

## **Online International Conference Report**

## "Agriculture Advancement and Sustainable Development: Learning from Robust Chinese Initiatives"



Jointly Organized by

Pakistan Research Center for a Community with Shared Future and MNS University of Agriculture, Multan

21st April 2022





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#### **CONCEPT NOTE**

Agriculture plays an integral part in the growth and development of a country as it has a connection with food security. Agriculture has been the foundation of Pakistan and China's economy and remains vital for sustainability. There have always been great debates regarding China's agricultural development. The ongoing processes of rapid economic growth and urbanization not only bring great opportunities but also new challenges to agriculture and rural society. There have been new concerns in various areas, such as food security, agricultural production, crop patterns vis-à-vis climate change, etc. In this aspect, China has done remarkable work to enhance its agriculture productivity. The country's agricultural sector has gone through tremendous changes, including institutional transformations, structural adjustment of policies, technology advancement, etc. Globally, increasing demand for agricultural products often contradicts the goal of environmental protection. This is particularly true for the agricultural sector. However, China's achievements in food security coupled with the environment-friendly policies provides a roadmap to follow.

On the other side, the significance of Pakistan's agriculture has two major directions. First, it accounts for 19% of the GDP. Second is the importance of the Agro-based products that comprise 80% of the country's exports. Furthermore, this sector engages almost 48% of the population in Pakistan via employment provision. Agriculture Research & Development (R &D) plays a crucial to evaluate the recent trends in the agriculture sector, innovation and also challenges. China is our closest ally and can assist Pakistan to enhance agriculture efficacy under the concept of Community with Shared Future presented by President Xi Jinping. Now, it is the high time to understand how the grand idea of Community with Shared Future can help to achieve sustainability and success in other sectors.





#### **BREIF OF THE ONLINE INTERNATIONAL CONFERENCE**

Pakistan Research Center for A Community with Shared Future (PRCCSF), in collaboration with MNS Agriculture University, Multan organized an online international conference, "Agriculture Advancement and Sustainable Development: Learning from Robust Chinese Initiatives", on 21st April 2022. The international conference aimed to discuss China's agricultural development and its sustainability by focusing on the agricultureenvironmental nexus. The conference also aims to integrate leading agriculture stakeholders, scientists, and researchers to provide suggestions to enhance Pakistan's agriculture sustainability under the concept of Community with a Shared Future. The discussion integrated experts and scholars from China and Pakistan to present adopted solutions in the fields of food security and sustainable agriculture development. The report represents a detailed analysis of the collective views and speeches of the panelists presented during the online conference. The discussion focused on multiple dimensions. The experts identified a wide range of core areas, i.e., global food security situation, latest Trends in China's agriculture production, economic growth, eco-smart policies, and Pakistan's Agriculture Sector. The speakers also explored possible ways where China can assist Pakistan in ensuring food security and promoting green growth for agriculture. The discussion has built a comprehensive analysis and cohesive measures to counter common issues with a shared approach.

The international conference was moderated by Ms. Maryam Raza, Deputy Director, Pakistan Research Center for a Community with Shared Future (PRCCSF). The online event was viewed live on leading social media platforms and was attended by 50 participants, including students and scholars from Pakistan and China.

## **SPEAKERS & SPEECH TOPICS:**

1. **Prof. Dr. Asif Ali, Vice Chancellor, MNS University of Agriculture, Multan (Chief Guest)** Keynote Address

 Prof. Dr. Irfan Ahmad Baig, Dean, Faculty of Social Sciences, MNS University of Agriculture Multan Topic of Speech: Food Security and Climate Change under the

Concept of Community with Shared Future

3. **Professor, Dr. Ting Meng, Lecturer, Department of Agricultural Economics, School of Economics and Management, China Agricultural University, China** Topic of Speech: Latest Trends in China's Agriculture Production towards Sustainability: Policies and Actions







4. Dr. Muhammad Hammad Nadeem Tahir, Professor and Director, Institute of Plant breeding and Biotechnology, MNS University of Agriculture

Topic of Speech: Promoting Technological Transformation in Pakistan's Agriculture Sector

5. Dr. Mubashir Mehdi, Associate Professor & Director, Business Incubation Center, MNS University of Agriculture, Multan

Topic of Speech: Food Security Challenges in Pakistan: Reforming Government's Role in Agriculture

 Mr. Luo Meng, PhD Candidate, majoring in Agricultural Economics and Management, College of Economics and Management, China Agricultural University Topic of Speech: Eco-smart Agriculture: China's Current

Situation and Development Vision















# EXECUTIVE SUMMARY, ANALYSIS & KEY-TAKEAWAYS







## **Executive Summary, Analysis & Key Takeaways**

(Based on the speeches of respective panelists)

## 1. <u>Tackling the Challenges of Climate Change and Food Security with</u> <u>a Shared Approach:</u>

- The World Economic Forum has enlisted the challenges the world is facing in this modern era related to inclusive growth, environmental sustainability, and climate change. These challenges are interlinked and directly impact the agriculture sector.
- The global challenges to food security can be further described in six components, i.e., production side challenges, Supply and Demand-side challenges, distribution challenges, institutional challenges, and politics.
- These six food security challenges are further aggravated by adverse climatic changes. Climate change is also affecting all four dimensions of food security, i.e., availability, access, utilization and stability.
- Due to climate change, populations living in low-income countries have a restricted choice of food. These climatic changes are affecting the sustainable food security system.
- As per an analysis, 80% of the extra energy will be used by 2050 to provide food security. It means that the requirement for water will be increased by 50%. Thus, creating food and nutrition threats as well as disruption in the global food supply chain.
- These global challenges call for global solutions. In this regard, the vision of building a community with a shared future for mankind by President Xi Jinping provides opportunities and a holistic platform to tackle common threats.
- This new concept of globalization emphasizes education and training, equal wealth distribution, and inclusiveness. The guiding principles include







rationale analysis of the existing situation and provide a road map for future development.

