



Information Technology Institute (ITI)

Smart Village

Graduation Project

Stock Market Analysis

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Table of Contents

Introduction	3
Data Source	3
Data Warehouse Data Model	3
Dimensional Modeling Process	4
1- BUSINESS PROCESS:	4
2- GRANULARITY:	4
3- DIMENSIONS TABLES:.....	4
4- FACTS TABLES:.....	4
Logical Model	5
Tables Identifications:	5
1- COMPANY DIMENSION.....	5
2- INDUSTRY DIMENSION.....	5
3- DATE DIMENSION.....	5
4- Stock Market FACT.....	6
5- income statment FACT.....	6
Physical Model	6
Insert Data Into Tables	8
Insert The Measured Data Into Fact Tables	11
Sql Queries To Create Measures	15
Screenshots from the Dashboard	28
Conclusion	29

Introduction

Our project is simply about analyzing the stock market's business and using key performance indicators to tell the stockholder which stock he should put and invest his money on.

Data Source:

We get our data from investing.com website. We used 24 companies from different industries. We thought of so many industries to get good comparison between companies and give the investor many options to choose from and tell where to invest his money.

We collected the data as every member of the team start searching of which time interval, we want our analysis then collect 4 or 5 companies of same or different industries those companies are appended together into one excel file.

Data Warehouse Data Model:

After seeing the data we start to build a model to be able to analyze the stocks from different perspectives so we decided to build a Galaxy schema to fit our analysis, decided to put 3 dimensions, the date to represent our time interval, the company dimension to put all the information about the companies, the industry dimension to put different information about different industries, so those 3 dimension was enough to represent out analysis.

Then we start to download the data for different countries preparing it through Excel to be a table ready to be inserted in the database then we imported the data through Toad into the tables.

Bus Matrix

	Date	Company	Industry
Stock Market Analysis	✓	✓	✓
Stock Market Indicators	✓	✓	✓

Dimensional Modeling Process:

1- Business process:

Analyze the Stock market to decide where to invest using several measures.

2- Granularity:

The grain level in Atomic per day

3- Dimensions Tables:

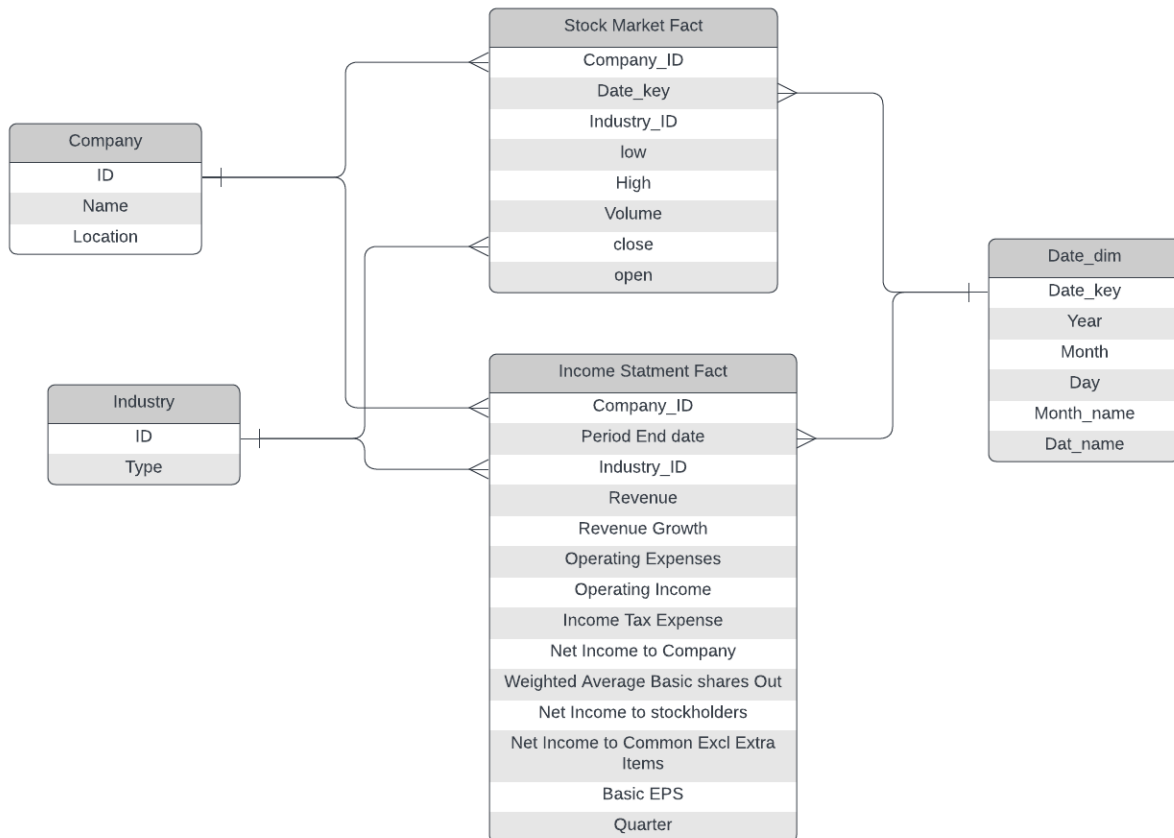
- 1- Company Dimension
- 2- Date Dimension
- 3- Industry Dimension

