Journal of Positive School Psychology http://journalppw.com
2022, Vol. 6, No. 11, 610-624

Factors Of Manpower Export In Saudi Arabia And Its Contribution To The Economy Of Bangladesh: An Empirical Analysis

Mostofa Mahmud Hasan[1*], BM Sajjad Hossain[2], Md. Abu Sayem[3] and Mahnaz Afsar[4]

[1]Department of Business Administration, EXIM Bank Agricultural University Bangladesh, Chapainawabganj, Bangladesh, mmhasanku@gmail.com
[2]Department of Social Science, American International University Bangladesh, Dhaka, Bangladesh, bmsajjad@gmail.com
[3]Department of Statistics, EXIM Bank Agricultural University Bangladesh, Chapainawabganj, Bangladesh, asayem89@gmail.com
[4]Department of Agricultural Economics, EXIM Bank Agricultural University Bangladesh, Chapainawabganj, Bangladesh, mahnazafsar@yahoo.com

Corresponding author:
Mostofa Mahmud Hasan
Department of Business Administration, EXIM Bank Agricultural University Bangladesh
Cell: +8801711-826210
E-mail: mmhasanku@gmail.com
ORCID ID: 0000-0003-0019-5605

ABSTRACT
The labor market is always found very complex due to multiple influential factors. Saudi Arabia and Bangladesh are closely involved in the labor market since 1976. This paper has attempted to figure out the impact of manpower export in Bangladesh to Saudi Arab respect to the change of crude oil price, gross domestic product and total labor force, etc. Secondary data was employed in this research. Descriptive statistics, factor analysis, Granger's causality, Johansen's test, vector auto-regression model, and econometric model were applied to measure the extent of the impact of the variables. Factor analysis indicates that gross domestic product per capita is the most potential variable for manpower export. Granger's causality reveals that there is a unidirectional relationship between variables. Johansen's test demonstrates the long-run association between employment, crude oil price, gross domestic product per capita, and total labor force. The vector auto-regression model discloses that total labor impacts employment in the long run. The econometric model explores that the total labor force influences manpower export in a major and favorable way. Scholars, the government, policymakers, and development organizations will be able to make more informed decisions on the country's economic performance with the help of these insights.

Keywords: Manpower Export, Labor Force, Gross Domestic Product, Crude Oil Price, Vector Auto-regression Model.

1. INTRODUCTION
Many wealthy countries around the world, particularly those in the Middle East, rely heavily on oil exports, including Saudi Arabia (KSA). According to the US Energy Information Administration, Saudi Arabia possesses over one-fifth of the world's reserves, the world's greatest production capacity, and is also the world's largest exporter of net oil (Algahtani, 2016). The amount of oil export is 71.1% of total exports and makes 87.5% of total revenues in KSA (SAMA, 2014). In 2020, the Kingdom of Saudi Arabia is expected to send goods

worth US$176.5 billion around the world. Mineral fuels, plastics, and chemicals, three are main categories for exports from KSA. The record shows that twelve countries are mostly (65%) import those products from KSA in the year 2020 (see Table 1).

Table 1: Saudi Arabia's main importing countries

SL. No.	Importer's name	Amount (%)
1	Yemen	2.0
2	United States	2.5
3	Malaysia	2.6
4	Jordan	2.6
5	Belgium	2.9
6	Kuwait	3.1
7	Egypt	3.5
8	Turkey	3.9
9	Singapore	6.2
10	India	6.8
11	United Arab Emirates	11.1
12	China	17.6

Source: WTO, 2021

Table 1 reveals that Asian countries imported 73.2 percent of all products, whereas Africa imported 10.6 percent and Europe imported 9.7 percent. About ten major export items are generating most of its earnings (see Table 1).

Table 2: Export particulars of KSA

SL.	KSA exports by categories	Export volume (US$ Billion)	Total export (%)
1	Articles of iron or steel	0.79	0.40
2	Machinery, equipment, vehicles	0.92	0.40
3	Dairy, eggs, honey	1.10	0.60
4	Fertilizers	1.20	0.70
5	Gems, precious metals	2.00	1.10
6	Aluminum	2.10	1.20
7	Inorganic chemicals	2.30	1.30
8	Ships, boats, floating structures	3.60	2.10
9	Organic chemicals	9.70	5.50
10	Plastics, plastic articles	16.30	9.20
11	Mineral fuels including oil	132.00	74.80

Source: (UN, 2021)

Table 2 shows the Saudi items with the highest export value in 2020. By 2020, Saudi Arabia's top eleven export categories will account for 97.3 percent of the total value of its global shipments. With a population of 34.8 million people, Saudi Arabia's total exports are expected to reach $176.5 billion in 2020, equating to nearly $5,100 per citizen. Saudi Arabia is playing a vital role in socio-economic development in Bangladesh. Bangladesh is one of the largest manpower exporter nations in the world and has a large market share in Saudi Arabia’s labor market. Cultural and religious similarities made this sitting possible. However, Bangladesh exported numbers of manpower to KSA since 1976 and it is still continuing. In fact, it sends about 77.88 percent of the total manpower export figure by the year 2021

(September). The figure was 57 percent (399,000) of a total of 700,159 workers, including 104,786 women in the year 2019 before the corona pandemic (BMET, 2020, 2021). So the relationship between Saudi Arabia and Bangladesh are very closed due to labor market engagement where Bangladesh is a supplier and Saudi Arabia is its buyer. To create academic knowledge and support policy-making level, this paper had tried to justify this statement using empirical data obtained from the official records of the World Bank, the International Monetary Fund, and the Government of Bangladesh.

