TOPIC: Impact of trade(import and export) on the growth of manufacturing industry in ghana. A case study of it impact on 1D1F(1 district 1 factory). Developing a model that predicts possible district that manufacturing factories can be established.

OVERVIEW OF THE PROJECT

INTRODUCTION

This is the capstone project for the data science track of the Azubi Africa Programme June 2020 cohort. Under the scope of the course work, we are required to do work on a project and apply every we have learnt and apply all the skills we have gained in the data science track.

DESCRIPTION

Manufacturing industries refers to those industries involved in the manufacturing and processing of items and indulge in either creation of new commodities or in value addition. The manufacturing industry accounts for a significant share of the industrial sector in both developed and developing countries. The final products can either serve as a finished good for sale to customers or as intermediate goods used in the production process. Bartlesman and Gray (1996) define the concept as a branch of manufacture and trade based on the fabrication, processing, or preparation of products from raw materials and commodities. While, according to German Economist Alfred Weber (1909) a manufacturing industry can be seen as an industrial production, in which raw materials are transformed into finished goods on a large scale. Lastly, the National Association of Manufacturing (USA) defined the concept as businesses involve in manufacturing and processing of products.

The Definition of Manufacturing Industries in Ghana

Kayanula and Quartey (2000) define manufacturing as the process of converting raw materials into finished goods. The Ghana Statistical Service (GSS) in its industry survey defined the concept as a variety of activities involved in the production of goods and services. The Ghana Enterprise Development Commission (GEDC) defined manufacturing industries in terms of its plant and machinery. Kayanula and Quartey (2000) have raised the danger inherent in valuing a fixed asset and the effect of inflation on valuation, especially adopting the fixed assets criteria. The regional project on Enterprise Development Ghana manufacturing survey paper gave a definition to the sector industry classifying firms into micro enterprise (less than 5 employees), small enterprise (5 -29 employees), medium enterprise (30 – 99 employees) and large enterprise (100 and more employees).

As the liberalization is increase then the international trade is increase, then both imports and exports of the goods will increase. As the exports in the country will increase then ultimately the foreign reserves will increase, inflows in the country will increase, domestic investment increase, production of manufacturing sector increase but when the imports will increase, domestic outflow increase, domestic investment decrease, domestic production of manufacturing goods decrease.

One District One Factory

One District One Factory also known as 1D1F is a Government of Ghana policy. It is aimed at creating jobs for Ghanaians through the setting up of factories and industries which will in turn move the country towards greater industrialization. The policy was first introduced to Ghanaians in 2016 as part of manifesto of the New Patriotic Party of Ghana. The programme received a boost on January 13, 2018, with the commissioning of Twyford Ceramics factory by President Nana Akufo-Addo at Shama District in the Western region. The ceramics factory which is into the production and distribution of tiles is estimated at the cost of $77.26 million and will operate at a designed production capacity of 14.4 million square meters per year with annual sales projected to be $82.8 million.

a total of about 170 factories are currently at various stages of completion such as, operating as new factories, operating as revived or expanded factories, new factories under construction, as well as small scale processing factories under construction.

Out of this number, a total of 28 factories have been completed and operating fully as direct 1D1F projects, while 31 factories, under same new 1D1F factories, are under construction.

In another classification of operational factories under 1D1F, government has partnered the private sector to either revive or expand 48 existing companies, thus bringing the total number of operational companies (directly under 1D1F and private partnership to 76).

While the 1D1F seeks to build new factories, it also focuses on helping small-scale entrepreneurs to advance their traditional processing of food and other items across the county.

President Akufo-Addo prior to being elected in 2016, promised a bold industrialisation drive to build factories across districts in the country, taking into consideration market and proximity of raw materials to create employment for the youth.

Despite the initiative being tagged One District One Factory, (1D1F) officials have explained that in neighbouring districts where particular raw materials are common, one factory is centrally located to cater for such districts instead of building same factories in each district with similar considerations.

One District One Factory Programme was instituted by His Excellency, President Nana Addo Dankwa Akuffo-Addo to address the challenge of slow economic growth at the district level through a massive nationwide industrialisation drive, which will equip and empower communities to utilise their local resources in manufacturing products that are in high demand both locally and internationally. This will allow the country to reap the well-known rewards of industrialisation, such as gains in efficiency in every facet of life in our society, increase in agricultural and manufacturing output, a reduction in the reliance on imports and increase in the production of consumer goods and food availability.

The programme is expected to facilitate the creation of between 7,000 to 15,000 jobs per district and between 1.5 million and 3.2 million nationwide by end of 2021.

- Increase job creation
- Promote rural income generation through grass-root participation in industrial and commercial activities

- Promote import substitution for currency stability
- Promote income generation for a wide range of producers
- Increase revenues through exports
- Attract and Improve profitability of investors
- Provide necessary incentive to increase yield of domestic output.
- Mission Statement

The mission of the One-District, One-Factory programme is to identify and create business opportunities in the districts, harnessing the strengths and resources of the locals in an efficient technology and demand driven value chain.

AIM OF PROJECT

This project aims to dive into the impact of trade (import and export) on the growth of the manufacturing industry in Ghana. We would be using a case study of its impact of the One District One Factory Initiative in Ghana.

DATASET

We used 3 different datasets, namely, import and export data of Ghana, crop production data in Ghana, One District One Factory Data.

PROJECT SCOPE

Our project scope is to run the exploratory data analysis using python and its libraries and to find business insights from our data. Also, perform machine learning using Microsoft Azure.

DATA CLEANING AND EXPLORATORY ANALYSIS

The datasets used for this project are structured data with few missing values and null values. Data cleaning and imputation techniques are used for the missing values imputation.