• Food security is also one of the pillars of the Belt & Road Initiative (BRI). Thus, the strategy of 3ES, i.e., Excite, Empower, Engage, would be beneficial for acquiring future goals and economic progress.

## 2. <u>Analyzing Latest Trends in China's Agriculture Production and</u> <u>Sustainability</u>

- Agriculture is directly linked with ecological sustainability because it contributes to higher production. In this aspect, China has formulated a high-quality development path by giving priority to maintain a healthy ecological system for promoting green development.
- There are two systems which are important in this aspect. First is the agri-food system, and the other is the environment, including the air, water, and ecosystem. The current agri-food system does have a negative impact on the environment. This system contributes to one-third of the global Greenhouse Gas (GHG) emissions.
- Since 1949, China has experienced four stages of agricultural development. The first one was recovering. The second and third were quantity-driven stages (for food safety). The fourth stage is China entering a new era that focuses on developing the environment and agriculture.
- In 2011, China promoted green pest control by providing regulation, biological, and physical control to replace the chemical pesticide. As a result, chemical pesticide use has been decreased by 20-30%.
- Moreover, plastic films were also a major source of pollution. Thus, China adopted effective practices in collecting, and reusing plastic films. In 2017, China organized demonstration agriculture farms to build awareness on how to protect and restore Agriculture ecological environment.
- In 2018, China also reduced antibacterial drugs during livestock breeding. Every year large-scale farms have been made to carry out pilot work and promote different modes to reduce the use of veterinary antibacterial drugs.





- The visionary government of China has also started to promote the utilization of waste and turn it into resources. Robust policies have been introduced to promote crop utilization by providing subsidies and modern machinery.
- So far, the comprehensive utilization rate of crop residues has been more than 80%. The manure from livestock has been promoted to use effectively. China also has different organic fertilizer plants to promote the livestock and crop integration for further use.
- All these policies and the latest developments in the agriculture sector, as well as environmental protection, can be taken as a successful model for Pakistan to learn from China via expertise and information sharing.

## 3. <u>Eco-smart Policies and Technological Advancement in Agriculture</u> <u>Sector: Learning from Chinese Model</u>

- The new wave of scientific and technological progress has brought an opportunity to China's agricultural sustainable development.
- Smart technologies have enhanced the developments and monitoring of farmland and water areas with intelligent equipment, intelligent analysis of the whole production process of planting, fertilization, and pesticide spraying to achieve the goal of green agriculture production.
- In China, intelligent and ecological smart agriculture is in its early stages and primarily used in many scientific agricultural research institutes.
- In 2019, the Shandong University of Technology established China's first ecological unmanned farm in Zibo, the Shandong province. It is a smart agriculture mode based on sustainable development integrating high-technologies like Artificial Intelligence (AI).
- Ecological agriculture's idea is to build fertile soil mechanized farming mode with the precise use of pesticide and application of ecological fertile soil mechanized framing mode including deep cultivation.





- The scientific decision-making system is supported by AI and a cooperative operating system. Another example relates to it like digital agriculture model in Chengdu province is for establishing technical services centers and the digital platforms.
- In this aspect, China will provide the farmers with technical solutions and low-cost, and all-around social services for large food production.
- Moreover, the 14th Five-year plan for green development in China improves the innovation system of green agriculture machinery and promotes the transformation of agricultural machinery to intelligence based on the demand.
- This plan also promotes the development of science and technologies in agriculture and rural areas.

## 4. <u>Food Security Challenges in Pakistan: Reforming Government's</u> <u>Role in Agriculture</u>

- The current state of food security in Pakistan in terms of availability and affordability depicts that the country is self-sufficient in major staples. It is ranked 8th in producing wheat, 10th in rice, 5th in sugarcane, and 4th in milk production.
- However, only 63% of the country's households are food secure. Data shows that the level of food insecurity in the country is around 40% of the population and different levels of food security are prevailing in the overall food system in Pakistan.
- One of the biggest challenges to ensuring food security in Pakistan is the vertically coordinated value chain that has far-reaching implications for meeting dietary patterns, nutrition, and health.
- The second important aspect is the industrialized production process and higher consumption of processed foods through vertically coordinated chains, guided by the industries.
- Another very important issue is ecological safety vis-à-vis curbing carbon emissions.
   Vertically coordinated, capital-intensive value chains are jeopardized by small-scale climate change, and intensification of natural hazards.





- Thus, supply chain management could be a guiding framework in ensuring food chain. It is a dire need to understand the supply chain mechanism. It is a chain of different players involved to satisfy a consumer's needs. That secure and balanced food flow in the form of products and pass into the hands of all the players in the food chain and every player has a different role to ensure that balanced food. If every player in the chain has adequate money to afford, then the food chain can be secured or balanced.
- In the agriculture production system, the government is one of the key stakeholders in terms of developing regulatory mechanisms and then extending the research and development.
- Thereby, the government should start structural reforms (can be commodity-based or market regulations). Moreover, adopting a commodity-based research approach as well as the technological transformation will help curtail the challenges to food security.