2. LITERATURE REVIEW

In the long run, oil prices, according to Ahmad (2013), have a very good impact on unemployment. An increase in oil prices, in particular, produces a drop in output, which leads to increased production costs, which leads to an increase in unemployment. Also, an increase in oil prices leads to higher interest rates, which affects both consumption and investment, resulting in a decrease in employment and, as a result, a rise in unemployment.

Pierce (2012) looked into how Saudi Arabian governments make decisions on oil policy. The study used available data sources to apply economic and political theories as factors of oil production capacity. The purpose of the Saudi Arabian oil reservation is to balance long-term revenue and political stability with short-term financial gain.

For the period of 1994 to 2010, Khaliq et al. (2014) investigated the relationship between GDP and unemployment in nine Arab countries. Finally, using the Pooled EGLS, the relationship is analyzed, and it is concluded that the GDP growth rate and unemployment have a very substantial negative relationship.

Pierru and Matar (2014) looked at the net present value of oil-related public investment projects in Saudi Arabia and discovered that the risk premium, or the cost of increased reliance on oil revenues, is determined for programs that render oil exports. According to the study, programs that convert oil prices into product pricing are less correlated with the national economy.

Using annual data from 1970 to 2015, Algahtani (2016) evaluated the impact of oil price shocks on Saudi economic activity. This research used VAR and VEC models to find long-run and short-run correlations between variables like oil prices and GDP, and discovered a positive and substantial association in the long run.

Foudeh (2017) investigated the long-run implications of oil price growth rates (OS) on Saudi Arabia's economic growth. Saudi Arabia has good business relations with Japan, China, the United Kingdom, and Korea, according to the study. When the OS weakens, it has a beneficial long-term influence on KSA's GDP growth rates via trade with one country and a negative effect on the growth rates of other countries. Trading with the United States, India, Canada, France, and Germany has no substantial impact on the Saudi economy, according to the report.

Tong (2018) attempted to establish a link between the price of crude oil and the performance of the Saudi stock market. The study discovered that when new participants enter the oil market, structural changes in the process of fixing crude oil prices occur. It was discovered that OPEC's lack of spare capacity has resulted in crude oil price disparities around the world, despite the fact that OPEC is a significant supply policy maker.

According to Haque (2020), international commerce has a significant impact on welfare and development difficulties, particularly in export-oriented countries like Saudi Arabia. The study used the autoregressive distributed lag approach to analyze the relationship between oil prices and the nation's terms of trade from 2000 to 2018. The study's findings suggested that as a largely oil-producing nation, Saudi Arabia's terms of trade are strongly dependent on oil prices, despite some constraints in

determining recent oil prices or having considerable volatility.

According to Alharbi (2021), oil has long been seen as a stable commodity on the global market. The drop in oil prices from 2015 to 2018 affected oil-exporting countries particularly hard, putting many countries on the verge of economic collapse or at the very least recession. Policymakers, investors, and economists are all concerned about the price of oil. Saudi Arabia's government, as the world's largest oil exporter, must always embrace structural, economic, and fiscal reforms in order to improve sustainability, transparency, and progress.

Rubee (2018) used longitudinal analysis to discover the impact of GDP on unemployment rates. Inflation and unemployment were shown to have a positive connection (0.477) in the study. According to the study, inflation has a large impact on unemployment in India, although GDP has a minor impact.

Mostly the researches have focused on the development projects of Saudi Arabia and its oil prices. As one of the larger oil exporter nations in the world, KSA plays a vital role in the market. Besides, Bangladesh supply manpower for its labor market since after the year of its independence in 1971, and most of them were sent to Saudi Arabia. The relationship between those two nations is much closed due to participation in the employment market. This article looked into the labor transaction trend in relation to Saudi Arabia's oil market, employment, and GDP, among other things.

3. RESEARCH GAP

Saudi Arabia is one of the world's wealthiest countries. The continued growth of the GDP, initiative for rapid development projects, goodwill for exports pure crude oil, and other natural resources, contributed all those for financial achievements. The previous studies have been more concerned about the oil price of Saudi Arabia, the world oil market, international politics, and world economic conditions, etc. Earlier research was more focused to find the relation between its GDP and oil price fluctuation of KSA only. But no studies have found on cross-country relationships such as oil price in Saudi Arabia how to impact labor export from third-party supper. Moreover, the studies had been conducted on Bangladesh's economy, growth of its economy, the contribution of migrated labor into GDP, market mechanism and socioeconomic issues, etc. This research has attempted to discover the gap of this cross-country relation as such, between oil price, GDP, etc in Saudi Arabia with manpower export from Bangladesh.

4. OBJECTIVES

The overall goal of this study is to assess the link between changes in some economic indicators in the Kingdom of Saudi Arabia and the labor supply in Bangladesh. A few more specific objectives are:

i. To find out the most important variables of manpower export in Saudi Arabia from Bangladesh.
ii. To observe the pattern of crude oil price, GDP per capita, total labor force with manpower export from Bangladesh.
iii. To discover the strength of linear relationship of crude oil price, GDP per capita, total labor force with manpower export from Bangladesh.
iv. To uncover causal relations of crude oil price, GDP per capita, total labor force with manpower export from Bangladesh.
v. To find out the influence of crude oil price, GDP per capita, total labor force on manpower export from Bangladesh.

5. HYPOTHESES

To testify the relationship following hypotheses have been developed:

i. No underlying relationship between crude oil price, GDP per capita, total labor force and manpower export from Bangladesh.
ii. No co-integration between crude oil price, GDP per capita, total labor force and manpower export from Bangladesh.

iii. No noteworthy joint effect of crude oil price, GDP per capita, total labor force on manpower export from Bangladesh.
iv. No noteworthy link between crude oil price and manpower export from Bangladesh.
v. No noteworthy link between GDP per capita and manpower export from Bangladesh.
vi. No noteworthy link between total labor force and manpower export from Bangladesh.

