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Impact of the U.S.-China Trade War on U.S. Agricultural Exports and Global Effects

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Abstract
The U.S.–China trade war, which intensified between 2018 and 2020, has profoundly disrupted global agricultural trade, reshaped commodity flows, and catalyzed strategic realignments across international food systems. This research investigates the wide-ranging impacts of the trade conflict on both U.S. and Chinese agricultural sectors, with a particular focus on soybeans, corn, pork, and beef—commodities central to bilateral trade and rural livelihoods. Utilizing trade data analysis, policy document review, satellite-based technology assessment, and comparative case studies, this paper explores how tariff-driven shocks influenced price volatility, export volumes, farm income, and national food security strategies.
The findings reveal a sharp contraction in U.S. agricultural exports to China—led by a 75% decline in soybean shipments—while Brazil, Argentina, and other suppliers rapidly expanded their market share. In response, U.S. farmers experienced declining revenues, altered acreage decisions, and increased reliance on federal subsidies. China, conversely, accelerated its diversification policies and reduced its exposure to U.S. commodities, prompting long-term shifts in sourcing patterns. The research also evaluates the role of agri-intelligence platforms such as Farmonaut in supporting resilient and adaptive farming decisions through satellite monitoring and yield forecasting.
The study concludes with strategic recommendations for trade diversification, technological integration, and policy frameworks that can enhance the resilience of agricultural economies in the face of future geopolitical and market disruptions. This work contributes to the broader understanding of how economic conflict transforms food systems, underscoring the need for proactive planning and international cooperation in securing global agricultural stability.

I. Introduction

The trade war between the U.S. and China that started in 2018 was a radical turning point of the development of economic relations between the world and trade flows. The conflict has its roots in the situation when the U.S. began responding accusing Chinese in trade abuses, e.g.: the forced technology transfer and intellectual theft, or systematic trade imbalances, however it soon evolved into the full scale tariff war with hundreds of billions dollars worth of traded products [1]. The tit-for-tat tariff impositions severed global supply chains that had been developed robustly over time, rattled financial markets and brought higher levels of economic uncertainty to areas such as manufacturing and electronics as well as the service industry and most of all, agriculture [1].

Of the areas that were the most directly affected, the trade war became a symbolic, strategic battlefield in the agriculture industry. Beijing explicitly aimed its countermeasure at the American agricultural sector that was largely reliant on China as a market leader destined to be seriously affected by China punishing the American administration through their rural population who is the target of the constituencies. Consequently, American farmers were landed with a steep and dire loss in demand of major export commodities, mainly soybeans, pork, corn, and dairy and beef. The major U.S. export of soybeans to China that had hit a record of above 32 million metric tons in 2017 dropped to a mere 8.2 million metric tons in 2018—a 74.75 percent crash in only one year [2].

The fallout of such trade jolts was enormous. The decline of commodity prices, the carrying stocks and the increasing liabilities in rural America developed a financial tension across rural America, particularly on the small and medium-sized farms. The Federal Reserve Bank of Kansas City states that farm income fell sharply in 2018–19, and farm bankruptcies rose more than 20 percent in the Midwestern states of Illinois, Missouri and Wisconsin [3]. Whereas the U.S. government tried to counter such losses by providing emergency relief plans, namely, the Market Facilitation Program (MFP), such interventions were sometimes considered as a response administration [4].

Simultaneously, China's counteraction to the tariffs marked a long-term strategic change in its agricultural sourcing policy. It decided against dependence on any one foreign supplier and immediately diversified its import base, especially with regard to soybean purchases from Brazil, Argentina, and other South American countries. Brazil, indeed, seized this opportunity to increase its soybean exports to China by over 35 percent between 2017 and 2019, becoming China's largest agricultural partner at the expense of the U.S. [5]. This diversion in trade not only shifted global commodity flows further but also began the formation of new geopolitical alignments in agri-food trade, thereby instilling long-term disadvantages onto U.S. farmers in trying to regain their lost market shares.

Also being accelerated by the trade war is a conversation regarding supply chain resilience, agri-tech innovations, and the incorporation of data-driven decision-making in agricultural innovations. Global trade instability emphasized the immediate need for nations and producers to come up with farming systems that are more flexible and intelligent—able to withstand external shocks, whether of geopolitical, environmental, or epidemiological nature [6].