In the import and export data, the goods description 2 was removed since it was a repetition of goods description 1 and was not very detailed.

After cleaning the data, we used python to run exploratory data analysis to find the business insights from the data. We extensively used python libraries: pandas, NumPy, matplotlib and seaborn for the data analysis. We also used Power BI.

BUSINESS PROBLEM

As the years go by, the revenue from exports in Ghana decreases. This is because the goods exported are not all finished products, some are exported in their raw state or semi-finished state, hence, the revenue gained is small.

We gathered the following problems regarding the import and export of agricultural products in Ghana.

1. The location of plantations. Some farm plantations are very far from factories that can process the raw materials into finished goods for export. So, a substantial quantity of the raw materials gets rotten

2. There are insufficient factories in areas that grow the raw materials that are in high demand

3. There are bad road networks in areas with plantations

This is an effort to explore the impact of trade on the manufacturing sector and its development on Ghana.

HYPOTHESIS

Our main hypothesis is that trade impacts negatively on the growth of the manufacturing industry in Ghana.

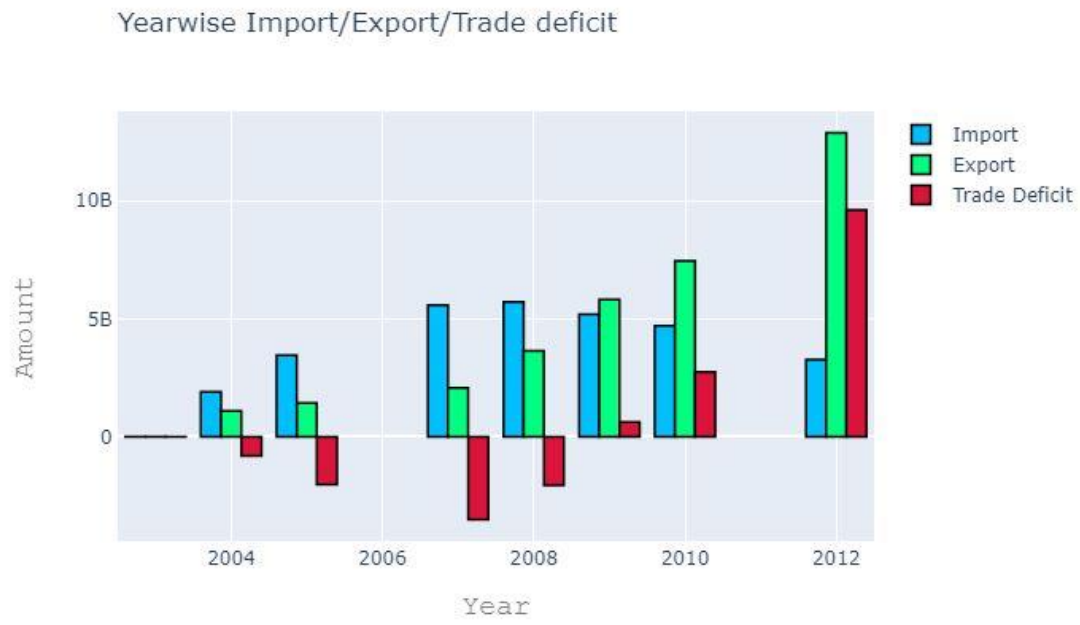
This hypothesis was motivated by the assumption that there are a lot of goods being imported into Ghana rather than goods being exported. Additionally, the goods exported from Ghana are not in their finished state. Hence, the manufacturing industry of Ghana is not growing, and this negatively affects industrialization in Ghana.

QUESTIONS

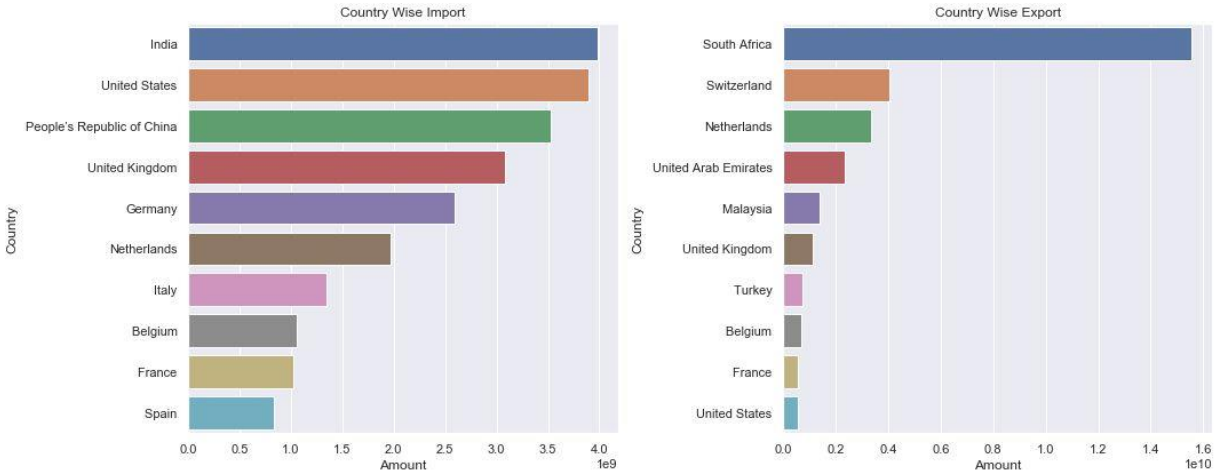
To be able to test the hypothesis, a few questions were asked. This will help in gathering information for data analysis.

