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The Contribution Of Agricultural Sector Toward Gross Domestic Product (Case Study In China)

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INDEXING

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ABSTRACT

The aim of research is 1) To assess the growth level of major agricultural products supporting China's GDP from 1989 to 2023. 2). To compare the performance of the agricultural sector with GDP through CAGR The analysis then continues to the comparison between CAGR rice, corn and wheat to CAGR GDP. Next, GDP predictions are made until 2050. The selection of 2050 is based on the reason to see the prediction of the next 25 years as the number of years that provide the possibility of many significant changes. The result of study shows Trend of agriculture towards GDP of China in the last 3 decades shows that, there is a declining in contribution of agriculture but it is still important Changes in economic growth in China from agriculture towards GDP is affected by the development of the industry, not the value of agriculture towards GDP.

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INTRODUCTION

The China economy's most significant industry is agriculture and the world's top producer of wheat, rice, pulses, wheat, and wheat items is China (Miller, 2020). Also it is said, there are numerous business opportunities in China, including dairy, meat, and poultry, fisheries, and food grains as China is currently the world's second-largest producer of fruits and vegetables.

In China, about 40% of the population works in agriculture, making it country rich in agricultural resources and agriculture is the practice of cultivating specific plants and rearing domesticated animals (livestock) to produce food, feed, fiber, and many other desired items (Miller, 2020).

China's increased agricultural output has been largely attributed to agricultural finance and a greater use of contemporary inputs such as fertilizer's, high-yielding variety seeds, irrigation, and other inputs, together with growing loan requirements supplied by agricultural finance institutions, were the hallmarks of the Green Revolution. (GAP, 2025). The main functions of agriculture are to feed the populace, supply raw materials for industry, create jobs for a large number of people, provide capital for agrarian expansion, and, if done well, produce surpluses for the national economy.

The result research of Huang, Yang and Roselle from FAO (2025) also showed China's economic growth is indeed rapid and has implications for agriculture and food security in China and around the world. They also found that average annual growth rates of the GDP have reached nearly 10 percent in the past 25 years. In the early reform

period (1979–1984), the household responsibility system (HRS) significantly increased agricultural productivity. Growth in agriculture provided a crucial foundation for the successful transformation of China's reform economy (Huang, Yang and Rozelle, 2025). They said, since the mid-1980s, rural township and village enterprises' (TVEs) development, measures to provide a better market environment through domestic market reform, fiscal and financial expansion, the devaluation of the exchange rate, trade liberalization, the expansion of special economic zones to attract foreign direct investment (FDI), state-owned enterprise (SOE) reform, higher agricultural prices and many other factors all have contributed to China's economic growth.

In order to get the result how far the agricultural sector contributes to the Gross Domestic Product (GDP) of China, therefore it needs to make a research about it. The overall objective of this study is to enhance the understanding of how the agricultural sector may influence china's GDP. The following are the detailed objectives of the study: a) General objective: to analyze the contribution and role of the agricultural sector to China's Gross Domestic Product (GDP) during the period 1989 to 2023. b) The specific objectives are as follows: 1. To assess the growth level of major agricultural products supporting China's GDP from 1989 to 2023. 2. To compare the performance of the agricultural sector with GDP through CAGR.

LITERATURE REVIEW

The Understanding about Agricultural Sector in China

Agriculture in China began a very long time ago, perhaps also the beginning of civilization there. Analysis of stone tools by Professor Liu Li and other researchers shows that hunters and gatherers 23,000–19,500 years ago ground wild plants with the same tools that were later used to grind millet and rice (Liu et al. , 2013). The result of their research, shows that the tools were used to process various plants, including Triticale and Paniceae grasses, *Vigna* beans, *Dioscorea opposita* yam, and *Trichosanthes kirilowii* snakegourd roots. They explained, tubers were important food resources for Paleolithic hunter–gatherers, and Paniceae grasses were exploited about 12,000 years before their domestication. The long tradition of intensive exploitation of certain types of flora helped Paleolithic people understand the properties of these plants, including their medicinal uses, and eventually led to the plants' domestication (Liu et al., 2013). This study sheds light on the deep history of the broad spectrum subsistence strategy characteristic of late Pleistocene north China before the origins of agriculture in this region.

