A Report on
Scoping study of Central Data Facility for Food Supply Chain Sustainability
Sustainable Development Policy Institute
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Section 1: Introduction

1.1: Background

The overall impact of COVID-19 on food security and agricultural food systems was not known in the initial phases of COVID-19. However, during the last five months of unfolding of the diseases in Pakistan, COVID-19’s effect on lives and livelihoods, more so for the poor, is gradually turning economic access to food for masses difficult. According to World Bank Group, South Asian countries may face food security challenges both in terms of supply and demand if not properly managed especially for marginalized sections in the society\(^1\). Pakistan is no exception to it. Already it is understood that food insecurity as per National Nutrition Survey 2018 is 36%\(^2\) – almost matching the poverty numbers (39%)\(^3\). These numbers are now set to deteriorate given current circumstances.

Although currently, the virus spread in Pakistan seems to be under control, the novelty of this disease has brought uncertainty. Any surge in cases and resultant restriction on mobility may lead to strain the food system in countless ways in the coming weeks and months. All of this will have, and is already having, significant negative effects on food supply chain, which is a complex web of interactions and of actors: inputs, producers, processors, marketers, transporters, storage, consumers, etc.

On the supply side, transportation restrictions, shortage of labour, and farmers' limited access to the market will be the major challenges. The food supply chain mainly consists of two groups: cereal group (wheat, rice, soybeans, corn, etc.) and fresh produce group (vegetables and fruits). Supplies of some food items

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\(^1\) World Bank, Food Security and Covid – 19  

\(^2\) MOPDR & UNICEF, National Nutrition Survey 2018. Islamabad, Pakistan

\(^3\) MOPODR & UNDP, Multidimensional Poverty in Pakistan, 2016. Islamabad, Pakistan
such as pulses and oil may also be compromised due to export restrictions imposed by the producing countries.

On the demand side, the impact of COVID-19 on food security is even worse. The factors which are mainly contributing to worsening the situation are individuals’ behaviour and loss of purchasing power due to unemployment. The daily labourers are at more risk now because a large percentage of the poor and marginalized in Pakistan works as daily wagers; and statistics about them are not available. In some cases, panic buying may also set in, which might cause food shortages and inflation. The low levels of liquidity in the hands of farmers are also resulting in slowdown of overall buying cycle in the agricultural inputs market. This will have implications for the next season crops.

It is also learnt that devoid of other livelihood options, many farmers in the Punjab treated wheat (their staple food) as cash crop and sold most of their yield for a ready cash. Resultantly, now they are forced to buy expensive wheat flour.

The strict lockdown and/or reduced purchasing power to buy inputs in time, in coming days due to spread of disease, may jeopardize sowing of rice and cotton, which is a major source of livelihood of majority of small farmers. Reduced production of these crops will decrease the foreign exchange earnings and employment in local textile industry. Another factor would be the pandemic impact on food prices. Already literature on Ebola in Africa shows that prices soar too quickly and if not properly managed could result in social unrest.

Urban food systems are also highly vulnerable because of COVID-19 pandemic. It is particularly more evident for millions of people living in dense urban and peri-urban agglomerations with poor health and sanitation facilities, and unhealthy food and inadequate infrastructure in mega cities of Pakistan.

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COVID-19 has implications on the informal food sector (transitional food supply chains), who have limited capacity to sustain due to lack of capital, safety nets and access to the financial sector for support under lockdown situation. Urban poor mostly depend on such informal markets for their food purchases, disruption of this informal food sector multiplies the already grave situation and potentially lead to social unrest if lockdown persists longer.

1.2: The Need of Hour

Under this backdrop, the Ministry of National Food Security Research (MNFSR) and National Security Division (Strategic Planning Cell) separately approached SDPI for assistance to prepare a crisis management food security plan to cope with negative effects of COVID-19 on food security and food supply chain.

There are potential measures and ways to overcome challenges of food supply chain disruptions. In this regard, federal and provincial food and agriculture departments have shown keenness around setting up a national data facility to strengthen response through better knowledge and information. This national data facility would inform MNFSR, Food Security Advisory Council, and National Security Division regarding quantitative inputs, data protocols, and related cooperation from Tehsil and districts across the country.

1.3: Goal

- To develop and launch a national data facility/dashboard to analyze food supply chains across the country to manage supply and demand for crisis management

1.4: Objective

- To produce a detailed feasibility by using available information and data on the structure of central data facility for analyzing and monitoring food supplies, demands and prices to better support policymakers about food
shortages, bottlenecks in logistics and controlling food prices and hoarding at different level of the government

1.5: Outcome

The outcome will be a detailed study on the structure of central data facility for analyzing and monitoring food supplies and demands to better support policymakers about food shortages, bottlenecks in logistics and controlling food prices. The aim is to compile list of indicators on which data is available which could inform on stocks, needs and future requirements at district level. It will provide government with much needed information about supply and demand, and whistle blowing threshold.