## **TRANSCRIPTS OF THE SPEECHES**







#### **Opening Remarks**

## Mr. Khalid Taimur Akram, Executive Director, Pakistan Research Center for a Community with Shared Future

First of all, on behalf of Pakistan Research Center for a community with a shared future, I would like to welcome all of you and would like to tell you about this center. PRCCSF is a newly established in Pakistan on the vision of President Xi Jinping on the community of shared future. These kinds of centers are being made in all the belt and road countries to develop the cultural and social integration between the societies of the belt and road countries. So, from the Pakistan side, we are very glad to establish this center which partners with various universities in China. The reason that we have requested all of you to gather today is to lay the foundation for developing a solid collaborative network between the agriculture sector of Pakistan and China. Here, I would like to introduce to you our partner universities in Pakistan which has been doing a lot of work in the agricultural sector and since we have good friends from China who are experts in Agriculture so we would like them to listen to the Pakistan point of view and share their perspective. Hopefully, Pakistan Research Center for a community with a shared future would act as a bridge between the universities and agriculture researchers of Pakistan and China.

#### Speaker 1

### <u>Prof. Dr. Irfan Ahmad Baig, Dean, Faculty of Social Sciences, MNS</u> <u>University of Agriculture, Multan</u>

#### Topic: Food Security and Climate Change under the Concept of Community with Shared Future

Today, we are going to discuss some of the ideas that have been put forward by the vision of the Chinese leadership through a new concept of Global Cooperation named the community with a shared future. I would directly start by enlisting the global challenges of the World Economic Forum. They have enlisted the challenges that the world is facing in this modern Era. The top-ranked challenge is food for all. Then it is inclusive growth, environmental sustainability, and Climate change and it ranges up to the future of smart health care.

We see that the first four challenges are directly linked with Agriculture so Agriculture is one of the bases of this global cooperation. Agriculture is linking the communities across the





Globe, with enhanced trade and movement of food from one part of the world to another part, it is affecting the whole globe. If there is a shortage of grain or food in one part of the World it eventually affects the other part of the World. We have seen this phenomenon in the recent unrest between Ukraine and Russia and before that the COVID Pandemic that how these things have affected the global food supplies.



The global challenges to food security can be further described in 6 components which are production Side challenges, Supply and Demand Side Challenges, distribution-institutional challenges, and the politics.











Production side Challenges: productivity, climate change

Supply Side Challenges: Supply chain inefficiencies, post-harvest losses

Demand Side Challenges: Consumption shifts like change of taste,

Distribution Side Challenges: Trade policies, Infrastructure, institutions, hazards, regulations, Technical barriers

Intuitional Challenges: Access & Affordability: Poverty, markets, trade

Politics: Conflicts, Sanctions,....

These food security challenges are further aggravated by the adverse climatic changes which we are experiencing across the Globe. Climate change is affecting all four dimensions of food security. If we talk about the accessibility of food, it is adversely affected not only due to the production side challenges but also due to the prices. Similarly, we can see the availability and it can be seen how the climate change is affecting the availability of different crops.









Climate change is also affecting the utilization of food. Due to climate change, most populations living in low-income countries have a restricted choice of food.

These climatic changes are affecting our future for the sustainable food security system. For the provision of food to the masses by 2050, we have to use 80% of the extra energy. We need 55% more water as well as 60% more food. So, it will create some food and nutrition challenges, rural livelihoods and stable food chain challenges, and environmental sustainability challenges. These are the global challenges that require global solutions.



Global maps show the temperature change, drought index, and climate risk index and we can see very clearly that this part of the world in which the south Asian and far eastern countries are situated, they are adversely affected by all these factors.







We need to work on these challenges as a team as it is the global responsibility to work closely. We see that these solutions in front of us like UNBP have given us the agenda in the shape of SDGs and then there is South-South Cooperation, BRI, and President Xi has given the idea of Diplomacy. We can see that the new concept of globalization is based on the emphasis on education and training, wealth distribution and inclusiveness are also essential parts of this concept.







#### Guiding principles of the communities with the shared future:

Communities with Shared Future: Guiding Principles



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- Rethinking our relationship with **Nature**: Community stewardship of Land coupled with Collective responsibility
- · Mutual respect, Transparency, fairness, and win-win cooperation
- Develop Indigenous solutions through Global learnings and best practices
- Cross cutting & Innovative Ideas
- Think Globally, respect sovereign Equality, believe in Dialogue and promote Coordinated efforts

If we further focus on the food and Agriculture initiatives which are included in BRI is a long list and it is reflected in terms of trade initiatives.

## Food & Agriculture: One Major Pillar of BRI



#### • Expand agricultural trade

- Diversify sources of agricultural imports
- Cut tariffs, form new FTAs & MTAs
- Local collaborations
- Cooperation
  - Foreign investment by Chinese agribusiness firms
  - Scientific exchanges
  - China provides agricultural technical assistance
  - Sharing market and policy information on Chinese platforms
- Trade facilitation
  - More ports/points of entry,
  - More efficient customs clearance, inspection/quarantine
     Making trade more "energy" "transpected " "inclusion"
- Making trade more "open," "transparent," "inclusive," and "non-discriminatory"
  - Change rules governing trade
  - Reduce power of oligopolies and cartels in ag markets

All ag imports	\$133 bi
From 65 "Belt and Road"	\$29 bil
countries	22%
Top Belt-Road sources:	
Thailand	\$8.0bil
Indonesia	5.3
Malaysia	2.8
Vietnam	2.5
Ukraine	2.4
Russia	1.3
Philippines	0.9
Myanmar	0.6
Laos	0.4





#### Potential for Pakistan and China to base their future cooperation:

Potent	ial to Expl	ore
Partner	Import Volume (USD billion)	Distance (kms)
France	2.68	8,017
United States	12.37	11,640
Australia	8.16	7,470
Netherlands	2.77	7,482
Argentina	6.47	17,038
Canada	7.01	12,219
New Zealand	8.36	11,160
Thailand	6.04	2,244
Brazil	28.6	16,622
Pakistan	0.47	??