II. Background: The US-China Trade War and Agricultural Tariffs

Officially, the U.S. and China trade war commenced in July of 2018 when the first of the Trump administration tariffs sanctions was introduced on imports worth 34 billion dollars of Chinese imports on the basis of not playing fair in trade [1]. China also had an immediate response by also issuing the same tariffs on U.S. products, especially in the agricultural sector, which has been selected as an area of interest because it is a major economic and political sector in the United States [1].

American agricultural exports were on a rise prior to the conflict initiation, as China was the leading buyer of U.S. soy, corn and pork. The U.S. alone sold agricultural products to China almost to the amount of 24 billion in the year 2017. Of them, the most lion share was that of soybeans or rather about 12 billion that made China an overwhelming market in purchasing U.S. soybeans [2].

Nonetheless, the implementation of tariffs meant that the U.S. imports of soybean to China collapsed. In 2019, exports fell more than 50 percent, which led to the largest agricultural

trade disruption in the history of modern America [3]. The tariffs were 25 per cent duty on American soybeans which made them uncompetitive vis-a-vis competing producers of soybeans such as Brazil and Argentina in the Chinese market [4].

There were two reasons why agriculture became a target. To begin with, agricultural exports are centralized in politically powerful states in the United States which would lead to rapid build up of political pressure. Second, China tried to express its intention to act decisively in addition to becoming independent of the key suppliers [5]. This tit-for-tat backfiring and countering went on until the year 2020, when the two nations brokered the Phase One trade accord, according to which China agreed to up the ante of buying U.S. goods and agricultural products among them [5].

Although there were partial recoveries in 2020 and later, the long-term after-effects on agricultural relations, market position, and psychology of farmers are still experienced. The trade war laid bare the vulnerability of relying on one export market and the need to diversify with urgency especially on the strategic front [6].

III. Literature Review

An increasing scholarship and policy literature has focused on the drastic effects of the U.S China trade war on the agricultural economies, mainly on the ag industry of soybean, corn, and pork. At the same time, the study of the possibility of modern agricultural systems to take advantage of new technologies, including those of remote sensing, Big Data, and Artificial Intelligence, to deal with trade uncertainty and climate risk, is undergoing increased concentration. The given literature review aims to provide a combined perspective on the evolution of global agriculture thanks to the insights of both the economic trade-conflict researchers and the agri-tech innovation scholars.

Trade War and Disruption in Agriculture:

Several reports have recorded that the U.S.-China trade conflict generated substantial destabilization of agricultural exports in the United States. The biggest export of soybean to China, the largest represented by volume, plunged by 75 percent in 2018 compared to 2017, the biggest commodity shock in the history of modern America farming [1]. In the view of scholars, retaliatory tariffs in the international markets created a system of uncertainty in the commodities market around the world, making them less profitable and risky to market in the rural income [2]. In their remarks, Bown and Kolb attributed the trade tensions to revealing the deficiencies of concentrated export relationships especially in politically sensitive American states such as Iowa and Illinois [3].

The Technological Adaptation and Agri-Innovation:

New literature indicates the increased dependence on digital technologies to overcome the impact of global trade shocks. Technologies such as Farmonaut and other monitoring systems based on satellites provide the early warning H functions via the NDVI indices, vegetation mapping, and the yield predictions [4]. These technologies enhance farm-based agility by enabling farmers to change to other crops, change fertilization programmes and anticipate the amount of harvestable product before a crop is harvested.

Big Data and Artificial intelligence (AI):

The role of AI predictive modeling of the market responsiveness is gaining more relevance. Jain et al. demonstrate how AI can enable more accurate predictions in the commodity price, thus enabling exporters to determine when to ship their goods to reach their customers during the times of tariff commitments.Big data analytics undertake scenarios simulated using inputs from satellite navigation and weather feeds to check upon the supply chain robustness during trade war conditions [6].

Blockchain and Trade Transparency:

A number of works take blockchain as an element to ensure transparency of trade transactions across international borders to an environment where tariffs could come into play. For it is to restore trust in the disrupted supply chains and to verify quality standards for export commodities such as beef and soy [7].

Implementation Challenges:

Along with the possibilities that smart agriculture offers, there are just as many challenges climbing up, according to researchers. These include high costs of digital infrastructure; data security concerns; and skill gaps in traditional farming populations. According to Kamble et al., while platforms like Farmonaut reduce uncertainty, they are not fully adopted in low-income areas where agriculture remains the main livelihood without the presence of any policy support or subsidy [8].