- Which raw materials are more available in which districts?
- Which factories are fully operational in which districts?
- Which goods are imported most into Ghana?
- Which goods are exported most out of Ghana?
- Which countries are more goods imported into Ghana?
- What was the highest amount paid for goods exported from Ghana?
- What is the highest number of package of goods exported from Ghana?
- What is the highest number of packages of goods imported into Ghana?
- What is the highest amount paid for goods imported into Ghana?
- Was the number of exports increasing over the years?
- Was the number of imports increasing over the years?

VISUALIZATION AND INSIGHTS

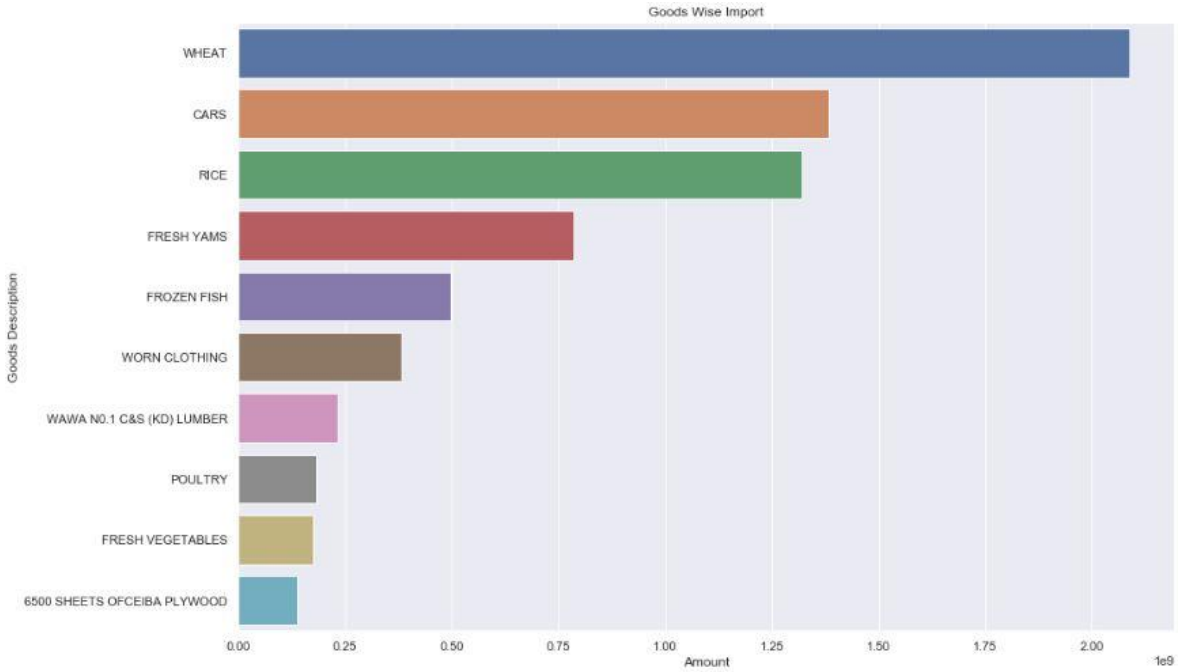


From the waterfall chart above, the red bars show the trade deficit. The years that have the red bars pointing down, indicate that there was a trade deficit in those years, so the imports were more than the exports.

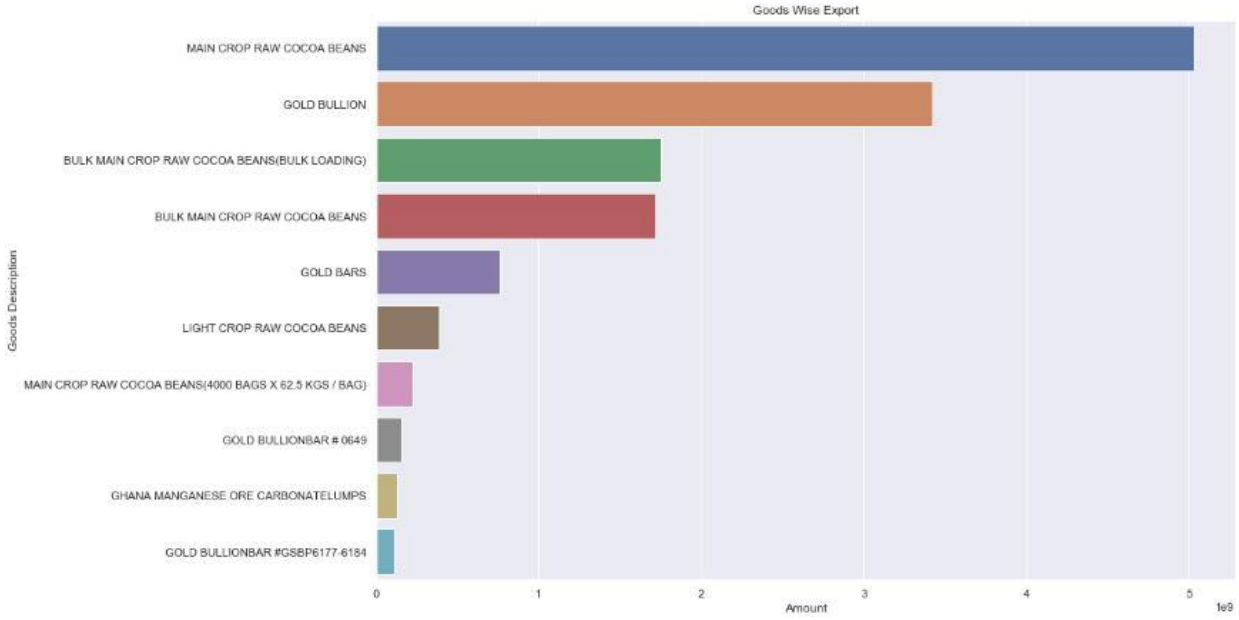


The chart shows the countries that Ghana imports and exports and the amount.