We can opt for a strategy of 3Es to involve community-level interaction which will result in connecting the community by creating excitement by visualizing by making them believe that this is Win-Win cooperation.







Excite



- Empower
- Connecting Communities: Flow of information
- Encourage Local Participation:
- Create Ownership
- · Collaborative implementation
- Co-designing actions & Assessment





Engage









#### Speaker 2

#### <u>Professor, Dr. Ting Meng, Lecturer, Department of Agricultural Economics,</u> <u>School of Economics and Management, China Agricultural University</u>

#### Topic: Latest Trends in China's Agriculture Production towards Sustainability: Policies and Actions

Agriculture is important to SDGs, we can see that out of the 17 Sustainable Development Goals, half of them is directly related to Agriculture and food and some of them are connected to the Environment. So, the transformation of the Agri-food system towards sustainability is very crucial. Since 2015, the Chinese President has appointed a high-quality development path with ecological priority and green development.

## 1.1 Background

China and global community are actively seeking sustainable development. Along the path, the transformation of agri-food systems towards sustainability is crucial.



- UN Agenda for sustainable development (2016-2030)
- China enters a new era of sustainable development (since 2015)

Two systems are familiar. The first one is the agri-food system and the other one is Environment including the air, water, and Earth ecosystem. The current agri-food system







does have a negative impact on Environment. The Agri-food system contributes to one-third of the global greenhouse gas emissions. The convention of natural lands to croplands is linked to a serious decline in biodiversity.

1.2 Challenges
Agri-food systems
Land degradation and water depletion
<ul> <li>Agricultural land covers 38% of the world's land surface, and it is the world's largest consumer of water (Ferrant et al., 2014).</li> </ul>
The vast monocultures in arable land lead to soil degradation, deforestation, depletion of freshwater resources and contamination (Altieri et al., 2020).
Climate change
<ul> <li>Agriculture and food system requires inputs and energy derived from burning fossil fuels (Godfray et al., 2010).</li> </ul>
Food systems is a major source of GHG emissions (29%).
Loss of biodiversity
<ul> <li>The conversion of natural vegetation and pasture to cropland is linked to serious declines in biodiversity, as well as the loss of other important ecosystem services (Marques et al., 2019)</li> </ul>

The current environment also constrains the future development of the agri-food system. Climate change increases uncertainty in agriculture production. Ecosystem degradation threatens the stability of the agri-food system affecting agricultural production, transportation, and marketing. Agriculture relies on water and land so the depletion of water and soil resources has a negative impact on production.









We need to transform the agri-food system to sustainability not only for the environment but also for ourselves. This is also the way to pursue better food security.



So far from 1949, China has experienced four stages of agricultural development. The first one is recovering, the second one is quantity-driven stages. We try to promote and foster more productivity in agriculture, the third stage is adding quality for food safety, and the last stage is about China entering a new era that focuses on the development between agriculture and environment.









There are several policies and practices for agricultural development, but here I just want to emphasize a few very important practices from two directions. The first one is reducing pollution and reducing the agricultural chemical input. Thanks to 2005, China is using and promoting formula fertilization by soil testing. Because of this policy, the adaption and application have reached almost 90% nationally. Secondly, thanks to 2017, China began to encourage the substitution of chemical fertilizer for organic fertilizer by encouraging eco-friendly behavior among farmers. The substitution and promotion of organic fertilizer are more with fruits, vegetables, and teas.

#### 2.2 Reducing Agricultural Inputs

- Formula fertilization by soil testing (since 2005)
  - Formula fertilization by soil testing, and encourage farmers to apply fertilizer scientifically
  - In 2019, more than 3,000 intelligent service outlets for formula fertilization by soil testing nationwide, the technical coverage rate of formula fertilization by soil testing reached 89.3 percent.
  - However, the cost of precision inputs is high.
- Substitution of chemical fertilizer by organic fertilizer (since 2017)
  - Replacing chemical fertilizer with organic fertilizer in fruit, vegetable, and tea (subsidies and technical training)
  - In 2020, the application area of organic fertilizer exceeded 37 million ha, an increase of about 50 percent over 2015 (MARA, 2021).
  - The adoption rate of organic fertilizer for field crops is relatively low (new policy focus, 2022).

Since 2011, we promoted green pest control by providing regulation, biological and physical control to replace the chemical pesticide and as result, the chemical pesticide use has been decreased by 20-30%. Pakistan is a very major exporter and producer of livestock. In China during 2018, we reduced and promoted antibacterial drugs during livestock breeding and every year large-scale farms have been organized to carry out pilot work and promote different modes to reduce the use of veterinary antibacterial drugs.

Green pest control (since 2011)

- Ecological regulation, biological control, physical control, and scientific medication on crop diseases and insect pests
- Reduce the overall amount of chemical pesticides used by about 20 to 30 percent
- Reduce use of veterinary antibacterial drugs (since 2018)
  - To achieve "zero growth" in the use of veterinary antibacterial drugs over three years, and effectively control veterinary drug residues and the drug resistance of animal bacteria.
  - Every year, no fewer than 100 large-scale farms have been organized to carry out pilot work and promote different modes to reduce the use of veterinary antibacterial drugs.







In the other direction for sustainable Agriculture Development, we want to promote the utilization of the waste and turn it into resources. We use policies to promote the utilization of crop residues by providing subsidies and machines. So far, the comprehensive utilization rate of crop residues has been more than 80%. The manure from livestock has been promoted to use and we also have organic fertilizer plants to promote the livestock and crop integration together for further use.