After the discovery of agricultural products as food ingredients, China experienced various significant changes in developing its agriculture. Ministry of Agriculture and Rural Affairs of The People’s Republic of China (2017) confessed that China has a big agriculture sector. It is explained, the Chinese government has always put the issue of feeding its 1.3 billio people on the top of its agenda, and adhered to the path of agricultural modernization with distinctive Chinese characteristics. Next it says, since the turn of the century, China has made remarkable achievements in agricultural and rural development. By 2015, its grain production has set a new record of 12 successive years of increase, offering abundant and diversified agricultural products (Ministry of Agriculture and Rural Affairs of PRC, 2017) . It is added, China feeds 20% of the world population with less than 9% of the world arable land. By 2015, farmers’ income has secured fast increase for 12 consecutive years, with fast improvement in social

undertakings, infrastructure and living conditions in rural area and on-going agricultural and rural economic growth basically meets people's increasing demand for agricultural products, providing strong support for the industrialization and urbanization that are unprecedented in terms of scale and speed, and making due contribution to food security around the world (Ministry of Agriculture and Rural Affairs of PRC, 2017).

Gross Domestic Product (GDP) of China

GDP measures the monetary value of final goods and services—that is, those that are bought by the final user—produced in a country in a given period of time (say a quarter or a year) it (Callen, 2025). It is added that counts all of the output generated within the borders of a country. GDP is composed of goods and services produced for sale in the market and also includes some nonmarket production, such as defense or education services provided by the government (Callen, 2025). It is also said, an alternative concept, gross national product, or GNP, counts all the output of the residents of a country. So if a German-owned company has a factory in the United States, the output of this factory would be included in U.S. GDP, but in German GNP (Callen, 2025).

Another definition of GDP is the **total monetary value of all goods and services produced and sold** within a country during a specific time period, typically one year (Worldometer, 2025).

Huang and Yang (2017) told that China's economy has experienced remarkable growth since economic reform initiated in 1979. They explained, the rapid economic growth has been associated with unprecedented progress in poverty alleviation. Moreover, based on China's official poverty line, the absolute level of poverty incidence fell from 33 percent in 1978 to less than 3 percent in 2004. Even they mentioned, based on World Bank's US$1/day (in PPP terms) poverty line, rural poverty incidence also fell from more than 30 percent in the early 1990s to about 8 percent in 2004.

Compound Annual Growth Rate (CAGR).

According to Fernando (2024). CAGR is the Compound Annual Growth Rate, is is the rate of return that an investment would need to have every year in order to grow from its beginning balance to its ending balance, over a given time interval. The CAGR assumes that any profits were reinvested at the end of each period of the investment's life span (Fernando, 2024).

With the development of science, the use of CAGR calculations is not only for investment, but is also used in calculating growth in several aspects of business, as Fernando (2024) explain that the compounded annual growth rate (CAGR) is one of the most accurate ways to calculate and determine returns for anything that can rise or fall in value over time.

RESEARCH METHOD

Data Collection

The data used in this study is secondary data, obtained from data provider institutions, namely FAOSTAT and World meter/IMF/World bank.

The process of obtaining data on FAOSTAT is as follows:

(1) Open the FAOSTAT website (2024)
(2) Click explore data

(3) Select production
(4) Select crop and livestock product
(5) In countries select CHINA
(6) In element select production quality
(7) In terms select crops primary
(8) In years select 1989-2023
(9) Click show data
(10) Click download data

Data Analysis

The analysis will be done as follows:

- CAGR GDP 1989 - 2023
- CAGR rice production 1989 - 2023
- CAGR corn production 1989 - 2023
- CAGR wheat production 1989 – 2023
- Comparison between GDP CAGR with

The analysis then continues to the comparison between CAGR rice, corn and wheat to CAGR GDP. Next, GDP predictions are made until 2050. The selection of 2050 is based on the reason to see the prediction of the next 25 years as the number of years that provide the possibility of many significant changes,

Definition of Operational

(1) GDP is measured in USD/year
(2) Rice production is measured in tons/year
(3) Corn production is measured in tons/year
(4) Wheat production is measured in tons/year.
(5) The formula used in measuring CAGR is:

$$CAGR = \left(\left(\frac{EV}{BV}\right)^{\frac{1}{n}} - 1\right) \cdot 100$$

where:

EV Ending value
BV Beginning value
n Number of years

(6) The formula for predicting GDP and production using simple regression:
y = a + bx with note :
y: future yield or GDP
a: constant
b: slope

RESULT AND DISCUSSION

CAGR Rice Production 1989 - 2023

By the formula which has been explained in Methodology, the CAGR of rice production can be gained as follows :

Per data is shown :

- Beginning Value (1989): 182,485,246 MT

- Ending Value (2023): 208,064,200 MT
- Beginning Year: 1989
- Ending Year: 2023
- Number of Years: 2023 - 1989 = 34 years

The process of calculation as follows :

(1) Divide Ending Value by Beginning Value:
208,064,200 / 182,485,246 ≈ 1.13938

(2) 1.1396 ^{0.0294} - 1

(3) The result of CAGR of rice production is approximately 0.0038 or 0.38 %

Then, the CAGR of rice production from 1989 to 2023 is approximately 0.38% per year.