6. METHODOLOGY

6. 1. Source of Data

For this analysis, the researchers analyzed secondary data from the World Bank and the IMF, which was collected from 1987 to 2020.

6.2. Techniques of Data Analysis

Excel, SPSS 16.00, and Eviews 8 were used to evaluate secondary data. Descriptive statistics, factor analysis, unit root test, Johansen's test, Granger's causality, vector auto-regressive model and econometric model were applied to study the relationships among the studied variables.

6.3. Dependent Variable

The study's dependent variable was manpower export from Bangladesh, as evaluated by a proxy variable of employment in KSA.

6.4. Causal Variables

Crude oil price, GDP per capita and total labor force were used as causal variables.

Blazquez et al. (2017) looked at Saudi Arabia's Vision-2030 strategy plan, which took into account the country's evolving economic structure. It sought to develop a dynamic general equilibrium model for long-term GDP and household welfare in the Kingdom of Saudi Arabia. It searched for cross-relationships between renewable technology costs and household well-being. Saudi Arabia's dependency on oil was lessened by increased renewable energy, and its GDP percentage was linked to oil shipments and price. Increased oil exports have a negative effect on global oil prices.

Saudi Arabia's oil reliance was examined as a sign of Dutch Disease by Bajwa et al. (2019). When oil prices decline, Saudi Arabia faces budgetary difficulties. When a country's economy is unduly reliant on oil revenues, it's tough to change policy. The diagnosis of Dutch Disease has yet to be established in the case of KSA. New programs, such as Vision 2030, have been developed by policymakers to provide possibilities for a non-oil-based economy to diversify. It has the potential to encourage the private sector to establish a more diverse supply chain with added value.

Between 1974 and 1984, Seccombe (1985) examined international labor mobility in the Middle East. It discovered three basic categories: i) migration trends, remittance flows, and their macroeconomic impact; ii) government strategies to regulate labor migration, and iii) comparisons among various labor-sending countries. The exploitation of oil resources was said to have begun in the mid-1930s, but research into the concerns began after an increase in mass labor inflow to the Middle East nations during the 1973-74 oil price spikes (Seccombe, 1983, 1984). By 1984, the central oil-producing states had invested heavily in infrastructure and industry, employing almost four million people. Both the labor-receiving and labor-sending countries were affected by this. People began to migrate to oil-producing economies in the Middle East as well.

6.5. Econometric Model

To study the association between a dependent variable and one or more causal variables, an econometric model is applied to study the time series data. The econometric model can take several forms, including:

$$y_{it} = \beta_0 + \beta_1 x_{it} + \beta_2 x_{it} + \beta_3 x_{it} + \ldots + \beta_k x_{it} + \varepsilon_{it} \quad (1)$$

Where, y_{it} = the dependent variable at time t with i[th] entity, β_0 = the intercept, x_{it} = the causal variables at time t with i[th] entity, β_1 to β_k = the alteration in y_{it} for each further alteration in the causal variables at time t with i[th] entity, and ε_{it} = the random error term.

As a result, the ordinary least square fit econometric model from (1) is

$$\hat{y}_{it} = \hat{\beta}_0 + \hat{\beta}_1 x_{it} + \hat{\beta}_2 x_{it} + \hat{\beta}_3 x_{it} + \cdots + \hat{\beta}_k x_{it} \quad (2)$$

$\hat{y}_{it}$ = the dependent variable's anticipated value, $\hat{\beta}_0$ = population intercept, x_{it} = the causal variables, $\hat{\beta}_1 to\ \hat{\beta}_k$ = the foretelling value of β_1 to β_k.

For our study, the prognosticated model is,

$$\widehat{\text{Employment}}_t = \hat{\beta}_0 + \hat{\beta}_1 \text{Crude Oil Price}_t + \hat{\beta}_2 \text{GDP Per Capita}_t + \hat{\beta}_3 \text{Total Labor Force}_t \quad (3)$$

7. RESULTS

Bangladeshi employment in KSA is influenced by a number of factors. We employed several carefully chosen variables, which are listed in the table below.

Table 3: Crude oil Price, employment in KSA, GDP per capita in KSA and total labor force in KSA from 1987 to 2020

Year	Crude oil price (in $)	Employment in KSA from BD (in Thousands)	GDP per capita KSA (in Thousand $)	Total labor force in KSA (in Millions)
1987	19.20	39.29	5.93	4.80
1988	15.97	27.62	5.86	4.85
1989	19.64	39.95	6.09	4.90
1990	24.53	57.49	7.25	5.03
1991	21.54	75.66	7.88	5.15
1992	20.58	93.13	7.93	5.31
1993	18.43	106.39	7.49	5.41
1994	17.20	91.39	7.42	5.50
1995	18.43	84.01	7.69	5.58
1996	22.12	72.73	8.34	5.67
1997	20.61	106.53	8.55	5.77
1998	14.42	158.72	7.42	5.88
1999	19.35	185.74	8.01	6.03
2000	30.38	144.62	9.17	6.36
2001	25.98	137.25	8.68	6.57
2002	26.19	163.27	8.70	6.85
2003	31.08	162.13	9.61	7.20
2004	41.51	139.03	11.19	7.57
2005	56.64	80.43	13.79	7.95
2006	66.05	109.51	15.38	8.30
2007	72.34	204.11	16.52	8.65
2008	99.67	132.12	20.08	8.98
2009	61.95	14.67	16.11	9.32
2010	79.48	7.07	19.26	9.88
2011	94.88	15.04	23.75	10.56
2012	94.05	21.23	25.24	11.31