## 2.3 Utilization of Crop Residues and Livestock Manure Resources

- Utilization of crop residues resources (since 2008)
  - Comprehensive utilization of crop ( subsidies on crop residues crushing/returning, picking and baling machines)
  - The comprehensive utilization rate of crop residues in China has exceeded 82 percent.
  - Utilization of crop residues in small farmers need to be further promoted.
- Utilization of manure resources (since 2017)
  - Accelerate the resource utilization of livestock and poultry breeding waste.
  - By 2019, the comprehensive utilization rate of livestock and poultry manure in China had reached 70 percent, and the matching rate of manure treatment facilities and equipment in large-scale farms had reached 63 percent.
  - The recycling of livestock and poultry manure need to be strengthened.

Plastic films are also a source of major pollution in Agriculture so the practices and policies have been used for picking, collecting, and reusing these plastic films. China in 2017, selected demonstration agriculture farms to show how to protect and restore Agriculture ecological environment.

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burning of crop residues; waste plastic films.





We can see that half of the pollution has been coming from agriculture. Ten years of policies and practices promotion have decreased the pollution from agriculture.

The livestock manure and pollution have also been decreased from the last ten-year policies.



 COD and TP emissions from livestock and poultry breeding, mainly from livestock and poultry manure, decreased. The absolute amounts by aquaculture have increased, which has become future policy focus.

After the new policies have been implemented the use of fertilizer and pesticides has reduced. The utilization rate in China is 40% so far.



- The use of fertilizer and pesticide have arrived their peaks.
- The fertilizer (pesticide) utilization rate for rice, corn, and wheat in China was 37.8 %(39.8%) in 2019, while that of Europe and the United States was 50–65 % (50–60 %). Therefore, the utilization rate needs to be further promoted.







Thanks to 2015, China has entered new stages to promote high-quality development and we have tried to transform the agri-food system towards sustainability and also better food security. Second, the policy and practice direction are coming in two ways. The first one is reducing pollution and reducing waste. The second one is reuse and recycling.

So far, our policies and practices are coming along these tracks by pilot works, practices policies, and diffusion by different crops.

In the end, I want to share that we look forward to learning experiences on sustainable agriculture development from Pakistan and other countries worldwide.



#### Speaker 3

#### Dr. Muhammad Hammad Nadeem Tahir, Professor and Director, Institute of Plant breeding and Biotechnology, MNS University of Agriculture

#### Topic: Promoting Technological Transformation in Pakistan's Agriculture Sector

CPEC is not only the development of different infrastructures, it also provides opportunities for technology transfer between the two countries through sharing the experiences, learning technologies, and materials for the mutual benefit of countries.









If we see the overview of China's Agriculture, the country is importing different commodities among them the major ones are soybeans, cereals, and edible oils from other countries. Pakistan can grab this opportunity if Pakistan's agriculture can provide these commodities to China.



If we compare the Agricultural yield of major crops in China and Pakistan, we can see that there is a big gap. This gap is actually due to technology. There is an opportunity that if Pakistan uses the technologies which are being utilized by China, we can cover this gap can increase Agricultural yield and we will be able to get the opportunity of exporting different items which China is importing from other countries.







Pakistan's agriculture is facing different constraints, in which the major one is the certified seed. Farm labor is not much skilled so we have to depend on unskilled labor. Likewise, the lack of farm mechanization is another issue. The irrigation system is not highly efficient and there is a problem with the storage of agricultural produce. The use of technology and information flow is very low so these major areas are responsible for Pakistan's low crop production compared to China.



We have the potential areas where China and Pakistan can cooperate. The first one is Farm mechanization and Renewable Energy. If farming in Pakistan is mechanized like in China,



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this can increase efficiency and reduce the loss of production, and ensure an increase in farm productivity. Energy is a big issue, and Pakistan is dependent mostly on fossil fuels. With Chinese cooperation through CPEC, different projects like solar parks or wind energy projects are underway.



Farm Mechanization and Renewable Energy

Storage facilities for Agricultural produce are not very good so the technology from China has improved storage facilities and agricultural products can be stored for a maximum period maintaining their shelf life. If food processing and packaging are enhanced, the extra produce can be processed and packed and ultimately it will be able to the high-end markets and maximum profit for farmers and processors is guaranteed.









The provision of quality seeds is a problem for agriculture due to the varieties which are cultivated in the field are not able to show maximum production. Seed production technologies ensure maximum germination and viability of the seed. If these are ensured, we will be able to provide the best quality seed to the farmers.



Similarly, under the CPEC project, different IT and industrial parks are part of the project. If these Information technologies are used in Agriculture, it will help in fixing the problems of agriculture and increase efficiency. Likewise, the industrial parks can ensure the processing of Agricultural produce from the farm and add value, and ensure good prices.









Irrigation is a big problem as the water resources are being depleted and we are using mostly surface irrigation. If we are interested to put marginal areas for example, in deserts such as the Cholistan, then there is a need to use high-efficiency irrigation systems using minimum water and getting maximum benefits. In some of the areas in the country, different high-efficiency irrigation systems like drip irrigation systems, and sprinkler irrigation systems are being used.



At our university, we already have some agreements and operations with Chinese Universities and different organizations and we are collaborating with them for different purposes including faculty or student exchange, exchange of material, scientific information, and expertise and collaborative research projects, and development of research facilities. Our major partners in China in this context are the biotechnology research institute, the Chinese Academy of agricultural research Beijing, and so on.