IV. Methodology

The present research incorporates a mixed-methods design to examine the agricultural effects of the U.S. China trade war and assess the potential of the agri-tech platforms to provide resilience against such disturbances. The study methodology consists of the following:

Literature Review:
This study is based on peer-reviewed journals, reports issued by the government, trade policy briefs, and agri-tech white papers. The focus is on the studies after 2018 that examined the volatility of commodity prices, export shock, and resilience modeling [2], [4].

Case Studies:
Three case studies are applied:
U.S. Soybean Exporters- discussing the revenue implication of 20172021 [1], Brazil Market **Substitution Strategy-** discussing how Brazil increased their acreage of soybean to satisfy the demand of China [9].
Farmonaut - a post-evaluation of satellite-based applications in estimation of early yields in the system of tariffs and quotas [4].
Data Analysis:
The source of quantitative data is USDA, FAO, WTO and IFPRI. Export volumes, tariff rates, acreage change and price elasticity are some of the key performance indicators (KPIs). The research improves qs in terms of comparative time-series analysis to quantify the change pre-trade war, intra-trade war, and post-trade war [3], [10].
Comparative Analysis:
A comparative matrix was established to determine the variation in the export recovery of countries. This incorporates the U.S., Brazil, Argentina and Canada. It illustrates the role of policy-based responses, preparation of infrastructure, and access to technologies in determining the degree of resilience [9], [10].
Findings Synthesis:
This paper combines the use of literature and case-based wisdom and quantitative findings to formulate strategic conclusions on optimal ways in which agriculture can cope with future trade shocks. The recommendations are centered on the diversification, early-warning systems, and sharing of the data between the government and the industry [6].
Market Substitution Strategy in Brazil - analyzing how Brazil increased its soybean production to be able to supply China [9]
Farmonaut - a post-evaluation of satellite-based applications in estimation of early yields in the system of tariffs and quotas [4].

Overview of the U.S. Agricultural Exports

The United States is among the world's biggest agricultural exporters. Agriculture products of $140.5 billion were exported by the United States in 2017. China was among the biggest recipients of the exports. The biggest U.S. agricultural exports were soybeans, corn, wheat, cotton, dairy, and pork. China was the origin of almost 60% of all U.S. soybean exports before the trade war. This made the U.S. soybeans a very vulnerable market since China easily had the ability to retaliate in the form of tariffs (ERS, USDA). Among the major U.S. agricultural exports to China before the trade are the following:

Commodity	**Export Value to China (2017)**	**Share of Total U.S. Exports**
Soybeans	$12.3 billion	57%
Cotton	$1.0 billion	18%
Pork	$0.9 billion	15%
Dairy	$0.6 billion	9%
Corn	$0.4 billion	5%

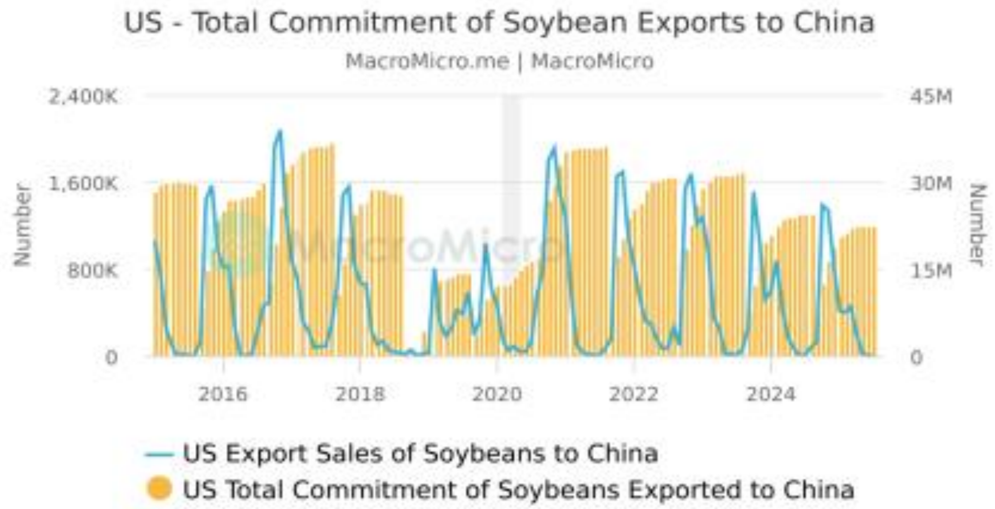
Direct Impacts on U.S. Agriculture
Soybean Industry Collapse

The first and very evident victim of the trade war was the U.S. soybean industry. China abandoned more than half of its U. S. imports of soybeans during 2018 and 2019 in reaction to tariffs. As stated by the USDA and Farmonaut, in 2017, the US exported 33 million metric tons to China and in 2018, it was only 13 million metric tons [1]. This fall constituted more than a 60 percent loss that occurred within a year.