Ghana imports most to India. Ghana exports most to South Africa



From the graph above, Ghana imports wheat most.



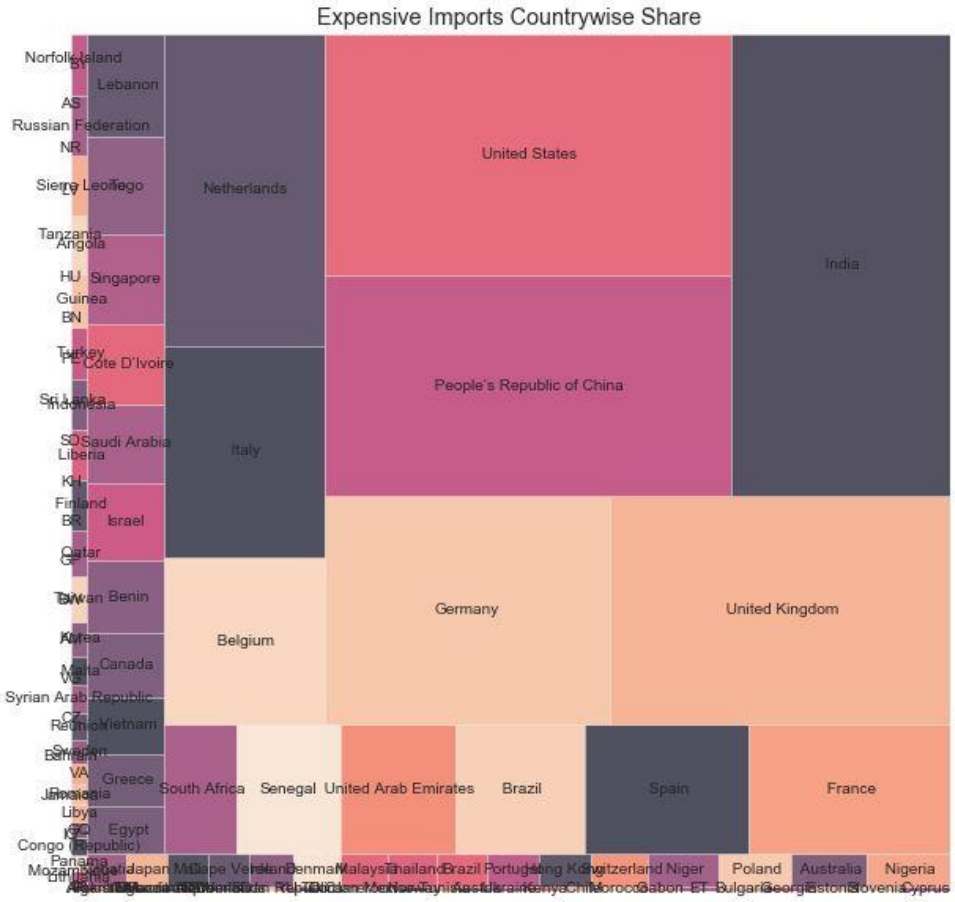
From the graph above, Ghana exports cocoa beans the most.

Year	Amount	deficit
2003	3.278808e+06	-9.304835e+05
2004	1.908745e+09	-8.164447e+08
2005	3.452519e+09	-2.019531e+09
2007	5.576353e+09	-3.507784e+09
2008	5.705912e+09	-2.059064e+09
2009	5.194366e+09	6.251364e+08
2010	4.699491e+09	2.744240e+09
2012	3.266426e+09	9.610468e+09

From the analysis above, the negative values for the deficit shows that there is a trade deficit. Hence, the imports were more than the exports.