The interpretation of the rice production grew at an average annual rate of 0.38% over the 34 year period. This indicates very slow growth as the production levels fluctuated significantly year-to-year but ended only slightly higher than the starting value.

Prediction of Chinese Rice Production 2024 – 2050

Based from the data of rice production 1989 - 2023, the prediction of rice production of China 2024 – 2050 can be raised by Excel facility as follows :

Table 1 . Chinese Rice Production Prediction 2024 – 2050

YEAR	PRODUCTION(TONS)
2024	214225607,8
2025	215236908,7
2026	216248209,5
2027	217259510,3
2028	218270811,1
2029	219282111,9
2030	220293412,7
2031	221304713,6
2032	222316014,4
2033	223327315,2
2034	224338616
2035	225349916,8
2036	226361217,7
2037	227372518,5
2038	228383819,3
2039	229395120,1
2040	230406420,9
2041	231417721,8
2042	232429022,6
2043	233440323,4
2044	234451624,2
2045	235462925
2046	236474225,9

2047	237485526,7
2048	238496827,5
2049	239508128,3
2050	240519429,1

Source : Managed Data by Excel from FAOSTAT (2025)

From data above, herewith the reviews and analysis about predicted rice production of China 2024 – 2050:

(1) Trend:

The data shows a "consistent and linear increase" in rice production from 2024 to 2050.

(2) There will be a magnitude of increase:

- Start (2024): there will be an increase 214.2 million tons
- End (2050):there will be an increase 240.5 million tons
- Total Increase over 27 years: 26.3 million tons
- Average Annual Increase: Approximately 973,703.7 tons per year.

(3) Rate of Growth: The growth rate is very gradual and constant. This represents an average annual growth rate of about 0.45% (calculated as (240.5 / 214.2)^(1/26) - 1).

Comparison between CAGR China GDP and CAGR Rice Production

CAGR of China GDP is 9.65 % while CAGR of China rice production is only 0.38 %. This condition brings about the following interpretation:

(1) China's GDP Growth (9.65% CAGR):
This figure indicates a historically very high rate of economic expansion for China over the period measured. It signifies rapid increases in the total value of goods and services produced in the country. This growth is typically driven by factors like massive industrialization, export-oriented manufacturing, infrastructure development, urbanization, technological advancement, and increasing consumption. It reflects the country's transformation into a major global economic power.

(2) China's Rice Production Growth (0.38% CAGR):
This figure indicates very slow growth, almost stagnation, in the total volume of rice produced in China over the same period. Given that the GDP grew much faster, this implies that agriculture, specifically rice production, has not kept pace with the overall economic expansion. Rice is a staple food for a large portion of China's population, so its production is critical for food security.

(3) Divergence between Overall Economy and Primary Sector: 22666 The stark difference highlights a fundamental shift in China's economic structure. While the service and industrial sectors have exploded, the agricultural sector, particularly for a crop like rice, has grown minimally. This is a common pattern in developing economies as they industrialize.

(4) There is Structural Transformation in China: China has undergone massive structural transformation. Resources (capital, labor, land) have flowed from agriculture into higher-value sectors like manufacturing and services, which drive the high GDP growth. This often leads to slower growth or even decline in traditional agricultural outputs.

(5) There is Agricultural Challenges: The slow growth in rice production could be attributed to several factors:
- Limited Arable Land: Urbanization and industrial expansion consume agricultural land.
- Water Scarcity: Rice is a water-intensive crop, and water resources are increasingly strained in many parts of China.
- Environmental Constraints: Pollution and soil degradation can limit yields.

(1) There is needed of Policy Focus: So government policies might prioritize economic growth drivers over agricultural output, or focus on higher-value cash crops.

(2) There is "Yield Plateau". It means, while yields might have improved slightly due to technology, this could be offset by a reduction in the total area planted with rice, perhaps due to farmers shifting to other crops or out of agriculture entirely.