4- Facts Tables:

- 1- Stock Market Fact
- 2- Income Statement Fact

Logical Model:

Represents the facts and dimensions tables, and the relations between them.



Tables Identifications:

1- Company Dimension

Represents data about company, like **Company ID, Name, Location**

2- Industry Dimension

Represents data about industry , like **Industry ID, Type**

3- Date Dimension.

Represents the **Minute, Hour, Day, Month, Quarter**, and **Year** for each date stored for different business needs.

.

4- Stock Market Fact.

Represents the Technical analysis operation and the data needed for it, it measures Exponential moving average and simple moving average to a given stock and the change of its price, it also measures Average true range , rate of change and Average daily trading volume for a stock

5- Income statement Fact.

Represents the finance process it measures revenue ,revenue growth ,net income to company and net income to stockholders

Physical Model:

The creation of tables using SQL queries. In this project, PL SQL is used for all queries.

1- Create Company Dimension:

```
Create Table Company_Dim
(
    Company_key number CONSTRAINT company_pk_cons PRIMARY KEY,
    Company_name varchar2(200),
    location varchar2(50)
);
```

2- Create Industry Dimension:

```
Create Table Industry_Dim
(
    Industry_key number CONSTRAINT industry_pk_cons PRIMARY KEY,
    Industry_Type varchar2(100));
```

3- Create Date Diminsion

```
CREATE TABLE Date_Dim
(
```

```

Date_key date CONSTRAINT D_pk_cons PRIMARY KEY,
Year number(5),
Quarter number(1),
Month_Name VARCHAR2(15),
Month number(2),
Day_Name VARCHAR2(20),
Day_Number NUMBER(3) );

```

4- Create Stock Market Fact

Create Table Stock_Market_Fact

```

(Company_ID number CONSTRAINT company_Id_Fk references
company_dim(Company_key) ,
Industry_id Number constraint industry_id_fk references
Industry_Dim(Industry_key),
Date_key Date Constraint Reservation_Date_FK references
date_dim(Date_Key),
close number(10,2),
open number(10,2),
Low number(10,2),
High number(10,2),
Volume number(10,2),
Change number(10,2));

```

5- Create Income Statment Fact

Create Table Income_Statment_Fact

```

(
Company_ID number CONSTRAINT company_Id_income_Fk references
company_dim(Company_key) ,
Industry_id Number constraint industry_id_income_fk references
Industry_Dim(Industry_key),

```

Quarter varchar(50),
Period_End_date Date Constraint Reservation_Date_income_FK references
date_dim(Date_Key),
Revenue number(14,2),
Revenue_Growth number(14,2),
Operating_Expenses number(14,2),
Operating_Income number(14,2),
IncomeTax_Expense number(14,2),
Net_Income_to_Company number(14,2),
Net_Income_to_stockholders number(14,2),
Net_Income_to_Common number(14,2),
Basic_EPS number(14,2),
Weighted_Average_Basic number(14,2));

Insert Data into Tables:

1- Company Dimension Data:

COMPANY_KEY	COMPANY_NAME	LOCATION
1	AJWA for Food Industries company Egypt	Egypt
4	Abu Dhabi Islamic Bank- Egypt	Egypt
7	Al Baraka Bank Egypt	Egypt
40	Cairo Poultry	Egypt
44	Cleopatra Hospital Company	Egypt
52	Delta Sugar	Egypt
66	Egyptian Financial & Industrial	Egypt
68	Egyptian Gulf Bank	Egypt
82	El Ahli Investment and Development	Egypt

2- Industry Dimension Data:

INDUSTRY_KEY	INDUSTRY_TYPE
2	Food, Beverages and Tobacco
4	Basic Resources
5	Banks
8	Shipping & Transportation Services
9	Energy & Support Services
10	Health Care & Pharmaceuticals
11	Real Estate
12	Building Materials
14	Industrial Goods , Services and Automobiles
15	IT , Media & Communication Services
17	Paper & Packaging
20	Other

3- Date Dimension Data:

DATE_KEY	YEAR	QUARTER	MONTH_NAME	MONTH	DAY_NAME	DAY_NUMBER
1/1/2021	2021	1	January	1	Friday	1
1/2/2021	2021	1	January	1	Saturday	2
1/3/2021	2021	1	January	1	Sunday	3
1/4/2021	2021	1	January	1	Monday	4
1/5/2021	2021	1	January	1	Tuesday	5
1/6/2021	2021	1	January	1	Wednesday	6
1/7/2021	2021	1	January	1	Thursday	7

4-Stock Market Fact Data:

COMPANY_ID	INDUSTRY_ID	DATE_KEY	CLOSE	OPEN	LOW	HIGH	VOLUME
224	15	8/10/2022	38.25	39.75	41.25	37.5	43312
224	15	8/11/2022	39.5	40.25	40.75	38	13748
224	15	8/12/2022	41.5	40	41.75	38.75	16304
224	15	8/15/2022	44.5	43.25	46.5	42.5	53780
224	15	8/16/2022	42.5	45	45	40.5	34508
224	15	8/17/2022	42.25	42.5	43	40.75	16812
224	15	8/18/2022	42.5	42.5	43	39.5	13456

5-IncomeStatement Fact Data:

COMPANY_ID	INDUSTRY_ID	QUARTER	PERIOD_END_DATE	REVENUE	REVENUE_GROWTH	OPERATING_EXPENSES	OPERATING_INCOME	INCOMETAX_EXPENSE	NET_INCOME_TO_COMPANY	NET_INCOME_TO_STOCKHOLDERS
224	15	Q	6/30/2022	20370042	2.15	-75011719	-79298972	311883	-80809785	-79869190
224	15	Q-1	3/31/2022	20370042	2.15	-75011719	-79298972	311883	-80809785	-79869190
224	15	Q-2	12/31/2021	12714499	1.82	-47193989	-50987821	1512148	-30400998	-30364365
224	15	Q-3	9/30/2021	12714499	1.82	-47193989	-50987821	1512148	-30400998	-30364365
224	15	Q-4	6/30/2021	6458128	0.56	-19940390	-21435532	846870	-40343700	-40343700
224	15	Q-5	3/31/2021	6458128	0.56	-19940389	-21435532	846870	-40343701	-40343701
224	15	Q-6	12/31/2020	4513268		-7241728	-8007170	819101	-7060700	-7060700
224	15	Q-7	9/30/2020	4513268		-7241728	-8007170	819101	-7060700	-7060700
224	15	Q-8	6/30/2020	4142875		-4900989	-8686256	758751	-7801901	-7801901
224	15	Q-9	3/31/2020	4142875		-4900989	-8686256	758751	-7801901	-7801901
4	5	Q	6/30/2022	1193505000	0.14	-318788000	874717000	-296435000	572593000	577630000
4	5	Q-1	3/31/2022	1226040000	0.29	-517300000	708740000	-264151000	444297000	446287000

Insert The Measured Data into Fact Tables

1-insert into stock market fact SMA

declare

cursor SMA_CALC is

select sm.Company_id,sm.date_key ,sm.Close, **sum**(sm.close) over(**partition**
by sm.company_id **order by** sm.date_key rows between current row and 20
following)/20 as SMA_20_day

from stock_market_fact sm

join company_dim cc on sm.company_id = cc.company_key ;

begin

for sma_record **in** SMA_CALC **loop**

update stock_market_fact

set SMA = sma_record.SMA_20_day

where date_key = sma_record.date_key **and** company_id =
sma_record.company_id ;

end loop ;

end;