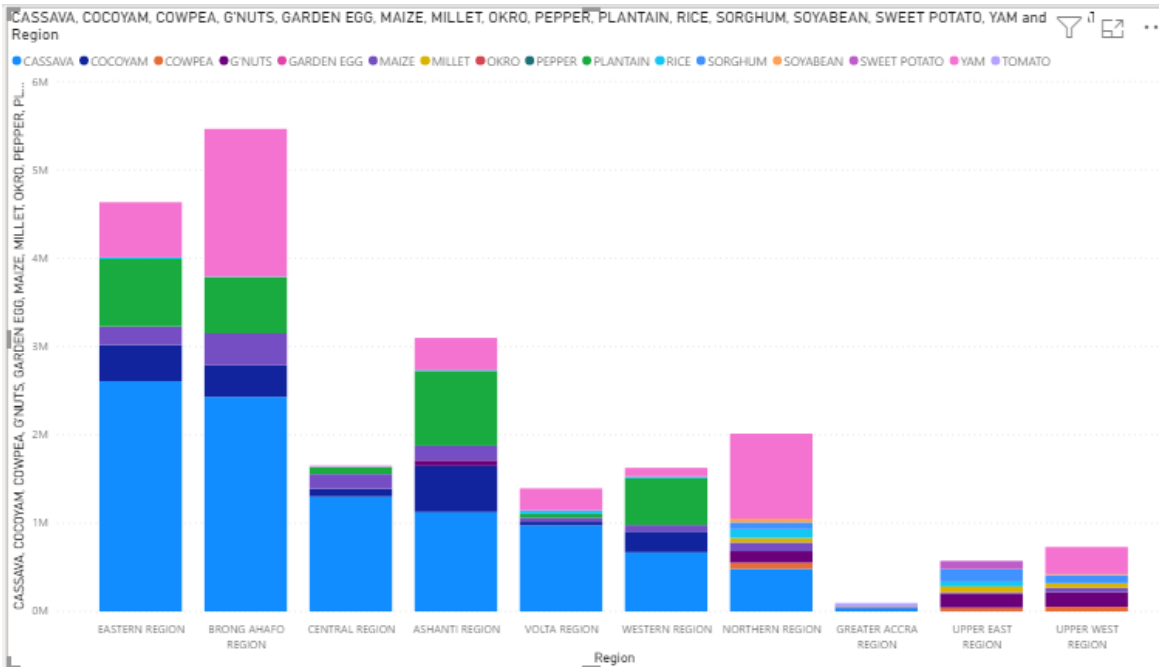
	Hs Code	Year	Goods Description	Items Number	Number of Package	Amount	Country
1272	1008900000	2007	60 CTNS X 400G WHEAT CERELAC AND15 CTNS X 400G...	1	22275	1155190.49	United States
2665	7102100000	2005	CARS	1	1	1001581.80	Germany
2666	714901000	2007	FRESH YAM	1	89	1001848.74	Germany
2667	714901000	2007	89 CTNS FRESH YAM	11	89	1002443.91	Germany
2668	714901000	2004	FRESH YAMS	1	500	1002645.14	Germany
2669	4202120000	2009	200 CTNS X 2 PCS ECOLAC BAGS	3	200	1003095.45	Togo
2670	3004500000	2009	PHARMACEUTICAL PRODUCT	1	1	1003264.47	Sierra Leone
2671	1511909000	2007	PALM OIL (100 JERRY CANS)	1	100	1003439.38	Australia
2672	904110000	2012	FOOD ITEMS & VEGETABLES	1	1	1003498.84	United Kingdom
2673	2106909000	2007	76 PKGS. ASSORTED PROVISIONS	3	76	1003890.37	South Africa

	Hs Code	Year	Goods Description	Items Number	Number of Package	Amount	Country
0	901112900	2004	BAGS GHANA ROBUSTA COFFEE GRADE 1	1	265	15.57	Netherlands
1	4407990000	2008	GHANA BLACK OFRAM NO. 1 C&SLUMBER AIR DRIED	1	41	35.92	Senegal
2	4408900000	2008	1X40' CONTAINER CONTG: GHANACEIBA ROTARY VENEER	1	23	38.71	United States
3	4407240000	2008	GHANA GUAREA LUMBER (KD) - 396 PCS	1	6	44.77	France
4	4408900000	2008	1X20' CONTAINER CONTG; GHANAASANFENA/EDINAM/OF...	1	8	44.89	Germany

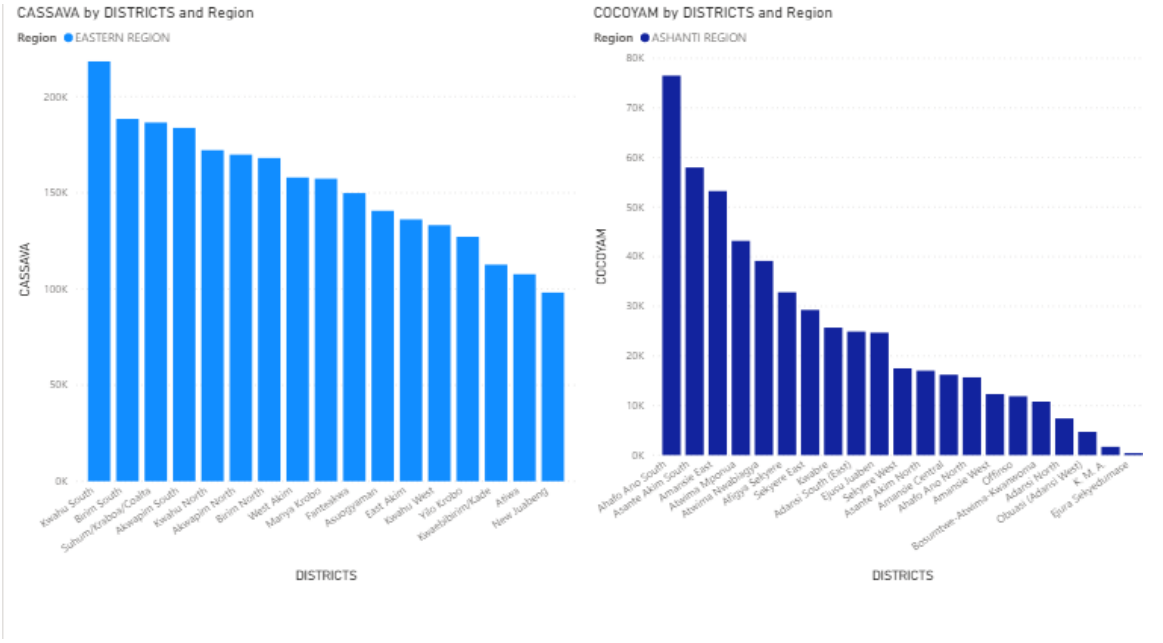


	Goods Description
RICE	1151
WHEAT	1070
CARS	731
FRESH YAMS	684
WORN CLOTHING	309
FROZEN FISH	263
WAWA N0.1 C&S (KD) LUMBER	213
FRESH VEGETABLES	187
POULTRY	157
FRESH CUT FLOWERS	119
6500 SHEETS OFCEIBA PLYWOOD	117
CEIBA PLYWOOD	90
1000 CTNS OF FRESH YAMS	89
CEIBA ROTARY VENEER	82
KHAYA FAS (KD) LUMBER	68
1000 CTNS FRESH YAM	66
CEIBA PLYWOOD(1X40 FT CONTAINER)	63
FAQ NIANGON BOULES	63
NO.1 C & S WAWA (KD) LUMBER(1X40 FT CONTAINER)	59
1000 CTNS FRESH YAMS	59