(3) There is an implications for Food Security: Despite the slow growth, China is still likely a major rice producer in absolute terms (it's the world's largest producer). However, the minimal growth raises questions about long-term food security, especially with a growing and increasingly affluent population that may consume more calories or diversify diets. It highlights the importance of imports and maintaining stable domestic production levels.

(4) It shows there is Economic Contribution: While GDP growth is high, the contribution of rice production (and agriculture in general) to that GDP is likely shrinking as a percentage, even if absolute production remains large. The value added per unit of rice production might not be growing as fast as the value added in manufacturing or services.

Data Collection of Chinese Corn Production 1989 – 2023

Corn production in China presents a different picture compared to rice, though it also reflects the complexities of Chinese agriculture. It is because of :

(1) Corn as a significant and growing crop: Unlike rice, where growth was minimal (0.38% CAGR), China's corn production has generally shown more significant growth over recent decades, although the rate has fluctuated.

(2) Corn has an importance: Corn is a major grain crop in China, crucial not just for direct human consumption (especially in northern and north-eastern regions) but primarily for:
- Animal Feed: The vast majority of corn is used to feed livestock and poultry, supporting China's massive and growing meat industry (pork, poultry, beef).
- Industrial Uses: Increasingly used for biofuels, starch production, brewing, and other processed foods.

(3) Corn is a shift in Agricultural Focus: The shift towards corn, both in terms of production volume and area planted, partly reflects the dietary changes in China (increased meat consumption) and the growth of the agricultural processing sector. This contrasts with the more static nature of rice production, which is deeply tied to cultural staples and food security concerns.

Herewith corn production of China since 1989 – 2023 from FAOSTAT (2025) :

Table 2. China's Corn Production 1989 – 2023

YEAR	CORN PRODUCTION(TONS)
1989	79310405
1990	97213883
1991	99147826
1992	95772877
1993	103109999
1994	99674118
1995	112361571
1996	127865412
1997	104647617
1998	133197612
1999	128287195
2000	106178315
2001	114244995
2002	120188915
2003	115997909
2004	130434297
2005	139498473
2006	151731441
2007	152418870
2008	166032097
2009	164107560
2010	177549788
2011	192904232
2012	205719284
2013	218621905
2014	215812100
2015	265157307
2016	263777750
2017	258256299
2018	257348659
2019	260957662
2020	260876476
2021	272762124
2022	277430136
2023	289086202

Source : FAOSTAT, 2025

If the data above is transformatted into a graph, it will be seen such in the following :

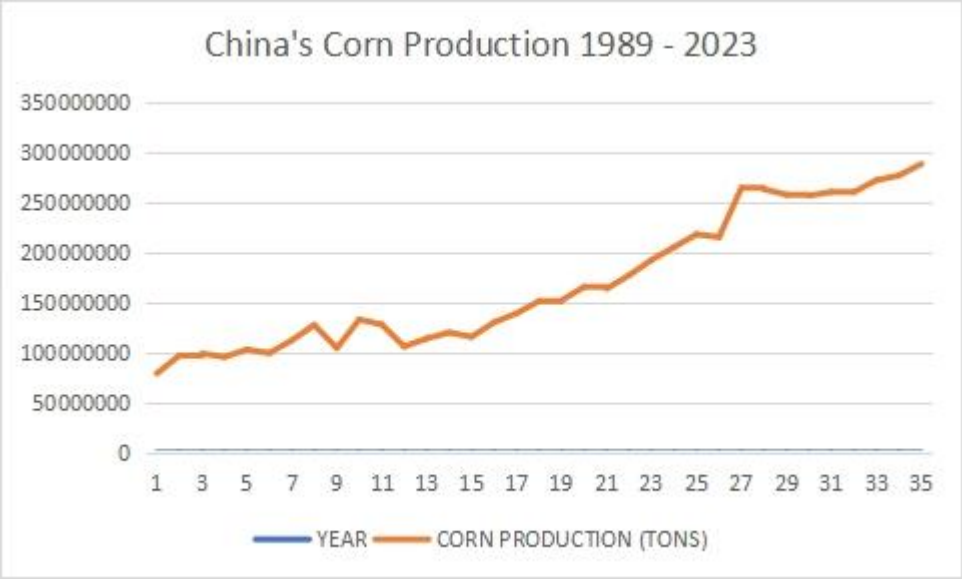

Figure 1. China Corn Production 1989 – 2023
Source : FAOSTAT, 2025

CAGR Corn Production 1989 – 2023

From the data of China's corn production 1989 – 2023, and using the formula of Compound Annual Growth Rate (CAGR), herewith the result of the calculation steps :