2-Insert into Stock Market fact ADTV_Measure

declare

cursor ADTV_CALC is

select sm.Company_ID,sm.date_key ,sm.volume, **sum**(sm.volume)
over(**partition by** sm.company_id **order by** sm.date_key rows between current
row **and** 10 following)/10 **as** ADTV_10_day

from stock_market_fact sm

join company_dim cc on sm.company_id = cc.company_key;

begin

```

for ADTV_record in ADTV_CALC loop
update stock_market_fact
set ADTV = ADTV_record.ADTV_10_day
where date_key = ADTV_record.date_key and company_id =
ADTV_record.company_id ;
end loop ;
end;

```

3-insert into Stock Market Fact ,ROC_Measure

```

declare
cursor ROC_CALC is
select Company_ID , date_key ,close,trunc(((close -
avg_close_10_day)/avg_close_10_day) *100,3) as ROC
from(
select sm.Company_id,sm.date_key ,sm.High,sm.Low,sm.Close,
avg(sm.close) over(partition by sm.company_id order by sm.date_key
desc range between current row and interval '30' day following) as
avg_close_10_day
from stock_market_fact sm
join company_dim cc on sm.company_id = cc.company_key
);
begin
for ROC_record in ROC_CALC loop
update stock_market_fact
set ROC = ROC_record.ROC
where date_key = ROC_record.date_key and company_id =
ROC_record.company_id ;
end loop ; end;

```

4-insert into Stock Market Fact ATR_Measure

```
declare
  cursor ATR_CALC is
    with ATR_calc(Company_id,date_key,HI, Hclose,Lclose)
    as (
      select Company_id,date_key, High-Low as HL , high - lag_close as Hclose,
      low-lag_close as Lclose
    from(
      select sm.Company_id,sm.date_key
      ,sm.High,sm.Low,sm.Close,lag(sm.close,1) over(partition by sm.company_id
      order by sm.date_key) as lag_close
    from stock_market_fact sm
    join company_dim cc on sm.company_id = cc.company_key ) )
    select company_id,date_key , sum(TR) over (partition by company_id order
    by date_key range between current row and interval '7' day following ) as ATR
    from (select Company_id,date_key,greatest(HI,Hclose,Lclose) as TR
    from ATR_calc ) ;
begin
  for ATR_record in ATR_CALC loop
    update stock_market_fact
    set ATR = ATR_record.ATR
    where date_key = ATR_record.date_key and company_id =
    ATR_record.company_id ;
  end loop ;
end;
```

5- insert into Stock Market Fact EMA_Measure

```
declare
  cursor EMA_CALC is
    select company_id , date_key ,
```

```

trunc((
  sum(power((1 / 0.5), seqnum) * close)
    over (partition by company_id order by seqnum)
    +
  first_value(close) over (partition by company_id order by seqnum)
  )
  /
  power(2, seqnum + 1),3) as EMA
from (select p.*,
      row_number() over (partition by company_id order by date_key) - 1
as seqnum
  from stock_market_fact p
  where date_key < to_date('1/15/2022', 'mm/dd/yyyy')

  ) p ;

begin

  for EMA_record in EMA_CALC loop

    update stock_market_fact
    set EMA = EMA_record.EMA
    where date_key = EMA_record.date_key and company_id =
EMA_record.company_id ;
  end loop ;

end;

```

6- insert into Stock Market Fact Change_Measure

```

declare
  cursor Change_CALC is
    select company_id,date_key ,close ,((close - prev_close)/ prev_close ) *
100 as change
    from (
      select company_id , date_key,close , lag(close) over (partition by
company_id order by date_key ) as prev_close
      from stock_market_fact
    ) ;

begin

  for Change_record in Change_CALC loop

```

```

update stock_market_fact
set change = Change_record.change
where date_key = Change_record.date_key and company_id =
Change_record.company_id ;
end loop ;

end;

```

SQL Queries to Create measures:

1- Calculating ATR Value -> Average true range

```

with ATR_calc(Company_id,date_key,HI, Hclose,Lclose)
as (
select Company_id,date_key, High-Low as HL , high - lag_close as Hclose, low-
lag_close as Lclose
from(
select sm.Company_id,sm.date_key ,sm.High,sm.Low,sm.Close,lag(sm.close,1)
over(partition by sm.company_id order by sm.date_key) as lag_close
from stock_market_fact sm
join company_dim cc on sm.company_id = cc.company_key ) )
select company_id,date_key , sum(TR) over (partition by company_id order by
date_key range between current row and interval '7' day following ) as ATR
from (select Company_id,date_key,greatest(HI,Hclose,Lclose) as TR
from ATR_calc ) ;

```

COMPANY_ID	DATE_KEY	ATR
1	4/1/2021	1.55
1	4/4/2021	2.6
1	4/5/2021	2.7
1	4/6/2021	2.25
1	4/7/2021	3
1	4/8/2021	3.75

2- Calculating ROC -> Rate Of Change

```
select Company_ID , date_key ,close,trunc(((close -  
avg_close_10_day)/avg_close_10_day) *100,3) as ROC
```

```
from(
```

```
select sm.Company_id,sm.date_key ,sm.High,sm.Low,sm.Close,  
avg(sm.close) over(partition by sm.company_id order by sm.date_key desc  
range between current row and interval '30' day following) as  
avg_close_10_day
```

```
from stock_market_fact sm
```

```
join company_dim cc on sm.company_id = cc.company_key
```

```
);
```

COMPANY_NAME	DATE_KEY	CLOSE	ROC
AJWA for Food Industries company Egypt	4/1/2021	12.2	0
AJWA for Food Industries company Egypt	4/4/2021	12.5	1.214
AJWA for Food Industries company Egypt	4/5/2021	12	-1.907
AJWA for Food Industries company Egypt	4/6/2021	11.6	-3.933
AJWA for Food Industries company Egypt	4/7/2021	11.6	-3.171
AJWA for Food Industries company Egypt	4/8/2021	11.7	-1.955
AJWA for Food Industries company Egypt	4/11/2021	12.35	2.977
AJWA for Food Industries company Egypt	4/12/2021	12.85	6.198
AJWA for Food Industries company Egypt	4/13/2021	12.6	3.656
AJWA for Food Industries company Egypt	4/14/2021	12.5	2.543
AJWA for Food Industries company Egypt	4/15/2021	13.05	6.372
AJWA for Food Industries company Egypt	4/18/2021	13.85	11.693
AJWA for Food Industries company Egypt	4/19/2021	14.5	15.431

3- Calculating EMA -> Exponential Moving Average

```
select company_id , date_key ,  
       trunc(  
         sum(power((1 / 0.5), seqnum) * close)  
         over (partition by company_id order by seqnum)  
         +  
         first_value(close) over (partition by company_id order by seqnum)  
       )  
       /  
       power(2, seqnum + 1),3) as EMA  
from (select p.*,  
       row_number() over (partition by company_id order by date_key) - 1  
as seqnum  
  from stock_market_fact p  
 where date_key < to_date('1/15/2022', 'mm/dd/yyyy')  
 ) p ;
```

COMPANY_ID	DATE_KEY	EMA
1	4/1/2021	12.2
1	4/4/2021	12.35
1	4/5/2021	12.175
1	4/6/2021	11.887
1	4/7/2021	11.743
1	4/8/2021	11.721
1	4/11/2021	12.035
1	4/12/2021	12.442
1	4/13/2021	12.521
1	4/14/2021	12.51
1	4/15/2021	12.78
1	4/18/2021	13.315

4- Calculating ADTV -> Average Daily Trading Volume

```
select sm.Company_ID,sm.date_key ,sm.volume, sum(sm.volume)
over(partition by sm.company_id order by sm.date_key rows between current
row and 10 following)/10 as ADTV_10_day
from stock_market_fact sm
join company_dim cc on sm.company_id = cc.company_key;
```