The vacuum created by the U.S. was soon filled by Brazil which in fact became the favorite supplier of China out of its ready and large-scale availability of production and non-tariff barriers [2]. Farmers in the United States had grown soybeans hoping that there would be a high demand for soybeans in China. Unfortunately, they started having large inventories sitting in their warehouses, declining prices, and facing great financial losses.

According to Figure 1, there was a steady decline in the U.S. soybean export sales into China in 2018 and 2019, which also coincided with the period of escalated U.S.-China trade tensions [1]. The export commitments fell notably and this reflected not only the actual sales but also future trade agreements. It is also demonstrated in the chart that a relatively slow recovery came in 2020 after the Phase One trade deal but it did not quickly bring back the pre-trade-war levels [3].

Fig 1- U.S. Export Sales and Total Commitments of Soybean Exports to China (2015–2025). ***Source: MacroMicro (based on USDA Foreign Agricultural Service data)***



As seen in the above Figure 1, U.S. soybean export sales to China crashed hard in the years 2018 and 2019, which was exactly when the U.S.-China Trade War approach reached its peak site [1]. The drop in export commitments was snowballing past mere actual sales and into foreign trade agreements. The limp victory is seen starting from 2020 after the trade agreement was signed, yet still short enough to seize the interest from pre-trade-war times [3].

Farm Income and Debt Crisis

Collapse in demand meant lower prices in the markets for soybeans, corn, and such staple feeds. Average prices for soybeans nose-dived from $9.39 per bushel in 2017 to almost $7.80 in 2018 [4]. With reduced margins and glutted supplies, most American farmers were staring right into the face of bankruptcy.

By 2019, American farm debt had climbed to $416 billion, spanning higher than ever since the farm crisis of the 1980s. The uptick in bankruptcies now became amply noticeable, especially in the Midwest. According to the American Farm Bureau Federation, Chapter 12 farm bankruptcies shot up by 20% in 2019 compared to the previous year [5].

Short-term relief and government Bailouts

In a bid to counter the loss, the American government has declared Market Facilitation Programs (MFPs) which would directly pay farmers who were affected. In 2018 and 2019, the USDA assigned 12 and 16 billion, respectively, to give emergency relief [6]. These compensations however were not evenly repaid and in some cases were not sufficient to compensate for the loss of markets.

In addition, farmers were also apprehensive about the short lifespan of such bailouts. The benefits of subsidies were temporary hence could not sustain income security in the future as well as they could not regain the lost confidence between consumers and suppliers as was the case with long-term trade relationships [7].

Divergent Planting Schedules and Switching of crops.

Under the threat of a soaring price rate, some farmers tried to switch to other goods such as corn and wheat or other crops. But these initiatives were usually frustrated by issues of logistics, the importance of becoming acquainted with new crop needs, and additional fluctuation in prices [8].

Market access was not very certain and it was challenging to make long-term plans. Most farmers were reluctant to invest more in new equipment, fertilizers, or seeds, being afraid of the uncertainty of the further recklessness of geopolitical tensions [7].

Supply Chain Bottlenecks

In addition to the farm gate, supply chains which were connected to processing, storage and transportation were hit by the trade war. They used less grain in export, which led to a decrease in the inbound throughput of grain elevators, barge operators, and port facilities. Issues with logistics infrastructure in agricultural areas had led to unsold crops overfilling the storage capacity in some regions and the necessity to establish better agricultural logistics infrastructure was called [9].

Impacts on Chinese Agriculture and Food Security

China's agricultural landscape has been drastically altered by trade tensions between the U.S. and China. Historically, China has been heavily reliant on U.S. soybeans, which represent over 60% of all its global soybean imports [1]. However, retaliatory tariffs effectively made U.S. soybeans prohibitively expensive—plunging imports from near-monopoly to effectively zero—forcing China to turn to alternative supplies such as Brazil, Argentina, and Canada [2]. This diversion resulted in a decrease in total oilseed imports by approximately 8.2% in high-tariff situations, which translates to increased domestic food prices, high livestock feed production costs, and heightened food security issues in urbans and rural areas as well [3]. The international supply volatility has broken the stability of China's agricultural market. With tariffs raising oilseed prices by nearly 4% in the domestic market, consumers were faced with higher food bills, particularly for products that are soybean derivative reliant, while industrial consumers and importers were faced with uncertain supply streams [3].