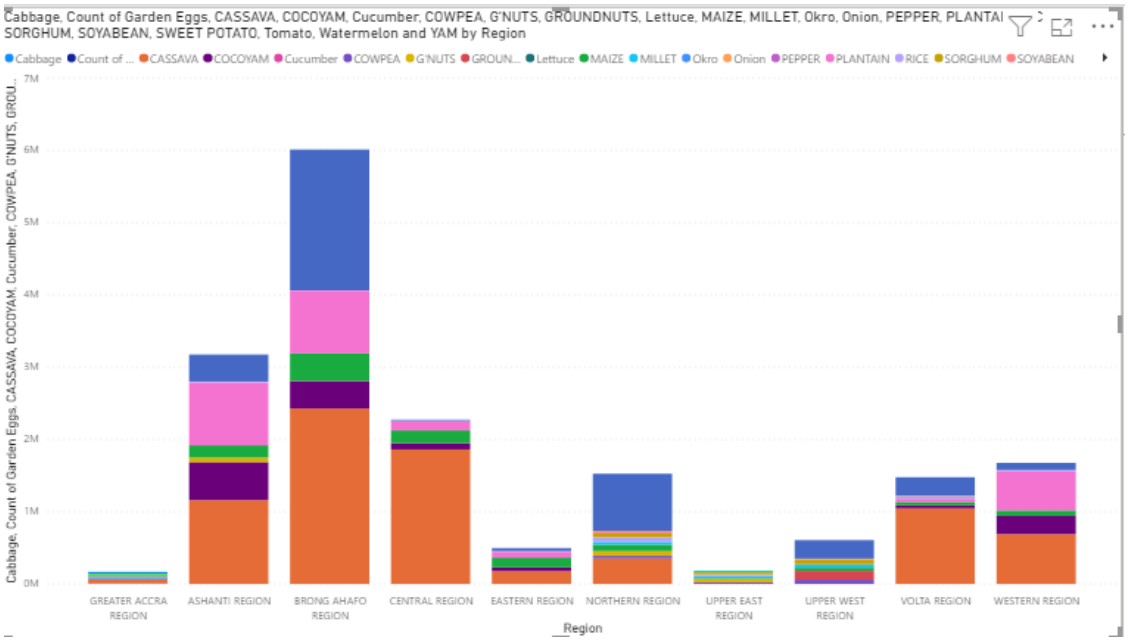
	Hs Code	Year	Goods Description	Items Number	Number of Package	Amount	Country
0	2508100000	2012	BENTONITE IN KILOGRAMS	2	1	1.02	Germany
1	2513190000	2008	ONE PARCEL CRUSHED STONE	1	1	1.04	United States
2	1901909000	2005	2CNTS ASSORTED FOOD ITEMS	2	2	1.04	Netherlands
3	405100000	2007	2 PC OF SHEA BUTTER	22	2	1.06	Switzerland
4	3204120000	2007	1 PC OF AFRICAN HAIR DYE	18	1	1.25	Switzerland



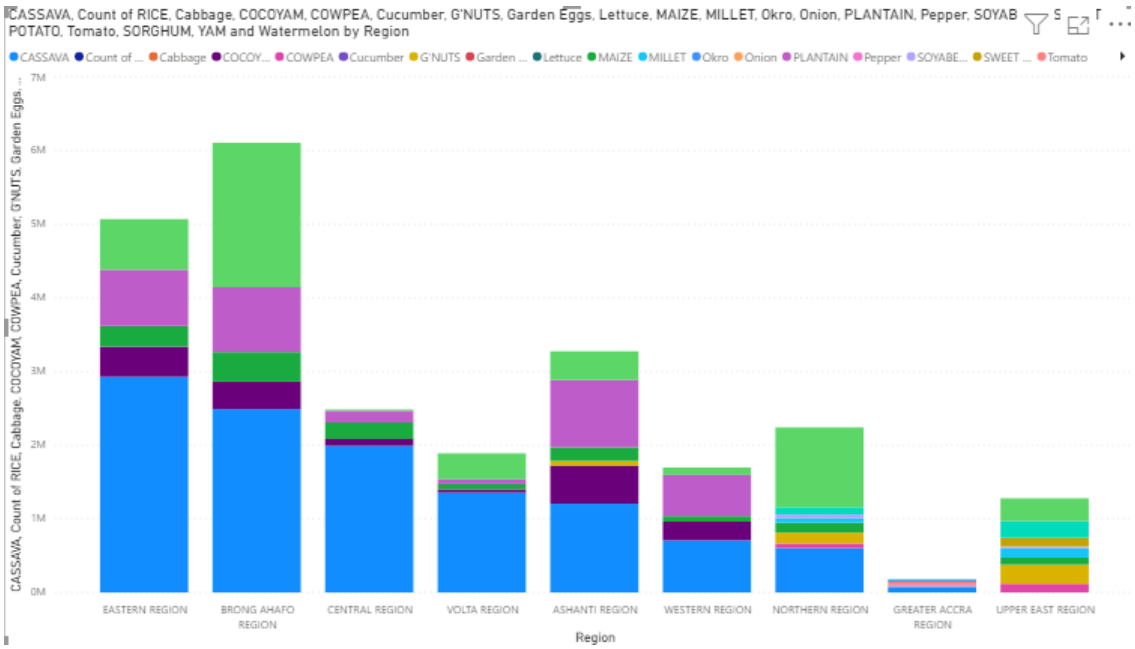
The bar graph shows the crops that are grown in each region and the ones that are grown most in 2006.