COMPANY_NAME	DATE_KEY	VOLUME	ADTV_10_DAY
Abu Dhabi Islamic Bank- Egypt	2/14/2021	251840	291745
Abu Dhabi Islamic Bank- Egypt	2/15/2021	382320	285736
Abu Dhabi Islamic Bank- Egypt	2/16/2021	225750	285510
Abu Dhabi Islamic Bank- Egypt	2/17/2021	110960	276497
Abu Dhabi Islamic Bank- Egypt	2/18/2021	195470	272115
Abu Dhabi Islamic Bank- Egypt	2/21/2021	257620	262405
Abu Dhabi Islamic Bank- Egypt	2/22/2021	313600	241128
Abu Dhabi Islamic Bank- Egypt	2/23/2021	305490	221842
Abu Dhabi Islamic Bank- Egypt	2/24/2021	171440	217033
Abu Dhabi Islamic Bank- Egypt	2/25/2021	205430	340889
Abu Dhabi Islamic Bank- Egypt	2/28/2021	497530	326997
Abu Dhabi Islamic Bank- Egypt	3/1/2021	191750	300213

5- calculate Change

```
select company_id,date_key ,close ,((close - prev_close)/ prev_close ) * 100
as change
from (
select company_id , date_key,close , lag(close) over (partition by
company_id order by date_key ) as prev_close
from stock_market_fact
```

COMPANY_ID	CLOSE	CHANGE
1	12.2	
1	12.5	2.459
1	12	-4
1	11.6	-3.333
1	11.6	0
1	11.7	0.862
1	12.35	5.555
1	12.85	4.048
1	12.6	-1.945
1	12.5	-0.793
1	13.05	4.4