There are a few projects from which we are getting the technologies from China to improve our research and cropping systems. As we are sitting in the Southern part of the province, which is the hub of cotton, we have joint activities with China regarding cotton and for this, we conduct the SINO-PAK cotton conference every year, and our major partner in this context is the biotechnology and research institute in China. Scientists from both countries get the opportunity to sit together and share their learning experiences to improve the cotton crop.







With the help of our Chinese counterparts, we have developed agricultural biotechnology labs at the university where our students and scientists are conducting research, especially on cotton.



PBW and whitefly are a big problem for the insect researchers in our regions so the scientists from Hebei Academy of Agricultural sciences Wuhan have trained our people. They helped us to establish this rearing facility in our university and now our entomologists are conducting research on these two insects on cotton and working on how to minimize their attack.



Likewise, we are running a joint research project with China's Academy of agricultural sciences mutually funded by Pakistan's science foundation and China's national science







foundation. It is actually for the improvement of wheat and cotton based on the 30 years of data and this data model is set to be used for the next 50 years. The climatic conditions of Punjab Province and Xinjiang province of China are similar. This study can help us successfully maintain the cotton and wheat system in both provinces.



We are trying to develop an institute in Pakistan with the Hebei institute of international business and economics and through the CPEC and country visits, we are overcoming the language barriers by conducting Chinese language courses at our university. With Wuhan Guoying Seed Company, we are having collaborations for the development of hybrid rice.





## Hebei Institute of International Business and Economics

Wuhan Guoying Seed



700



Chinese language

Hybrid rice

## Speaker 4

#### Dr. Mubashir Mehdi, Associate Professor & Director, Business Incubation Center, MNS University of Agriculture, Multan

#### Topic: Food Security Challenges in Pakistan: Reforming Government's Role in Agriculture

When we talk about food security, three fundamentals come into our minds that ensure food security that people need sufficient and reliable food from reliable sources and that food can be available to everyone. Its raises four questions do the food supply chain ensure adequate and healthy food for the consumers is the food affordable, the supply chain challenges, and the role of government in the food chain?









The current state of food security in Pakistan in terms of availability and affordability talks that Pakistan is presently self-sufficient in major staples, we are ranked 8th in producing wheat, 10th in rice, 5th in sugarcane, and 4th in milk production. But despite that only 63% of the country's households are food secure. If we get the data and see what is the level of food insecurity in the country which is around 40% of the population, there are different levels of food security that are prevailing in the overall food system of Pakistan. There is severe, moderate, mild, and full food security. The severe food security is another aspect that is prevailing in different provinces across Pakistan and if we compare these provinces with Gilgit Baltistan, which is the neighboring province to China is less food insecure. Apart from that, all provinces are facing some sort of severe food insecurity.







## Q. 1, 2: The Current State of Food Security in P Availability and affordability?



Pakistan is presently self-sufficient in major staples – ranked at 8th in producing wheat, 10th in rice, 5th in sugarcane, and 4th in milk production

Despite that, only 63.1 percent of the country's households are "food secure"



Across the provinces, Gilgit- Baltistan are relatively more food secure than other provinces

If we see in terms of affordability and nature of food security, we know that per capita income is around \$1500 in Pakistan which is not very big as compared to other neighboring countries. Pakistan is struggling with undernourishment, micronutrient deficiencies, and safe drinking water. Per capita consumption of food products is almost 6-10 times lower than that of developed countries. We are facing stunted growth in children with low weight and height. Pakistan ranked 106th among 119 countries on the global hunger index. We are also among those 7 countries which are heavily malnourished.





#### Q. 1, 2: The Current State of Food Security in P Availability and affordability?



- Per capita consumption of food products that possess high-nutritional value like beef, chicken, fish, milk, vegetables and fruits is almost 6-10 times lower than that of developed countries.
- More worryingly, almost half of the children under 5 years are stunted (low- height-for-age) and one in ten has been suffering from wasting (low-weight-for- height) in the country.
- Pakistan was ranked 106th among 119 countries surveyed for the Global Hunger Index,
- Pakistan is among those seven countries that cumulatively account for two-thirds of the world's under-nourished population (along with Bangladesh, China, Congo, Ethiopia, India and Indonesia

Source: National Food Security Policy, Government of Pakistan, 2017



One of the biggest challenges to ensuring food security in Pakistan is that the vertically coordinated value chain has far-reaching implications to meet dietary patterns, nutrition, and health. The second important aspect is that the industrialized production process and higher consumption of processed foods through vertically coordinated chains guided by the industries raise different consumption patterns in the society, and people are moving towards more modernized food rather than the indigenous food. Another very important issue is that the longer food chain may have a larger ecological footprint and because of that it is associated with higher green gas emissions. Vertically coordinated, capital-intensive value chains challenges small-scale farmers, climate change, and intensification of natural hazards are there, a lot of deforestation is happening which is creating climate uncertainty which is affecting the production system of developing countries like Pakistan.







## Q. 3 Food Chain Management and Challeng

- Vertically coordinated value chains have far-reaching implications to meet dietary patterns, nutrition and health
- Industrialized production processes and higher consumption of processed foods also raise concerns related to nutrition, the environment, food security and food safety
- > Longer food value chains may have a larger ecological footprint
- Vertically coordinated, capital-intensive value chains challenge small-scale farmers
- > Addressing climate change and intensification of natural hazards

If we see how supply chain management could be a guiding framework to ensure a secure food chain, we need to understand what the supply chain is first. The supply chain is a chain of different players involved to satisfy a consumer's needs. That secure and balanced food can flow in the form of products and pass into the hands of all the players in the food chain and every player has a different role to ensure that balanced food. If every player in the chain has adequate money and can afford that produce the balanced food can be ensured.