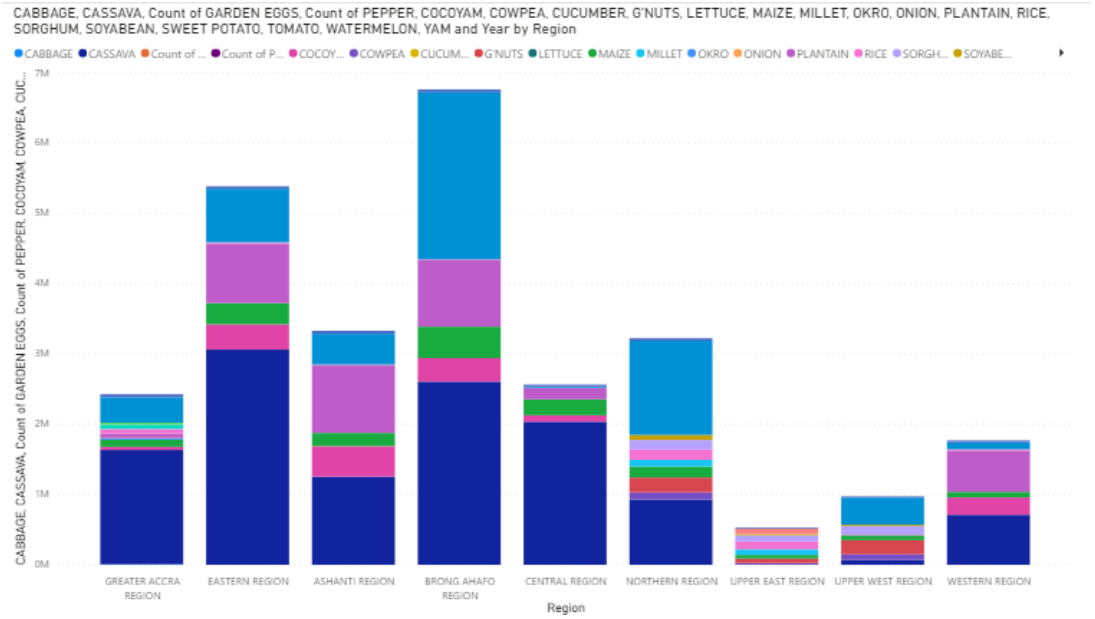
The bar graph above, shows the districts that cassava is grown most in the Eastern Region and that cocoyam is grown most in the Ashanti Region.



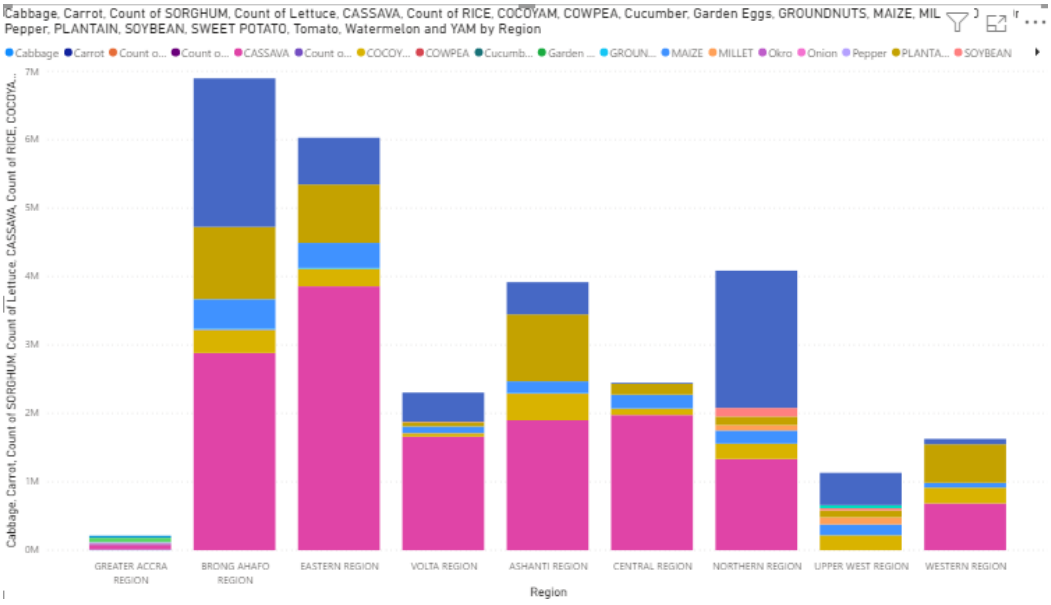
The bar graph shows the crops that are grown in each region and the ones that are grown most in 2007.