2013	97.98	12.65	24.85	11.98
2014	93.17	10.66	24.46	12.56
2015	48.66	58.27	20.63	13.19
2016	43.29	143.91	19.88	13.61
2017	50.80	551.31	20.80	13.84
2018	65.23	257.32	23.34	14.02
2019	56.99	399.00	23.14	14.39
2020	39.68	161.73	20.11	14.46

Data source: World Bank, CIA, IMF, & BMET, 2021; WTO 2021

7.1. Analytical Graphs

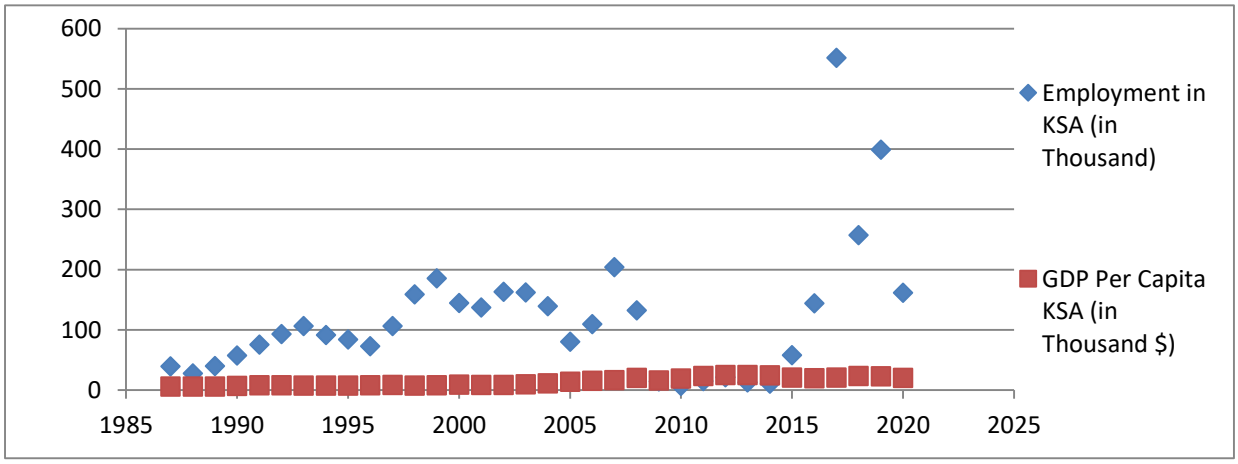

Figure 1: Scatter plot of employment in KSA and GDP per capita in KSA from 1987 to 2020
Source: Researchers computation from composed data

Figure 1, disclosed that employment in KSA from BD and GDP per capita in KSA go consecutively in the same way, a little deviation found in the year 2016 to 2019. In those years somehow employment increased may for some other reasons.

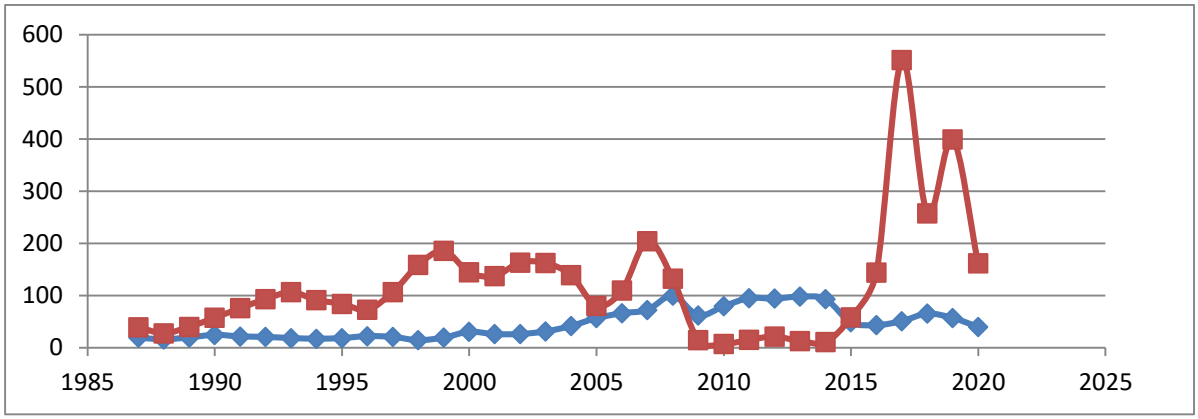

Figure 2: Scatter plot of crude oil price and employment in KSA from 1987 to 2020
Source: Authors calculation from collected data

Figure 2 explains that employment in KSA from BD and Crude oil price are related with employment in KSA from BD throughout the period except for those years of 2010 to 2019. In the year 2009 to 2014 employment in KSA became too low and on the contrary in the year 2017 to 2019 that became too high than other years.

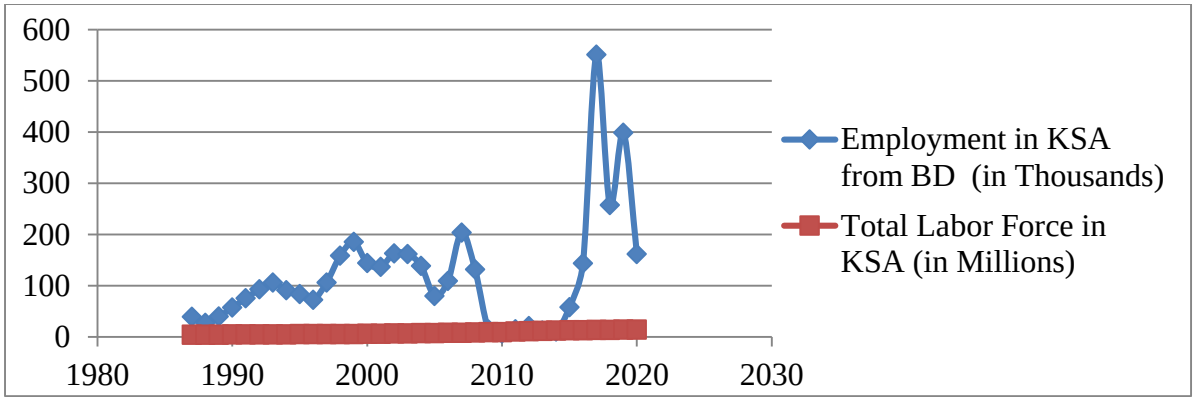

Figure 3: Scatter plot of employment in KSA and total labor force in KSA from 1987 to 2020
Source: Authors calculation from collected data