In the agriculture production system, the government is one of the key stakeholders in terms of developing regulatory mechanisms and then extending the research and development. The government should first start working on the structural reforms and these can be commodity-based market infrastructure, we are bringing small farmers into clusters and they are developing their brands. The second thing is the commodity-based research approach. Agriculture taxation and easy access to finance to smallholders rather than an emphasis on subsidy. We as a developing country always talk about the subsidy but that is not the solution, we have to think broadly about whether putting taxation on the input is more feasible or putting it on the income is more feasible. Access to finance is also a big challenge. Promoting green economy and regulating deforestation particularly to discourage wooden packing and deforestation. We should promote urban agriculture but we also have to promote small to medium cottage industries in rural areas. We should create awareness of kitchen gardens. Efficiency in the production and governance system is also one of the keys to developing integration and coordination among the research and extension departments to improve the overall production system in Pakistan so that our food chain could be more competitive.

#### Q. 4 Role of Government to ensure 'SECURE' Food Chain System



#### Structural Reforms :

- · Commodity based market infrastructure is required (one village one brand)
- Commodity based a "whole of chain" research approach is required among the R&D institutions
- Economic Reform:
- · Agricultural taxation and easy access to finance for small holders rather emphasis on subsidy
- Climate Reform:
- · Promoting green economy and regulating deforestation particularly to discourage wooden packaging
- Urban/Rural economy:
- Promote urban agriculture and small to medium scale cottage industry
- Efficiency in Production and Governance system:
- Strengthening integration and coordination among the reser h and extensions





#### Speaker 6

#### <u>Mr. Luo Meng, PhD Candidate, majoring in Agricultural Economics and</u> <u>Management, College of Economics and Management, China Agricultural</u> <u>University</u>

#### **Topic: Eco-smart Agriculture: China's Current Situation and Development Vision**

In the past 40 years, China's agriculture has seen a decrease in agricultural employment and an increase in overall agricultural output. The statistics on China's agriculture employment and production shows that the agriculture production has improved in the past years but it also faces many challenges.

		LUO Meng,CA
Total supply increases, agricultural employ	ment-population decreases	
In 2019, about 177 million people were employed in a country's total employed population, down 46 percentage	ngriculture, accounting for 23.6 percent points from 1978.	it of the
Total grain output has been on the rise with fluctuation	ons, exceeding 658 million tons for 12	consecutive
Total grain output has been on the rise with fluctuative years since 2009.	ons, exceeding 658 million tons for 12 Growth	consecutive
Total grain output has been on the rise with fluctuative years since 2009.           Category           Pigs, cattle and sheep	ons, exceeding 658 million tons for 12 Growth 5.6-8.6%	consecutive
Total grain output has been on the rise with fluctuative years since 2009.           Category           Pigs, cattle and sheep           Aquatic products	ons, exceeding 658 million tons for 12 Growth 5.6-8.6% 7%	consecutive
Total grain output has been on the rise with fluctuative years since 2009.           Category         Pigs, cattle and sheep           Aquatic products         Fruit	ons, exceeding 658 million tons for 12 Growth 5.6-8.6% 7% 11%	consecutive

With the aging population and upturning of living standards, the demand for agricultural products has been restructured. The aging problem makes a lack of agriculture and high-quality labor. Today, we emphasize crop yields and put the same importance on ecological certainty and it troubles China's agriculture.





## Challenges in China's agricultural development



#### Changes in agricultural demand

An ageing population, rising incomes and changing consumption habits The consumption of grain was less while that of high-value agricultural products increased Aquaculture and aquatic products, the demand for high-protein products will increase

#### **Changes in agricultural production**

Aquaculture industry will develop towards comprehensive scale and modernization Farming will be 20% large-scale farmers producing 80% of the crops

#### Agricultural development faces constraints

Aging of agricultural labor force and inadequate comprehensive literacy of farmers We should not only seek output growth, structural adjustment, but also consider the sustainable ecological environment

The new wave of scientific and technological progress has brought an opportunity to China's agricultural sustainable development. New smart technologies push forward the developments and monitoring of farmland and water areas with intelligent equipment, intelligent analysis of the whole production process of planting, fertilization, and pesticide spraying to achieve the goal of green agriculture production. In China, intelligent and ecological smart agriculture is in its early stages and is mostly used in many scientific agricultural research institutes.

#### The turning point of China agriculture sustainable development



#### Scientific and technological revolution brings development opportunities Sensor, remote sensing, information, Internet of Things and other information and equipment technology Biological breeding technology and other modern biotechnology Agriculture has entered the period of modern agriculture marked by intellectualization and socialization

#### **Eco-smart agriculture**

Modern biotechnology and intelligent information and equipment technologies are applied to reshape agricultural production methods

Monitoring farmland and water area with intelligent equipment, intelligent analysis of the whole production process of planting, fertilization and pesticide spraying with big data platform, intelligent monitoring of agricultural product quality

Agricultural green development goal: Improve the efficiency of water and soil resources, improve the production environment of agricultural products, improve the safety and quality of agricultural products.

In 2019, the Shandong University of Technology established China's first ecological unmanned farm in Zibo, Shandong province. It is a smart agriculture mode based on







sustainable development integrating high technologies like artificial intelligence. Ecological agriculture the ecological unmanned farm includes two keys, i.e., technologies, ecological agricultural and unmanned farm.



Ecological agriculture's idea is to build fertile soil mechanized farming mode with the precise use of pesticide and application of ecological fertile soil mechanized framing mode including deep cultivation. The scientific decision-making system is supported by artificial intelligence and a cooperative operating system.