- Beginning Value (1989) : 79,310,405 tons
- Ending Value (2023) : 289,086,202 tons
- Number of Years = 2023 - 1989 = 34 years

The process of Calculation:

- Divide the Ending Value by the Beginning Value: 289,086,202 / 79,310,405 ≈ 3.6448
- Divide the number 1 by the number of years: 1 / 34 ≈ 0.029412
- Raise the result from step 1 to the power of the result from step 2:

  ^ 0.029412 ≈ 1.0264
- Subtract 1 from the result of step 3: 1.0264 - 1 = 0.0264
- Convert the decimal to a percentage: 0.0264 * 100 = 2.64%

Therefore, the Compound Annual Growth Rate (CAGR) of China's corn production from 1989 to 2023 was approximately 2.64%. This means that, on average, China's corn production grew by about 2.64% per year over that 34-year period.

Prediction of Corn Production 2024 – 2050

By using Excel facilities for prediction, the predicted data for China's corn production can be obtained as follows:

Table 3. The Prediction of China's Corn Production 2024 – 2050

YEAR	CHINA'S CORN PRODUCTION
2024	283461497
2025	289752720,9
2026	296043944,9
2027	302335168,8
2028	308626392,8
2029	314917616,7
2030	321208840,7
2031	327500064,6
2032	333791288,6
2033	340082512,5
2034	346373736,4
2035	352664960,4
2036	358956184,3
2037	365247408,3
2038	371538632,2
2039	377829856,2
2040	384121080,1
2041	390412304
2042	396703528
2043	402994751,9
2044	409285975,9
2045	415577199,8
2046	421868423,8
2047	428159647,7
2048	434450871,6
2049	440742095,6
2050	447033319,5

Source : Data processed using Excel facilities, from FAOSTAT, 2025

Comparison between CAGR Chinese GDP and CAGR Corn Production

Per report of CAGR of China's GDP is 9.65 % while CAGR of China's corn production is 2.654%. This stark contrast reveals important insights about China's economic development and its agricultural sector:

Data Collection of Chinese Wheat Production 1989 – 2023

Similar to corn, wheat is a critical staple crop and a key component of China's food security strategy, but it has its own distinct history and dynamics.
Here's an analysis of China's wheat production:

(1) Vital Importance and Staple Status:

- Wheat is one of China's three major staple crops, alongside rice and corn.
  It's a primary food source for a significant portion of the population, especially in the north and northwest regions (the "Breadbasket of North China" including provinces like Henan, Shandong, Hebei, Shanxi, and Jiangsu) (Tao et al., 2008).
- It's essential for basic food items like noodles, steamed buns (mantou), and flatbreads.
  (2) Wheat has historical growth and stabilization:
- Like corn, wheat production saw significant increases following China's economic reforms in the late 1970s and 1980s, driven by technological improvements and increased input use.

Figure 2. China Wheat Production 1989 – 2023
Source : FAOSTAT, 2025

From the data of wheat production above, herewith the analysis has been arranged:

(1) This dataset provides a detailed, year-by-year record of China's wheat production in metric tons over a 35-year period. Here's an analysis based solely on the numerical values presented:
Starting Point (1989): Production began at approximately 90.81 million tonnes. Ending Point (2023): Production ended at approximately 136.60 million tonnes.
Overall Trend: The data shows a clear long-term upward trend in wheat production over the entire period. From 1989 to 2023, production increased by roughly 45.79 million tonnes, representing an increase of about 50.5%.

(2) Periods of Significant Change:
Early 1990s (1989-1993): Steady growth, increasing by nearly 16 million tonnes. Mid-to-Late 1990s (1994-1998):Fluctuation, with a notable peak in 1997 (~123.29 Mt) followed by a drop.

- Late 1990s to Early 2000s (1998-2003): A period of considerable volatility and an overall decline, reaching a low point in 2003 (~86.49 Mt). This represents a drop of over 36 million tonnes from the 1997 peak, a significant contraction.
- Mid-2000s Recovery (2004-2014): A strong and relatively consistent recovery, climbing back past 120 million tonnes by 2012 and reaching nearly 126 million tonnes by 2014. This represents a gain of almost 40 million tonnes from the 2003 low.
- Recent Years (2015-2023): Production stabilized at a very high level, generally fluctuating between 132 and 137 million tonnes. It reached its peak within this dataset in 2021 (~136.95 Mt) before showing slight dips in 2022 and 2023.