1.6: Literature Review

Despite the fact that food is smoothly available in Pakistan (Sleet 2019), the country’s overall food security situation is poor. The food security status is worse in rural areas, although there is a significance of agriculture to the farm economy. The reason is high prevalence of poverty in rural areas and majority of farmers are net buyers of food. In addition, economic and environmental shocks have left deeper impact on the lives of poor Pakistanis, which leads to reduce food access. In case the economic pressure increases, it hardly seems that the Pakistani government will be able to implement a series of proposed improvements particularly planned to reduce poverty and increase food security. Pakistan was able to export a record 1.4 million tons of wheat last year, but hunger and malnutrition remain at an alarming rate. The World Food Program (WFP) reported that 60 per cent of the population confronts food insecurity. In Pakistan, food availability is not the issue; the main food security issue begins from the poor accessibility of food supply. Similarly, affordability is one of the greatest barriers in the way of achieving a nutritious diet.

According to Malli et al. (2019), food supply and production make agriculture an intuitively obvious economy sector to start. However, issues regarding food
availability, accessibility, and quality make agriculture’s role in food security and not just food supply more complicated than it first appears. Access to adequate and sufficiently nutritious food is noticeably affected by commodity prices and how affordable food is to households in different income types. Despite that access also varies depending on how food is disseminated within households, and even in households that are classified inclusive as food secure, certain members suffer from starvation.

Agriculture is one of the most significant sectors in Pakistan that plays a vital role in the economy by contributing 18.9% to GDP and occupies 42.3% of the labor force (GoP 2017-18). Following the population explosion and urbanization in Pakistan, the demand for food crops is also increasing at a rapid pace. For instance, wheat, maize and rice contribute 9.1%, 2.4%, and 3.1% to the value added by agriculture, i.e. 1.7%, 0.5%, and 0.6% respectively to the GDP of Pakistan.

According to Akram et al. 2018, in order to meet second Sustainable Development Goal (such as ‘End hunger, achieve food security and improved nutrition and promote sustainable agriculture’), increasing crop yields will be required in many regions, including Pakistan.

According to the Ministry of National Food Security and Research (2018), Pakistan has seen improvements in food production and is considered as the major producer of staple food such as wheat. However, a substantial part of population is still food insecure. The Ministry has suggested that this will remain a key challenge due to rapid urbanization, high price fluctuation, low purchasing power, unpredictable food production, and ineffective food distribution system.

According to the State Bank of Pakistan in 2019 quoted the UN’s Food and Agriculture Organization as stating that the vision of food security is adaptable, but its widespread view is: “physical and socio-economic access to safe, nutritious and an adequate food for all people, at all times, which fulfils their dietary
requirements and food choices for a healthy life." For this, some major dimensions are significant which include:

i) Availability of adequate quantities and proper quality of food supplied through domestic production,

ii) Food access to all individuals to sufficient resources for obtaining proper food,

iii) Availability and access of food in emergency situations, such as individual shouldn't lose access to food as a result of sudden shocks, i.e. climatic crisis or seasonal food shortages or disrupted food supply system.

iv) Utilization of food through sufficient diet where all food requirements are fulfilled.

In Pakistan, agriculture sector consists of five subsectors, including major crops, minor crops, fisheries, livestock, and forestry. The major food grain crops are wheat, rice, maize, bajra, jowar, and barley as described by Jiang and China (2016).

This report will essentially focus on key areas, which include the discussion on the structure of central data facility in section two, while section three elaborates the development plan of the central data facility. Section four highlights the limitations followed by section five which revolves around the future of Food Security Portal in terms of development.

**Section 2: Structure of Central Data Facility**

**2.1: Planning and Initiation**

The plan to build and run a central data facility portal was initiated with the Ministry of National Food Security and Research in early April 2020. In collaboration with Prime Minister’s Office (PMO) and other stakeholders from federal and provincial food and agriculture departments, and representatives from
academia, a meeting was held to discuss the scope of the portal. Honorable Federal Minister for National Food Security and Research Syed Fakhar Imam chaired this meeting. In this meeting, the idea of central data facility was popped out and moved forward for discussion and finalization. It was discussed that coronavirus crisis could cause the collapse of Pakistan’s food system in multiple ways. A complete lockdown, restricted public transportation, shortage of labour, lack of access to inputs, etc can harm the food system. Prior to COVID-19, reduced incomes, disrupted food supply chains, and acute hunger was on the peak due to several factors, including socio-economic conditions, conflict, climate change, pests attack, etc. However, 2020 may be considered as the most severe in terms of global food insecurity. The meeting finalized the plan to establish a central data facility dashboard for analyzing and monitoring food supplies and demands to take informed decisions about food shortages, bottlenecks in logistics and controlling food prices/hoarding.