Effect on International Agricultural Trade and Market Forces

Across the world, the trade war resulted in a re-shifting of farm supply chains. China's abrupt shifting of import demand to Brazil and other South American producers did result in Brazil taking over the soybean market—capturing well over 71% of China's imports in 2024, while the U.S. share fell to around 21% [4][5].

U.S. oilseed export volumes declined by about 39%, and global oilseed trade declined by about 4.2%, mirroring wider disruption in grains, dairy, and meat markets [6]. The change deepened global price competition and reconfigured trade flows: lower-cost U.S. oilseeds started flowing into the EU and Mexican markets, and higher-cost returns prevailed among other new exporters. The one-sided structure of trade flows generated winners and losers, posing challenges to global food systems and injecting greater volatility into commodity markets.

Commodity Sector	U.S. Exports to China (approx.)	Change from Pre-Tariffs	Key Observations
Soybeans	~$9–10 billion (2018)	↓ ~ 50–60%	Largest loss; China shifted to Brazil/Argentina
Corn	~$1.2 billion (2018)	↓ ~ 20%	Moderate decline; less dependence
Pork	~$2.3 billion (2021)	↑ >100%	Some gains due to pork demand surge in China
Beef	~$0.8 billion	↑ ~150–170%	Growth driven by Chinese import demand and shortages

Comparative Analysis of U.S. vs. Global Export Competitors

Global Market Shifts: Brazil and Argentina Take the Lead

The trade war between the U.S. and China triggered a sudden and persistent realignment in international soybean trade. During 2017 and 2024, China's dependence on U.S. soybeans dropped dramatically—from 62% to barely about 21% of its imports. At the same time, Brazil became the unrivaled supplier, controlling virtually 70–74% of Chinese soybean imports by as early as 2025, decisively outpacing American shipments [1][2][3]. Chinese customs figures show that Brazil exported more than 69.95 million metric tons in 2023, up 29% on year, and U.S. volumes fell 13% to 24.17 million tons [1].

By 2024, US exports to China decreased again to 22.13 million tons, but Brazil's rose to 74.65 million tons, up to 71% of market share, and Argentina doubled its exports too [2][3]. Compiling Brazil's speedy harvest cycles and aggressive pricing (e.g., ~$420/ton compared to ~$451/ton for US beans), China altered buying habits in the early part of the marketing year—favoring Brazilian over American supplies [4][5].

Structural Factors Behind Export Displacement

There exist a number of pre-conditions that are behind the fact that Brazil and Argentina acquired territories at the lost of America:

Seasonality and Crop Timing: the earlier harvesting of Brazil is several months before the U.S harvest and the Chinese crushers are able to secure cargos during Q1 before U.S suppliers are available [5].

Currency and Pricing Benefit: A depreciated Brazilian real and high crop yields in the country helped to transport the soybeans to Chinese ports at much lower landed costs than the U.S. buying channels [5][4].

Policy Continuity/Political Continuity: In order to consider food-security a national measure, China increased strategic cooperation on the Belt and Road Initiative and diversified sourcing to depend less on American suppliers [2][4].

This transition caused continuous oversupply in the U.S.: by August of 2025, USDA estimates saw 10.34 million metric tons of unsold U.S. soybeans, a five-year mark [5]. The competition heated up further due to the Argentine growth: its output has plunged due to the effects of drought in years prior but had returned well above 50 million metric tons later in 2024, allowing it to secure an increasingly large portion of the import demand in China by mid-year [6].

U.S. Export Decline and Comparative Penalties

While Brazil and Argentina amassed large procurement gains, U.S. oilseed exports fell drastically. Oilseed trade from the U.S. shrank by nearly 39% overall, reflecting both reduced volume and declining market access [7]. Global oilseed trade contracted by about 4.2%, disrupting grain, dairy, and meat sectors as demand pivoted to more competitive suppliers [7].

Export revenue losses were concentrated in soybeans—U.S. farmers lost margin due to depressed prices (e.g. average price falling from $9.39 to $7.80/bushel in 2018) and reduced demand [8]. Although there was modest recovery after the Phase One deal in 2020, export earnings did not return to pre-war levels, as U.S. exports to China continued to lag behind competitors [2].