Figure 3 reveals that employment in KSA from BD and total labor force in KSA are always positively related, though in the year 2017 to 2019 employment found to be very high than total labor force.

7.2. Analyzing Factors

Factor analysis is a technique for reducing a large number of variables to a smaller number. This procedure isolates the common variation from all relevant variables and consolidates it into a single score level. There are various strategies for doing so, but principal component analysis (PCA) is the most often used. Principal component analysis (PCA) was employed by researchers in this study. Through principal component analysis, a scree plot is used to identify statistically (in)significant variables (PCA).

Table 4: Bartlett's Test and the Kaiser-Meyer-Olkin test

The Kaiser-Meyer-Olkin Test for Adequate Sampling		0.441
The Sphericity Test by Bartlett	Chi-Square (Approx.)	155.643
	df	3
	Prob.	0.000

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.441, hence factor analysis is appropriate for this data, according to table 4. Bartlett's test is extremely significant ($p < 0.001$) for this data, indicating that factor analysis is suitable.

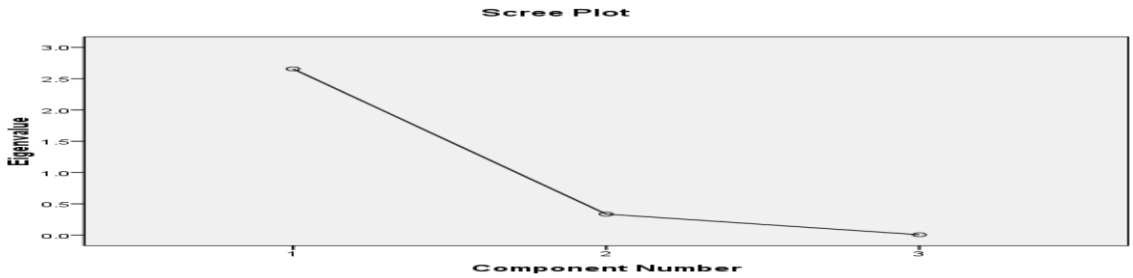

Figure 4: Graph-based method for determining the appropriate number of components

It can be seen in the preceding graph (figure 4) that the curve in the picture has an elbow at about i = 2. That is to say, the eigen values after $\hat{\alpha}_1$ are all small and roughly the same size. One sample principle component adequately summarizes the overall sample variation in this scenario.

Table 5: Variables that explain total variance

Variables	Initial eigenvalues			Extraction sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
V_1	2.655	88.514	88.514	2.655	88.514	88.514
V_2	.337	11.233	99.747	Extraction Method: Principal Component Analysis		
V_3	.008	0.253	100.000			

V_1 = Crude oil price
V_2 = GDP per capita in KSA
V_3 = Total labor force in KSA

Table 5 shows that the first component explains approximately 88.514 percent of total variance with just a 11.486 percent loss of information.

Table 6: Component matrix

Variables	Component 1
Crude Oil Price	0.903
GDP Per Capita	0.997
Total Labor Force	0.920

From the table 6, it is seen that the second component is most highly correlated with the employment in KSA from Bangladesh. Therefore, the gross domestic product (GDP) per capita is a better representative of employment in KSA from Bangladesh in this study.

7.3. Unit Root Test

In statistics and econometrics, a unit root test is used to assess whether a time series variable is stationary and has a unit root. The presence of a unit root is the null hypothesis in some tests, whereas stationarity, trend stationarity, or explosive root is the alternative hypothesis in others.

Table 7: Unit root test

Variables	Level		First difference		Second difference	
	Intercept	Intercept and trend	Intercept	Intercept and trend	Intercept	Intercept and trend
Employment	0.0348	0.0802	0.0000	0.0000		
Crude Oil Price	0.4958	0.0096	0.0000	0.0003		
GDP Per Capita	0.7694	0.0094	0.0006	0.0043		
Total Labor Force	0.6863	0.4135	0.4927	0.9570	0.0004	0.0014

Unit root tests are used to determine whether trending data should be first differenced or regressed on predictable functions of time in order to make it stationary. The cointegration test and estimate of the proposed regression model can now proceed thanks to this stationarity test.

Table 7 displays the probability values of four different variables (employment, crude oil price, GDP per capita, and total labor force) at three different levels: baseline, first difference, and second difference. At the 1% level of significance, the table shows that employment is stationary at the first difference, crude oil price is stationary at the first difference, GDP per capita is stationary at the first difference, and total labor force is stationary at the second difference.

7.4 Optimal Lag Length Selection

The goal of selecting appropriate lag is to reduce residual correlation and, more importantly, to make VAR models parsimonious.