6- Calculate SMA >> Simple Moving Average

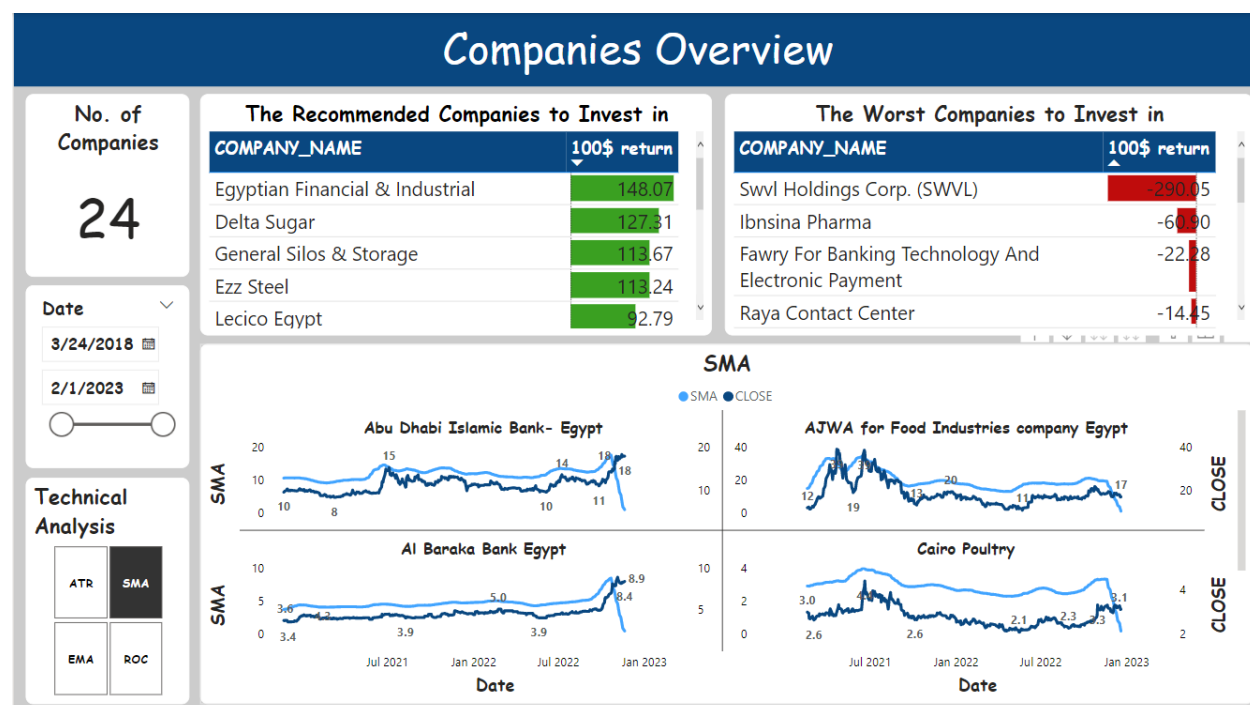
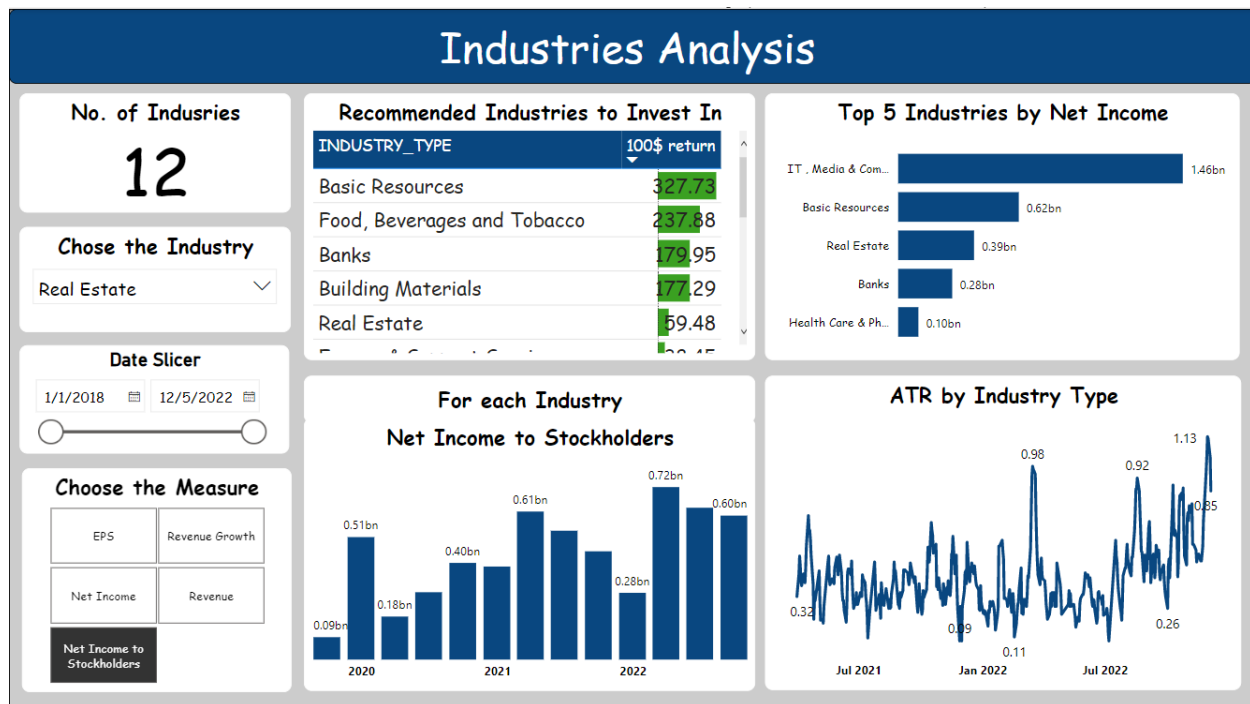
```
select sm.Company_id,sm.date_key ,sm.Close, sum(sm.close) over(partition by  
sm.company_id order by sm.date_key rows between current row and 20 following)/20  
as SMA_20_day
```

```
from stock_market_fact sm
```

```
join company_dim cc on sm.company_id = cc.company_key ;
```

COMPANY_ID	DATE_KEY	CLOSE	SMA_20_DAY
1	4/1/2021	12.2	14.7525
1	4/4/2021	12.5	15.0925
1	4/5/2021	12	15.51
1	4/6/2021	11.6	16.0125
1	4/7/2021	11.6	16.6175
1	4/8/2021	11.7	17.315
1	4/11/2021	12.35	18.1375
1	4/12/2021	12.85	19.0325
1	4/13/2021	12.6	19.99
1	4/14/2021	12.5	20.9
1	4/15/2021	13.05	21.735
1	4/18/2021	13.85	22.4475
1	4/19/2021	14.5	23.0125

Screenshots from the Dashboard:



Conclusion:

After going through all this steps and analyzing the performance of each company and Industry, we could answer the question that we asked in the beginning, As We have figured out that the best industry to invest in is **Basic Resources** and the best Company to invest in is **The Egyptian Financial & industrial company**.