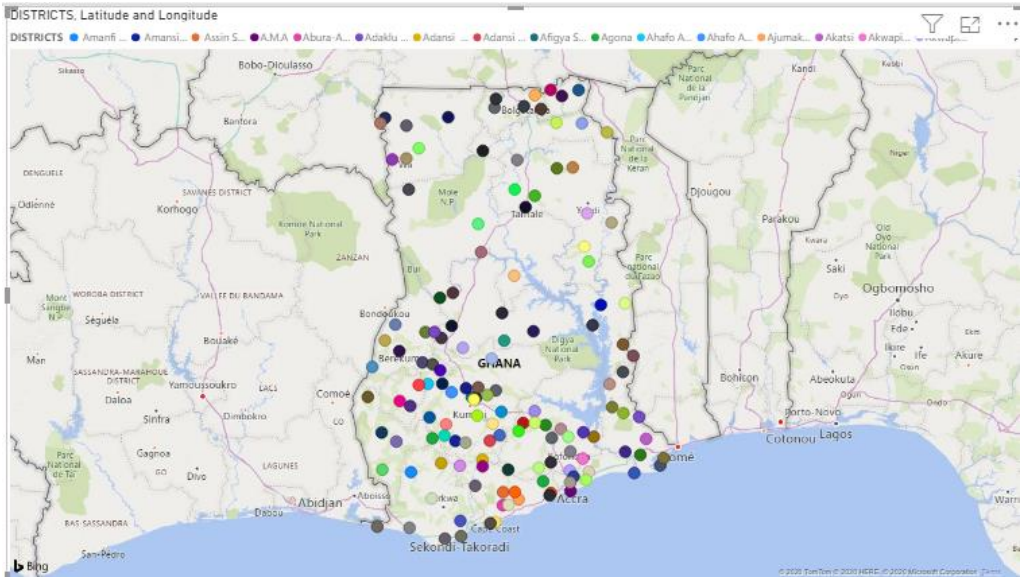
The bar graph shows the crops that are grown in each region and the ones that are grown most in 2008.



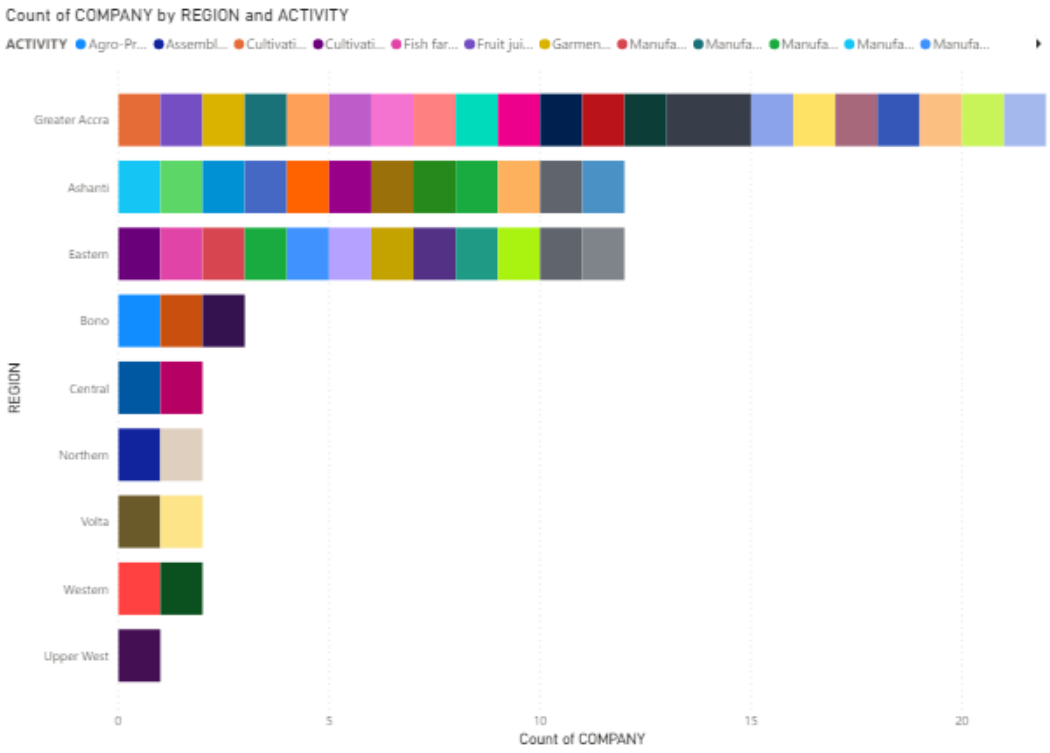
The bar graph shows the crops that are grown in each region and the ones that are grown most in 2009.



The bar graph shows the crops that are grown in each region and the ones that are grown most in 2011.



The map above shows the points in Ghana were crops are grown.



The graph above shows the factories that have been set up in the 1 District 1 Factory initiative and the regions that they have been set up in

IMPLICATIONS

From our analysis this will be the implications if our model is implemented.

- It will ensure equitable distribution of factories across the country
- create strong link among industry, agriculture and other natural resources

- ensure rapid industrialization; reduce importation considerably
- create job opportunities
- ensure local currency stability relative to foreign major currencies such as the American dollar, European euro, and British pound sterling
- enhance wealth creation among individuals and businesses in the Ghanaian economy.

DEEP DIVE ON SOLUTION

Auto ML was used, and the best algorithms were MaxAbscaler and LightGBM with an accuracy of 0.63823.

PRESCRIPTIONS

Governments should focus more on building factories in districts based on the most crops grown there. Hence, the finished goods exported would be more which would lead to higher revenue from exports.

SUMMARY AND CALL FOR ACTION

The mission of the One-District, One-Factory programme is to identify and create business opportunities in the districts, harnessing the strengths and resources of the locals in an efficient technology and demand driven value chain.

Our model is expected:

- To facilitate the creation of between 7,000 to 15,000 jobs per district and between 1.5 million and 3.2 million nationwide by end of 2021.
- To increase job creation
- To promote rural income generation through grass-root participation in industrial and commercial activities
- To promote import substitution for currency stability
- To promote income generation for a wide range of producers
- To increase revenues through exports
- To attract and Improve profitability of investors
- To provide necessary incentive to increase yield of domestic output.

CHALLENGES

- We had difficulty in getting data especially the import and export data and the crop data. More of such data would help us in analysis and training the model.
- The accuracy of the machine learning model would have to be improved.
- We had difficulty in normalizing our data in the machine learning process