Table 8: Choosing the best lag length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-309.2187	NA	13764.39	20.88125	21.06808*	20.94102
1	-290.1478	31.78490	11356.75	20.67652	21.61065	20.97536
2	-266.5070	33.09709*	7271.976*	20.16713*	21.84857	20.70504*

*indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Following the unit root test, the model's maximum lag length is determined using the Vector Autoregressive (VAR) lag order selection criterion. The findings are provided in the Table 8, and it has been confirmed that the model's maximum lag length is '2', and that it is determined based on the minimum value of each criterion, and that the maximum number of 'lag 2' should be chosen based on that. All of the criteria indicate that 2lag should be taken. As a result, our ideal lag is '2', which we should utilize in the test of Johansen's co-integration and the vector error correction model.

7.5 Granger's Causality

Granger causality is an approach that can be used to evaluate both lagged and endogenous correlations.

Table 9: Testing Granger causality

Null hypothesis	Observation	F Value	P value
Crude oil price does not Granger cause employment	31	9.60032	0.0008
Employment does not Granger cause crude oil price		0.40983	0.6680
GDP per capita does not Granger cause employment	31	4.20912	0.0261
Employment does not Granger cause GDP per capita		0.15057	0.8610
Total labor force does not Granger cause employment	30	2.81256	0.0791
Employment does not Granger cause total labor force		4.55544	0.0206
GDP per capita does not Granger cause crude oil price	31	0.36486	0.6978
Crude oil price does not Granger cause GDP per capita		0.33344	0.7195
Total labor force does not Granger cause crude oil price	30	0.27936	0.7586
Crude oil price does not Granger cause total labor force		1.02021	0.3750
Total labor force does not Granger cause GDP per capita	30	0.22351	0.8013
GDP per capita does not Granger cause total labor force		0.55024	0.5836

Granger causality's findings between employment, crude oil price, GDP per capita and total labor force are disclosed in table 9. The empirical result reveals that there is a unidirectional relationship between crude oil price to employment, GDP per capita to employment, and employment to total labor force at 5% level of significance.

7.6. Co-integration tests

Cointegration tests identify situations when two or more non-stationary time series are joined in such a way that they cannot deviate from equilibrium over time

Table 10: Unrestricted co-integration rank test (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace statistic	5% Critical value	P value
None*	0.761948	56.72286	54.07904	0.0285
At most 1	0.239678	15.10018	35.19275	0.9493
At most 2	0.140625	7.153809	20.26184	0.8872
At most 3	0.090642	2.755476	9.164546	0.6273

* The null hypothesis is rejected at the level of 0.05.

Table 10 shows that trace test indicates 1 co-integrating equation at the 0.05 level which implies that we reject the null hypothesis that there is no long-run relationship amongst employment, crude oil price, GDP per capita and total labor force. That means, they exhibit a long-run relationship amongst employment, crude oil price, GDP per capita and total labor force.

Table 11: Unrestricted co-integration rank test (Maximum eigen value)

Hypothesized No. of CE(s)	Eigen value	Max-eigen statistic	5% Critical value	P value
None*	0.761948	41.62268	28.58808	0.0006
At most 1	0.239678	7.946371	22.29962	0.9546
At most 2	0.140625	4.398333	15.89210	0.9341
At most 3	0.090642	2.755476	9.164546	0.6273

* The null hypothesis is rejected at the level of 0.05.

Table 11 shows that at the 0.05 level, the max-eigen value test suggests one co-integrating equation, implying that the null hypothesis of no long-run link between employment, crude oil price, GDP per capita, and total labor force is rejected. That is, employment, crude oil price, GDP per capita, and total labor force have a long-run relationship.

7.7. Vector Auto-regression Model

The relationship between many quantities as they change over time is captured using a statistical model called vector auto-regression (VAR). A VAR, or stochastic process model, is a type of stochastic model.

$$\begin{aligned}\mathrm{D(Employment)} &= \mathrm{C}(1) * \big(\mathrm{Employment}(-1)\big) - 3.358 * \mathrm{Crude\ Oil\ Price}\ (-1) + 33.731 \\ &* \mathrm{GDP}(-1) - 75.586 * \mathrm{Total\ Labor\ Force}\ (-1) + 198.432 + \mathrm{C}(2) \\ &* \mathrm{D}\big(\mathrm{Employment}(-1)\big) + \mathrm{C}(3) * \mathrm{D}\big(\mathrm{Employment}(-2)\big) + \mathrm{C}(4) \\ &* \mathrm{D}\big(\mathrm{Crude\ Oil\ Price}(-1)\big) + \mathrm{C}(5) * \mathrm{D}\big(\mathrm{Crude\ Oil\ Price}(-2)\big) + \mathrm{C}(6) \\ &* \mathrm{D}\big(\mathrm{GDP}(-1)\big) + \mathrm{C}(7) * \mathrm{D}\big(\mathrm{GDP}(-2)\big) + \mathrm{C}(8) * \mathrm{D}\big(\mathrm{Total\ Labor\ Force}(-1)\big) \\ &+ \mathrm{C}(9) * \mathrm{D}\big(\mathrm{Total\ Labor\ Force}(-2)\big) + \mathrm{C}(10)\end{aligned}$$

Table 12: Estimates of vector auto-regression

	Coefficient	Std. Error	t	P
$C(1)$	-0.393	0.410	-0.958	0.349
$C(2)$	-0.480	0.330	-1.455	0.161
$C(3)$	0.0004	0.229	0.018	0.986
$C(4)$	-5.058	3.611	-1.401	0.176
$C(5)$	-8.587	2.964	-2.897	0.009
$C(6)$	32.557	27.983	1.163	0.258

$C(7)$	39.654	24.639	1.609	0.123
$C(8)$	-568.541	220.514	-2.578	0.018
$C(9)$	357.121	264.510	1.350	0.191
$C(10)$	57.425	51.554	1.114	0.278