It was decided to take “wheat” as a pilot commodity for this proposed Central Data Facility. It was also decided to discuss it further to analyze the need of Food Security Portal. This was due to the fact that wheat is the highly consumed crop of Pakistan because of local taste and preferences. Furthermore, Pakistan is facing wheat crisis for many decades. For this purpose, another meeting was arranged on 4th of September 2020 at 3:30 pm.

Mr Moeed Yousaf, the Special Assistant to Prime Minister on National Security, chaired the session. Based on the discussions with representative from MNFSR, KP Food/Agriculture Department, Punjab Food/Agriculture Department, Sindh Food/Agriculture Department, Flour Mills, and academia, following structure (figure 1) was developed by taking “WHEAT” as a pilot commodity. On the basis of it, another structure was also developed later for Sugar and Rice (Annexure 1).
In this meeting, wheat market operations, wheat market system, and key players of wheat procurement system were also discussed. The discussion led to consider traditional procurement system, dynamics of wheat support price, lack of inter-provincial coordination and dealing with surplus and deficiency of wheat in an area to build central data facility. All the participants and the chair agreed that other provincial stakeholders, including provisional agriculture and food secretaries, directors, etc. (as mentioned in the Annexure 2), should also be consulted to better finalize the scope of this food security portal.

Another important part of the discussion was the data sources for the portal. It was instructed to find out stakeholders of data during consultations. It was also suggested by the chair to finalize a unanimous data sheet for all the centre and provinces to collect data and feed it on the portal.
2.2: Consultation with different stakeholders

To successfully integrate the required information in the portal and to present it in a most effective way, it was necessary to have consultations with different stakeholders in all the four provinces other than federal consultations. For this purpose, team SDPI visited all the four provinces and held one on one meetings with different stakeholders (Annexure 2). Through these consultations, it was learnt that data is available at ground level, but it is in scattered form which needs to be organized. Another barrier was the unsatisfactory coordination among food departments, which further led to distorted information.

Stakeholders said that the dashboard may contain essential commodities’ stock information. They said there is a quota of flour mills and mill owners do not release it. As a result, flour prices increase and they can get benefits out of it. People have stock of wheat, but they kept the stock till the wheat prices increase. The government has no check and balance system, as it lacks an organized database and coordination. In addition, provincial chief secretaries will decide as to who will add data to portal. User IDs and passwords will be provided to provinces’ chief secretaries, and they will hand over those user IDs according to domains at district level, so the data entry will be done at district level.

Hoarders are the actual players, who purchase or import wheat. It was discussed that these hoarders include individual wholesalers at the micro level and large firms at the macro level. In addition to COVID-19 being the main reason of disruption of food supply chain, other disruptions include consumer behaviour such as panic buying, depreciation of rupee against dollar and lack of coordination. Food vendors, wholesalers and retailers get impacted during lockdown situations due to restricted work. Dashboard can make it possible to get pricing information on time because currently the Bureau of Statistics only provides pricing of 17 cities. It was also discussed that verbally obtained information over phone calls at any point is often misleading. District level analysis
is the most challenging task, but dashboard provides district-wise analysis and required information so that districts can use it to formulate their regional programmes.

False information like wrong market signal of food shortages may lead to bulk-purchase of food or hoarding. Through online database, hoarding can be minimized as it will provide real time market data which can aid in identifying hoarding. Portal should contain data on national consumption and national production in order to resolve the provincial governments’ issue regarding the lack of information. Dashboard will interconnect provinces and prices will be the same. Presently, every province has its own price. Dashboard will help fix prices according to all three stages of market such as ex-mill, wholesaler, and retailer. It will ensure profits taken at all stages as controlled by the government to avoid overpricing.

This portal also assists the demands of a wide range of stakeholders in terms of data, information, and knowledge about sustainable food system all across the food supply chain. Moreover, it mainly targets public and private institutions and repository data of food security in the country. The portal aims to facilitate Pakistan’s population to have access to adequate, safe and nutritious food for a healthy life at affordable prices in times of crises and emergencies.

Although similar dashboard already exists in all the provinces, they lack required data and analysis. There is no linkage between existing dashboards. In addition, Deputy Commissioners and market committees perform a significant role in gathering data. The provinces require a comprehensive vision and direction for agricultural development to make certain that collaborations are maximized, and overlaps minimized

2.2.1: Punjab

It was discussed by SMEDA officials that through this dashboard, district within the Punjab can be categorized into surplus, sufficient, and deficit in terms of stock
position. It is also possible to easily move food stocks from surplus district to deficit districts while controlling hoarding. Proper and recorded coordination between the departments could be possible by this dashboard. Furthermore, Muhammad Hussain Khokhar, Additional Director of Punjab Food Department, pointed out the concept of domestic retention which meant that brokers can keep some amount with them which they can sell to local people in the area for domestic use not further sale, so domestic retention should also be included in the dashboard. He also explained that wheat is not just transferred between provinces and centre but some other authorities also obtain wheat, which include utility stores defense and army, which should also be highlighted in the dashboard.