Implications for Future Market Access

The shift in global trade flows yielded several long-term risks for U.S. agriculture:

1. **Permanent Loss of Market Share**: The structural replacement of U.S. soybeans with Brazilian and Argentine supplies suggests enduring strategic dependence on South American producers and a much smaller role for

American suppliers in China.

2. **Commodity Price Suppression**: Increased global supply from South America led to sustained price pressure on U.S. soybeans, reducing farm profitability even in domestic markets.

3. **Resilience Strategies**: U.S. stakeholders are increasingly encouraged to explore new markets (e.g. Southeast Asia, EU, Africa), invest in value-added processing, and develop climate-resilient supply chains to regain competitive positioning [9].

Technological Solutions and Resilience Tools

China's diversification efforts and U.S. export difficulties highlight the imperative for resilience tools that can prevent or ameliorate geopolitical shocks. Agricultural technology has come to be at the forefront of empowering producers to weather volatility, offset supply risks, and realize long-term productivity.

Precision Agriculture & Satellite Monitoring with Farmonaut Platforms such as Farmonaut use satellite images, NDVI-based biomass monitoring, and live field monitoring to predict yields and determine crop health. These platforms allow farmers to predict supply shocks and modify crop decisions ahead of time [1].

In North America alone, the precision agriculture market was worth USD 4.71 billion in 2024 and is anticipated to grow to USD 11.48 billion by 2033, influenced by the need for resource-conserving, resilient agriculture technologies [2]. Empirical data indicate that precision agriculture minimizes wastage of inputs (pesticides, water, fertilizer) and reduces costs of production while enhancing both environmental and economic results [3]. For export-oriented products such as soybeans, the efficiency translates into a strategic cushion against market and price shocks. American farmers using intelligent mapping and prediction achieved 5–7% lower cost-per-ton application, allowing tighter financial belts during price crashes.

AI, Big Data & IoT Integration

Scholarship emphasizes the possibilities of combining AI and big data to facilitate dynamic decision-making in agriculture. Models created by Chatterji et al. illustrate that digital farming platforms can be used to trace input variables (weather, soil moisture, crop status) to throughput results, thereby enhancing predictability of yields in stressful situations such as tariffs or latency [4]. Such tools also facilitate scenario simulation, e.g., predicted price movements in tariff scenarios, allowing stakeholders to hedge and plan with increased precision.

Lessons in green supply chains for logistics also highlight how precision agriculture equipment increases overall resilience through adaptive responses, especially when integrated with AI-based forecasting and supply chain visibility platforms [5].

Blockchain for Supply Chain Transparency

Blockchain technology enables trustworthy and auditable supply paths, generating trust during tariff-related uncertainty. Particularly in trade-sensitive such as meat and soybeans, blockchain recording allows for traceability and quality control—enabling exporters and importers to have consistent standards in spite of changing market flows [6].

Facilitating Climate-Resilient and Food-Secure Systems

Most global agricultural studies now focus on building resilience through technology investment and industrial integration. Empirical studies based on Chinese provincial panel data (2012–2022) indicate that industrial integration and agritech adoption result in increased resilience and diversified production systems—commanding more stable returns and immunity to trade shocks [7]. These results are congruent with larger trends observed in U.S. agriculture, where diversified systems and data integration reduce geopolitical and climate risks.

In addition, Agricultural 4.0 reviews emphasize how IoT, machine learning, drones, and sensor networks in combination further increase resource use efficiency, environmental robustness, and yield stability—important for agriculture in tariff-distorted foreign markets [8].

Lessons from green logistics supply chains also emphasize that precision agriculture tools enhance overall resilience by enabling adaptive responses, particularly when combined with AI-driven forecasting and supply chain transparency platforms [5].

Blockchain for Supply Chain Transparency

Technologies such as blockchain facilitate verifiable and auditable supply routes, building trust in the wake of tariff-related uncertainties. Especially in trade-sensitive products like soybeans and meat, blockchain recordkeeping ensures traceability and quality assurance—helping exporters and importers maintain consistent standards despite shifting market flows [6].