$R-squared = 0.706$ Mean dependent var $= 3.928$
Adjusted $R-squared = 0.580$ S. D. dependent var $= 112.460$
S. E. of regression $= 72.871$ Akaike info criterion $= 11.671$
Sum of squared resid $= 111513.30$ Schwarz criterion $= 12.134$
Log likelihhod $= -170.899$ Hannan $-$ Quinn criterion $= 11.822$
Durbin $-$ Watson stat $= 1.668$

If the variables have long-run relationship, the sign of the co-efficient must be negative and statistically significant. Table 12 shows that crude oil price has negative effects on employment but statistically insignificant at 5 percent level of significance, GDP per capita has positive effects on employment but statistically insignificant at 5 percent level of significance and total labor force has negative effects on employment and statistically significant at 5 percent level of significance. Therefore, we infer that total labor has influence on employment in the long run.

7.8. Econometric Model

Statistical inference techniques are used to build econometric models from economic data. These models are usually based on economic theories that imply that economic agents will optimize their conduct.

Table 13: Estimates of econometric model

Variable	Coefficient	Std. error	t	P
C	-47.029	61.068	-0.770	0.447
Crude Oil Price	0.980	2.657	0.369	0.715
GDP Per Capita	-27.773	21.500	-1.292	0.206
Total Labor Force	59.963	27.441	2.185	0.037

$R-squared = 0.365$ Mean dependent var $= 119.529$
Adjusted $R-squared = 0.301$ S. D. dependent var $= 111.374$
S. E. of regression $= 93.089$ Akaike info criterion $= 12.015$
Sum of squared resid $= 259964.50$ Schwarz criterion $= 12.195$
Log likelihhod $= -200.257$ Hannan $-$ Quinn criterion $= 12.076$
$F-statistic = 5.746$ Durbin $-$ Watson stat $= 1.633$
Prob $(F-statistic) = 0.003$

$$\widehat{\text{Employment}}_t = -47.029 + 0.980\ \text{Crude Oil Price}_t - 27.773\ \text{GDP Per Capita}_t + 59.963\ \text{Total Labor Force}_t$$

The value adjusted R-square 0.301 demonstrates that 30.10 percent of the total variation of the employment is explained by the crude oil price, GDP per capita and total labor force. The probability value of F-statistic discloses that crude oil price, GDP per capita and total labor force have a significant joint effect on employment at 5 percent significance level but individually crude oil price has statistically insignificant positive impact on employment, GDP per capita has statistically insignificant negative impact on employment, and total labor force has statistically significant positive impact on employment at 5 percent significance

level. Durbin-Watson's value of 1.633 showed that there is no autocorrelation problem as it lies in the rule of thumb of less than one or more than three.

7.4. Results of Assumed Hypotheses

Assumed hypothesis for the series crude oil price, GDP per capita, total labor force and manpower export from Bangladesh are given bellow:

H_0: There is no underlying relationship between crude oil price, total labor force, GDP per capita and manpower export from Bangladesh.

H_1: There is underlying relationship between crude oil price, total labor force, GDP per capita and manpower export from Bangladesh.

Table 9 shows Granger causality tests results. This result reveals that there is a relationship between crude oil price and manpower export from Bangladesh, GDP per capita and manpower export from Bangladesh, and manpower export from Bangladesh and total labor force at 5 percent level of significance since their calculated P value is less than 0.05 because we reject the assumed hypothesis.

Assumed hypothesis for the series crude oil price, GDP per capita, total labor force and manpower export from Bangladesh are given bellow:

H_0: There is no co-integration between crude oil price, GDP per capita, total labor force and manpower export from Bangladesh.

H_1: There is a co-integration between crude oil price, GDP per capita, total labor force and manpower export from Bangladesh.

Table 10 and 11 shows the co-integration tests results for trace and maximum eigen value. This result demonstrates that the series are co-integrated at level since their calculated P value is less than 0.05 because we reject the assumed null hypothesis.

Assumed hypothesis for the series crude oil price, GDP per capita, total labor force and manpower export from Bangladesh are given bellow:

H_0: There is no noteworthy joint effect of crude oil price, GDP per capita, total labor force on manpower export from Bangladesh.

H_1: There is a noteworthy joint effect of crude oil price, GDP per capita, total labor force on manpower export from Bangladesh.

Table 13 shows the econometric model results. Since the calculated P value of F-statistic is less than 0.05, so we reject the assumed null hypothesis at 5 percent level of significance which implies that crude oil price, GDP per capita, total labor force jointly impacts on manpower export from Bangladesh.

Assumed hypothesis for the series crude oil price and manpower export from Bangladesh are given bellow are given bellow:

H_0: There is no noteworthy link between crude oil price and manpower export from Bangladesh.

H_1: There is a noteworthy link between crude oil price and manpower export from Bangladesh.

Table 13 shows the econometric model results. Since the calculated P value of t-statistic is greater than 0.05, so we accept the assumed null hypothesis and we infer that there is no noteworthy link between crude oil price and manpower export from Bangladesh.

Assumed hypothesis for the series GDP per capita and employment are given bellow:

H_0: There is no noteworthy link between GDP per capita and manpower export from Bangladesh.

H_1: There is a noteworthy link between GDP per capita and manpower export from Bangladesh.

Table 13 shows the econometric model results. Since the calculated P value of t-statistic is greater than 0.05, so we accept the assumed null hypothesis and we infer that there is no noteworthy link between GDP per capita and manpower export from Bangladesh.

Assumed hypothesis for the series total labor force and manpower export from Bangladesh are given bellow:

H_0: There is no noteworthy link between total labor force and man power export from Bangladesh.

H_1: There is a noteworthy link between total labor force and manpower export from Bangladesh.

