety	0.400	0.556	0.522	0.621	0.524	4.414
Standard of living	0.200	0.278	0.261	0.207	0.236	4.397
			Consistency Ratio			0.113

Summary

After all, we summarize our results from previous matrixes that indicated the score for our four criteria. Based on our research data and team members' preferences to each criteria, we calculated weighted average scores for the three countries after all. U.S has a weighted average score of 0.35, for China 0.45 and Mongolia, 0.20.

	U.S	China	Mongolia	Criteria Weight
Unemployment	0.09	0.70	0.21	0.06
Salary	0.72	0.10	0.19	0.18
Safety	0.09	0.66	0.25	0.52
Standard of living	0.71	0.19	0.10	0.24
Weighted average score	0.35	0.45	0.20	1.00

As a result of our AHP process project, China has the highest score and most desirable country to work between these three countries.

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