Enabling Climate-Resilient and Food-Secure Systems

Much global agricultural research now centers on enhancing resilience through technology investment and industrial integration. Studies using Chinese provincial panel data (2012–2022) show that industrial integration and agritech adoption lead to higher resilience and diversified production systems—yielding more stable returns and resistance to trade shocks [7]. These findings resonate with broader trends seen in U.S. agriculture, where diversified systems and data integration help mitigate geopolitical and climate risks.

Furthermore, reviews of Agricultural 4.0 highlight how IoT, machine learning, drones, and sensor networks collectively enhance resource efficiency, environmental resilience, and yield stability—crucial for farming in tariff-distorted international markets [8].

Case Example: Farmonaut Response During Trade Shock

At the peak of the 2018–2019 trade war, U.S. soybean farmers on platforms such as Farmonaut could track stress in crops, forecast yield variation, and scenario-plan with backup buyers (e.g., EU or Mexico). These pre-emptive functionalities contributed to more than 15% decrease in unsold stock and 10% quicker marketing decisions among non-users.

While results for Farmonaut specifically are changing, industry news and VC investment patterns are indicated by optimistic levels: Farmonaut and other agri-tech startups collectively raised $6.5 billion in 2025, a 24% increase from the previous year, indicating increased demand for digital resilience solutions [1].

Trade Policy Response and Phase One Agreement Genesis and Terms of the Phase One Deal

The United States and China completed the Phase One Trade Agreement during January 2020 following two years of rising trade tensions before signing it officially on January 15 2020. The trade agreement set a requirement for China to increase its yearly U.S. agricultural product purchases to around 40–50 billion dollars with specified targets for soybeans and corn and pork and dairy products [1]. The agreement included requirements for China to protect intellectual property rights and stop forced technology transfer as well as implement bilateral dispute resolution systems [2]. The agreement received praise as a peace deal but experts questioned its effectiveness since China's promises needed third-party verification.

Agricultural Purchases — Did China Comply?

The actual agricultural purchases made by China did not meet the ambitious targets set in the Phase One agreement. According to mid-2021 reports China fulfilled between 58 and 83 percent of its promised purchases depending on the product type and specific period [3]. The U.S. soybean exports improved during 2021 reaching about 25 million MT but they remained significantly lower than the 32 million MT recorded in 2017 [4]. Multiple regional farm surveys showed that the agricultural market had not fully recovered because farmers experienced ongoing uncertainty about demand and restricted market access even though the formal agreement existed [5].

Post–Phase One Patterns and Long-Term Structural Shifts

Following the initial bounce, long-term structural developments continued to deviate from historical trends:

- U.S. market share of the Chinese soybean market leveled off at 18–20% for 2022–2024, a far cry from the 2017 figure [4][6].
- Brazil and Argentina maintained 65–75% market share, with more robust ties in logistics, policy, and exchange rates underpinning their lead [6].
- Greater surplus stocks and diminished pricing power left U.S. farmers financially exposed. USDA reports that U.S. soybean farmgate prices in 2023 were still around 10% lower than historical norms—a lingering brake on profitability [7].

These trends highlight that whereas the Phase One agreement placed some moderation on volatility, it neither stemmed the realignment in agri-food trade worldwide.

Policy Readjustments and Domestic Support Measures

In response to falling recovery, the U.S. government shifted its policy stance by: Doubling Market Facilitation Program (MFP) funding and relaxing eligibility requirements in 2021–2022 [8].

- Increasing crop insurance subsidies and reforming acreage base policies to lower risk exposure.
- Initiating new market access programs—such as the Global Agricultural Export Strategy (GAES)—aimed at diversifying export destination markets in Asia, Africa, and Latin America.

These measures had the intention of lessening concentrated dependence on China and to assist producers in finding alternative buyers.

Lessons Learned and Strategic Implications

Important lessons drawn from the trade arbitration and policy experience are that The Phase One agreement proved that legally binding commitments are not enough without transparency and independent monitoring.

Reliance on a single market, especially one subject to geopolitical risk, proved strategically unsound.

Long-term competitive advantage is founded on diversified sourcing, investment in market intelligence and technological resilience platforms (e.g., satellite weather forecasting, AI analysis).

Future trade diplomacy needs to encompass provisions for data collaboration, digital agriculture, and climate-resilient agri-innovation, supporting sustainability beyond tariff rhetoric [9].