The digital agriculture model in Chengdu province is the establishment of technical services centers and digital platforms, relevant farmers will be provided with technical solutions and convenient low-cost, and all-around social services for food production. According to the model, the planting area is about 33000 acres, and wheat and rice are planted in one season per year, achieving a carbon emission reduction of 3166 tons of grain planting every year.



#### Few examples of Ecological smart Agriculture:

## Planning of Ecological smart agriculture in China



#### Related to the development planning of ecological smart agriculture

The 14th Five-Year Plan for The Green Development of Agriculture The 14th Five-Year Plan for the Development of Science and Technology in Agriculture and Rural Affairs National Agricultural Mechanization Development Plan in the 14th Five-Year Plan Soil, Groundwater and Rural Ecological Environment Protection Plan in the 14th Five-year Plan

The plan for agricultural and rural modernization was promoted during the 14th Five-Year Plan period The 14th Five-Year Comprehensive Work Plan for Energy Conservation and Emission reduction The big data Industry Development Plan of the 14th Five-Year Plan Development plan of robot Industry in the 14th Five-Year Plan

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The 14th Five-year plan for green development of agriculture improves the innovation system of green agriculture machinery equipment and promotes the transformation of agricultural machinery to model and intelligence based on the mechanization demand of green agriculture development.

This plan also promotes the development of science and technologies in agriculture and rural areas.



The national agriculture mechanization development plan will accelerate the spread and application of green and intelligent agricultural machinery and equipment and cost-saving and high-efficiency agricultural mechanization technologies promoting energy conservation and emission reduction in agricultural machinery and help achieve carbon neutrality and carbon peak in agriculture.







### Planning of Ecological smart agriculture in China



#### National Agricultural Mechanization Development Plan in the 14th Five-Year Plan

We will accelerate the spread and application of green and intelligent agricultural machinery and equipment and cost-saving and high-efficiency agricultural mechanization technologies, promote energy conservation and emission reduction in agricultural machinery, and help achieve carbon neutrality and carbon peak in agriculture.

#### Address by the Chief Guest

#### Prof. Dr. Asif Ali, Vice Chancellor, MNS University of Agriculture, Multan

I am impressed with my team and my Chinese counterparts. The talks have been very focused and comprehensive with great learning experiences. This is a kind of topic where we can have extended debates and discussions. I'm impressed with the concept given by President Xi on the community with a shared future. Unless and until we focus on the communities, no research can get to a point where the impacts are fragmented. Within this context, I appreciate the efforts of Pakistan Research center for a community with a Shared Future. There is a kind of learning that when we start through a value chain approach involving stakeholders and researching for development, then things reach fast to the community and the impacts are greater.

I will be very happy to have a further discuss to make it more effective. We have worked across continents and we are mainly focused on agriculture and social sciences for creating an impact there. Dr. Baig looked after the challenges of food security and where the non-traditional security threats and there are learnings on that which the world has started realizing particularly after COVID and war scenarios. Coming back to China, one thing I would like to mention is that we don't have yet any kind of collaboration agreement with China Agriculture University so we would like to request Mr. Khalid to link the two universities so we can work together. We have been working with many other universities, particularly with the Chinese academy of agriculture sciences and we have done many projects together like the SINO-PAK cotton technology labs here with very frequent exchanges, business to business links and we have some initiatives focused on degree programs and skill development programs.





If we look into the system as such, as sustainable agriculture or in the climate change scenario we have to follow the lines of food and agriculture organization. In production diversity, we have to have diversification in crops but essentially whatever we do in the climate change scenario things have to be led by breeders or designing the plant which could cope with such climatic challenges. Mr. Hammad has mentioned that we are doing a project with the Chinese Academy of agriculture sciences which is on historic data that what traits we are putting into wheat and cotton in the perspective of the availability and fertilizers in the last 30 years. If we look at Pakistan the Gilgit Baltistan province has the least food insecurity and that leads to many questions we can study on this hypothesis which we can study with the help of the Pakistan research Center. Dr. Mehdi has put light on the food supply chain that how these chains affect and the patterns of growth, diversity, and consumption all together impact the overall food system.

Eco-smart system is a very valid idea and we have to work on it and we are already holistically working on the genetic aspects and designing plants to cope with the climate change, our water harvesting wheat is an example. This year has been very critical in terms of wheat production because it is our food security and this year has been a very hightemperature difference. We have to see this angle in terms of research. Despite having a crisis of phosphorus and the highest temperature in the time of rain formation, still we are hoping that there are no major dents in the targets we have set for production. Diversification has also been emphasized by Ms. Ting Meng. In terms of our dietary and production patterns as the existing crops would not 100% succeed to cope with the challenges of climate change, we have to diversify our diets and, in this diversification, we also have to address the issue of malnutrition. More diversified food, fewer impacts on human health. We have done a few projects for climate change which we can talk about in detail someday and I would like to particularly mention that at our university we have made a brand which we call smart plant production which is reducing the use of synthetic pesticides and maintaining the crop production, using IT tools for monitoring insects and using technologies like drones.

Comparing Gilgit Baltistan with other provinces in terms of food insecurity, I have a few hypotheses and by learning from today's presentation my hypothesis says that one of the factors in Gilgit Baltistan being more food secure is the population, less use of pesticides, more diversity, and smaller food value chain. I request the team members of the center to consider this hypothesis and try to find the answers to the thesis hypothesis and how we can implement these learnings to make whole Pakistan food secure and learning from Chinese experiences, improving our agriculture overall, sustainable production, trade, and food supplies across the provinces. I would like to continue the dialogue which we have started and by learning from such dialogues we can develop strategies to cope up and make the world a better a place to live.





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