CAGR Wheat Production 1989 – 2023

Based on data production of wheat in China 1989 -2023, herewith the analysis :

- Beginning Value (1989) = 90,810,047
- Ending Value (2023) = 136,596,100
- Number of Years (\(n \)) = 2023 - 1989 = 34

By CAGR Formula then result of the calculation is : 1.26%

So the average annual growth rate of wheat production from 1989 to 2023 was 1.26%.

Prediction of Wheat Production 2024 – 2050

Predicting wheat production is critically important for China for a multitude of interconnected reasons, stemming from its vast population, significant agricultural sector, and role in the global economy:

(1) Food Security for the World's Largest Population: China is home to nearly one-fifth of the world's population. Ensuring a stable and sufficient domestic supply of staple foods, including wheat (a major staple, especially in the north), is paramount for national food security and social stability. Accurate predictions allow the government to anticipate potential shortfalls or surpluses well in advance. Based on information from Gunawan et al (2024) stated that food management is about how to support food for the people in the country to handle food security by integration management system.

(2) Price Stability and Inflation Control: Wheat is a fundamental input for numerous food products (bread, noodles, flour, etc.). Fluctuations in wheat production directly impact food prices. Accurate forecasts help the government manage grain reserves, adjust import/export policies, and implement price stabilization measures to mitigate inflationary pressures, which is crucial given the significant share of food in the consumer price index (CPI).

Comparison between CAGR Chinese GDP and CAGR Wheat Production

Per the result above, CAGR Chinese GDP is 9.65% while CAGR wheat production of China is 1.26 %. This significant difference highlights a crucial point:

- Divergent Growth Rates: The massive gap (almost 8 percentage points) clearly shows that the engine driving China's overall economic expansion is vastly outpacing the growth in its wheat output. This is not unusual for many rapidly developing economies.

- There is “Economic Structure Shift” : China's high GDP growth is largely fueled by manufacturing, services, infrastructure, and technology sectors. These areas have experienced explosive growth, contributing significantly more to the overall economy than agriculture.

From the above discussions, there is comparison of CAGR among rice, corn, and wheat towards GDP CAGR of China as follows :

Table 4. Comparison of CAGRs

CAGR Rice	CAGR Corn	CAGR Wheat	CAGR GDP
0.38 %	2.64 %	1.26%	9.65%

Source : Research result

From this comparison, it shows that :

(1) Dramatic Gap Between Agriculture and Economy: The most striking feature is the enormous difference between the growth rates of these staple crops and the overall GDP. The agricultural growth rates are very modest (even negligible for rice at 0.38%), while the GDP grew nearly ten times faster.

(2) Ranking of Crop Growth:
   - Corn (2.64%) showed the strongest growth among the three crops during this period.
   - Wheat (1.26%) was in the middle.
   - Rice (0.38%) experienced the slowest growth, nearly stagnant.

Meanwhile, World Bank (2025) which also Statista (2025) noted that agricultural sectors contribute 6.8 % to the GDP of China in 2024, while the industrial sector accounted for 36.5% of GDP, and the service sector contributed 56.8% It means, although the agricultural sector remains an important sector for China's GDP, this sector remains the sector that contributes relatively the smallest to China's GDP as well as it is shown from comparison from the each of CAGR

Agriculture in China as A Multiplier Effect

The agricultural sector in China, while contributing directly around 7-8% to the country's GDP, exerts a significant “multiplier effect” that amplifies its overall economic impact. This multiplier effect occurs through backward and forward linkages with other sectors, rural income generation, and broader socio-economic development.

CONCLUSION

Presenting a summary of findings, implications, limitations and research suggestions sequentially. (Times New Roman, Font 12, American Psychological Association 7th edition)

(1) Trend of agriculture towards GDP of China in the last 3 decades shows that:
   - There is a declining in contribution of agriculture but it is still important
   - Changes in economic growth in China from agriculture towards GDP is affected by the development of the industry, not the value of agriculture towards GDP

(2) The growth of agriculture sector is shown by its rice, maize, and wheat CAGR as 0.38%, 1.24 %, and 1.26% while GDP’s CAGR is 9.65 %.

(3) The role of agriculture sector in China is to support food sovereignty as a multiplier effect to the growth of GDP

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