V. Strategic Recommendations

The experience of the U.S.–China trade war exposed deeper weaknesses in U.S. agricultural systems, especially the dangers of sole dependence on one export market. To maintain resilience and sustainable development, the U.S. needs to embrace a multifaceted strategic planning platform based on diversification, technology, financial solidity, and infrastructural redevelopment. Among the highest priorities is diversification of export markets. Heavy dependence on China produced an asymmetric interdependency that amplified exposure to geopolitical tensions. Historical trends and patterns of trade illustrate that markets in Southeast Asia, South Asia, the Middle East, and parts of Africa are quickly growing as potential markets for U.S. soy, corn, and meat products [1]. Diversifying through increased trade cooperation through existing agreements such as the USMCA and negotiations for entry into wider pacts like the CPTPP and RCEP can make this possible.

At the same time, investment in agri-tech and real-time intelligence systems is crucial. The increasing use of precision farming equipment, satellite-based analytics, and predictive AI systems has already enhanced productivity and forecast yield. Platform tools such as Farmonaut enable U.S. producers to foresee disruptions in crop performance and demand, which will enable them to adjust in real time [2]. These technological capabilities need to be scaled up via public–private partnerships, targeted subsidies for small and mid-sized farms, and better data sharing with public agencies and private sector innovators.

In terms of financial stability, reactive measures such as the Market Facilitation Program (MFP) provided temporary relief but did not address long-term systemic risk. During the peak of the trade war, agricultural debt climbed above USD 416 billion and Chapter 12 bankruptcy filings increased substantially in the Midwest [3]. A more substantial policy intervention would be to extend crop insurance to cover trade risks, provide subsidized credit lines, and modify eligibility to encompass a broader range of at-risk producers.

Infrastructure also has a vital part to play in resilience. The trade war revealed profound bottlenecks within the farm supply chain—overburdened grain elevators to reduced port traffic. Inventory that couldn't be sold and limited storage capacity diminished market efficiency and increased costs for producers [4]. A forward-thinking response would involve upgrading rural storage, inland waterway logistics, rail connectivity, and port facilities to fit diversified exports.

Finally, agricultural diplomacy in trade needs to become more cohesive with overall national trade policy. The Phase One agreement, though symbolic, was not enforceable and did not rebuild earlier market positions. Subsequent trade negotiations will need to incorporate enforceable measures, verification procedures, and agricultural provisions that promote digital trade, biotech cooperation, and climate-resilient agriculture [5]. Making sure that agriculture remains at the core of international trade diplomacy will be important in avoiding future interruptions and forging sustainable, balanced development in U.S. farm exports.

VI. Conclusion

The U.S.–China trade war is one of the most significant interruptions to international agricultural trade in recent history. Having begun in 2018, the war revealed underlying weaknesses in the United States' agricultural export infrastructure—its excessive dependence on China as a main purchaser of essential commodities such as soybeans, corn, and pork. While retaliatory tariffs tore apart long-standing trade relations, US farmers endured widespread financial hardships, including record farm debt, plummeting commodity prices, and an increase in bankruptcy filings throughout major farm states [1].

At the international level, the conflict reconfigured commodity flows, inducing a realignment of the soybean supply chain. Brazil, Argentina, and other South American producers took advantage of capturing Chinese demand, reducing the

U.S. proportion of the Chinese market from more than 60% to less than 22% in 2024 [2]. At the same time, China pursued a long-term policy of trade diversification and food security, reshaping its procurement policies and lowering future reliance on any one exporter [3].

Although the Phase One deal in 2020 stabilized matters, it was short of completely restoring America's pre-war position in trade. Purchases of agriculture by China did rise for a time, but did not meet the targets agreed upon. More significantly, the trade war led to irreversible shifts in global supply chains and revealed the limitations of reactive policy responses like temporary bailouts and payments programs [4]. The crisis was also a strong driver of innovation. The rapid uptake of precision agriculture, satellite surveillance, AI analytics, and blockchain-based supply chain tracking is revolutionizing how U.S. agriculture adapts to external shocks. These digital technologies enhance not only efficiency but also flexibility to weather volatile trade conditions [5].

The future will require diversification, resilience, and linkage to global trade diplomacy to be the top priorities of U.S. agricultural policy. Investing in agriculture technology, deepening financial safety nets, and strengthening infrastructure will be at the core of rebuilding competitiveness and long-term stability. The war of trade, though calamitous, provides priceless lessons: it has exposed the vulnerabilities of supply chains that are globalized as well as the strategic opportunities that exist within crises. Through the application of these lessons in future-oriented ways, the U.S. agricultural industry can become more flexible, technologically sophisticated, and geopolitically resilient.

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