Table 13 shows the econometric model results. Since the calculated P value of t-statistic is less than 0.05, so we reject the assumed null hypothesis and we infer that there is a noteworthy link between total labor force and manpower export from Bangladesh.

8. DISCUSSION

Globalization has a tremendous impact on migration. International worker migration has increased dramatically during the last decade. It has grown into a significant source of employment and is critical to Bangladesh's poverty reduction efforts. In terms of job creation, GDP growth, and poverty reduction, labor migration has become a significant component in Bangladesh. This study used secondary data for the fiscal year 1987 to 2020. The principle of this study was to determine the influence of Bangladeshi manpower exports to Saudi Arabia on changes in crude oil prices, GDP, and total labor force. There is a long-run (Foudeh, 2017) and short-run correlations between oil prices and GDP, and discovered a positive and substantial association in the long run (Algahtani, 2016). From the empirical analysis, it is disclosed that GDP per capita is the most contributing indicator on manpower exports as factor analysis. Granger causality test shows that crude oil price, GDP per capita, and employment to total labor force all have a one-way link. Johansen co-integration reveals that total labor force has ascendancy on manpower exports in the long run and econometric model implies that total labor force is significantly and positively associated with manpower exports. Therefore, Bangladesh, as a country that exports labor, must carefully evaluate these variables in order to continue to export manpower and generate more remittance to boost our economy.

REFERENCES

1. Ahmad, F. (2013). The effects of oil prices on unemployment: Evidence from Pakistan. *Journal of Business and economic Research*, *4*(1), 43-57.
2. Algahtani, G. J. (2016). The effect of oil price shocks on economic activity in Saudi Arabia: Econometric approach. *International Journal of Business and Management, 11*(8). doi:10.5539/ijbm.v11n8p124
3. Alharbi, A. (2021). Economic effects of low oil prices in Saudi Arabia, *International Journal of Information and Technology*, *13*, 195-200. doi.org/10.1007/s41870-020-00432-w
4. Bajwa, I. A., Elahi, M. A., Rafi, W., & Bajwa, F. A. (2019). Oil overdependence and Dutch disease: KSA evidence. *Management Studies and Economic Systems*, *4*(3), 213-223. https://doi.org/10.12816/0054688
5. Blazquez, J., C Hunt, L., & Manzano, B. (2017). Oil subsidies and renewable energy in Saudi Arabia: A general equilibrium approach. *The Energy Journal*, *38*(01). https://doi.org/10.5547/01956574.38.si1.jbla
6. Bureau of Manpower Employment and Training (BMET), (2020), *Annual Report 2019*. Overseas Employment and Remittances Section, Ministry of labor and Employment, Government of Bangladesh
7. Bureau of Manpower Employment and Training (BMET), (2021). *Overseas Employment and Remittances Progress Report- Sep 2021*. Ministry of labor and Employment, Government of Bangladesh
8. Central Intelligence Agency (CIA). (2021). *The World Factbook*, Middle East: Saudi Arabia.

9. Foudeh, M., (2017). The long run effects of oil prices on economic growth: The case of Saudi Arabia. *International Journal of Energy Economics and Policy*, 7(6), 171-192.
10. Haque, M. I., & Imran, M. (2020). Oil prices and terms of trade of Saudi Arabia: An empirical analysis. *The Journal of Asian Finance, Economics and Business*, *7*(9), 201-208. https://doi.org/10.13106/JAFEB.2020.VOL7.NO9.201
11. International Monetary Fund (IMF). (2021). *World Economic Outlook Database* (GDP based on Purchasing Power Parity), USA
12. Khaliq, S. A., Soufan, T., & Shihab, R. A. (2014). The relationship between unemployment and economic growth rate in Arab country. *Journal of Economics and Sustainable Development, 5* (9).
13. Pierce, J. J., (2012). Oil and the house of Saud: Analysis of Saudi Arabian oil policy. *Digest of Middle East Studies. 21*(1) 89–107. doi: 10.1111/j.1949-3606.2012.00128.x
14. Pierru, A., & Matar, W. (2014). The impact of oil price volatility on welfare in the Kingdom of Saudi Arabia: Implications for public investment decision-making. *The Energy Journal*, *35*(2), 97-116. http://www.jstor.org/stable/24695762
15. Rubee, D. (2018). Impact of GDP and inflation on unemployment rate: A study of Indian economy in 2011-2018. *International Journal of Management, IT & Engineering*, *8*(3), 329-340.
16. Saudi Arabian Monetary Agency (SAMA) (2014). *Annual Report (2014)*, Government of KSA.
17. Seccombe, I. J. (1983). Labor migration to the Arabian Gulf: Evolution and characteristics 1920–1950. *British Society for Middle Eastern Studies. Bulletin*, *10*(01), 3–20. https://doi.org/10.1080/13530198308705359
18. Seccombe, I. J. (1983a). International migration for employment and domestic labor market development: The Jordanian experience. Ph.D. thesis. The University of Durham. Retrieved 13-03-2022 from http://etheses.dur.ac.uk/7231/
19. Seccombe, I. J. (1985). international labor migration in the Middle East: A review of literature and research, 1974–84. *International Migration Review*, *19*(2), 335. https://doi.org/10.2307/2545776
20. Tong, S., Baslom, M. M. M., Alsharif, & H. Z. H., (2018), Investigating Volatility in Saudi Arabia Crude Oil Prices and its Impact on Oil Stock Market. *International Journal of Energy Economics and Policy, 8*(4), 338-346
21. United Nations (UN). (2021) Com-trade Database on International Trade
22. World Trade Organization (WTO). (2021) World Trade Statistical Review (WTSR) - 2020