The Punjab Extensions Director General Dr Muhammad Anjum Ali said that harvest machinery also plays an important part because availability and movement of machinery need to be coordinated to ensure greater production. Other factors that impact the supply of essential commodities, he said, included weather conditions and the issue of locusts. For example, he pointed out that a locust outbreak would inevitably impact the crop production and resultantly the supply. Both SMEDA officials and Punjab Extensions Director general pointed out that weather conditions like winter temperatures and monsoon rains can also influence crop production. Therefore, threats to supply such as monitoring weather and locusts’ outbreaks can be included in the dashboard as well. He also pointed out that for future modifications, the dashboard should take account of essential commodities that are perishables so that their timely transportation can be arranged. Lastly, regarding consumption figures, he stated that it needs to be calculated properly to determine how much households consume. In addition, the figure for household consumption can also be compared with industrial consumption.
2.2.2: Sindh

During the discussion, vice-chancellor of Agriculture University Tando Jam said that when commission agents had less stock, it would have worse impact on price fluctuation. Sindhi people, he said, cannot live without wheat and there should be a comprehensive food safety policy and a food plan which cater to the need of population in the province. He also emphasized for coordination among all departments of agriculture in Sindh.

Director-General Food, Sindh suggested that real time comparison between domestic and international prices is needed. He further quoted the case of 2015 when Pakistan exported wheat in the international market at low rates compared to its domestic market price. He also focused on the comparison of provincial prices and said timely import of wheat can save us from crisis. He suggested that we should stop exporting wheat, and said 12 to 13 essential commodities required a proper management system. According to him, it is difficult to trace hoarding because incomplete data of stock and crop. Reporting institute does not provide correct information.

2.2.3: Khyber Pakhtunkhwa

During the consultation, Mr. Khushal Khan, the secretary food department, said that federal government should establish a mechanism to get the required information regarding the location of production, required need for production, availability, stocking and hoarding. He added that a constitutional framework is needed. Mr. Muhammad Israr, the secretary agriculture department, said that provincial calendar should be provided to share inter-provincial estimations. Moreover, there should be a strong connection with the reporting department while collecting data. He further added that the data about perishable items and the price list of other food items related to agriculture should be added in that dashboard.
While providing the consultation regarding hoarding, Mr. Khushal Khan said that hoarding of wheat and sugar is happening at district level too. He suggested that turnover should not be fast so that authorities can take out the average which is necessary to get information about the wheat hoarding. He added that reporting should start during procurement period. Mr. Israr said that a national level expert is needed and a proper mechanism for supply chain should be added to the dashboard.

During the discussion about the existing dashboard in KP, Mr. Khushal Khan said that they had developed some thresholds in that dashboard; for instance, blinking of red lights and so on. Mr. Israr added that their dashboard provides weather forecast and market information related to agriculture. Both these suggestions were made regarding existing provincial databases.

2.2.4: Balochistan

During the discussion, District Commissioner Badin said that Balochistan has enough wheat production for itself. Even it transports wheat to the Punjab and Sindh. According to him, last year only 1.2 per cent of total production was lost in locust attack whereas this year they totally got control over locust. He admitted that hoarding happened in Balochistan. Dr Arif added that Balochistan does not have any qualified person, who can analyze food data and predict, so there should be an experienced person there otherwise results would be destructive. Dashboard should provide us strong market intelligence and complex calculations with trends, so that we can forecast timely.

Focal person of IT department suggested that there should be pricing list in dashboard which can be accessible for everyone. So, everyone should be well aware of the reasons behind high/low rates in one’s district.
## 2.3: List of Indicators for Dashboard Development

There were eight major indicators identified during Desk Review and Consultations with stakeholders and policy makers, which are as follow:

1. **Crop production** is a crucial aspect for the dashboard because production/consumption ratio leads to shortage of a commodity in the country as in case of wheat. Secondly, literature shows that Pakistan’s per acre yield of wheat is lowest in south Asia. Thirdly present crop production information is incomplete, so there is a need for correct information.

2. **Supply of Fertilizers** to the farmers is immensely vital, when fertilizer is added to the soil, it enhances plant’s growth and yield. Nitrogen component of fertilizer such as ammonia is extracted from air by pumping natural gas and steam into a large vessel. Air is inhaled into the system and oxygen is exhaled out by burning natural gas and steam, leaving behind nitrogen, hydrogen and carbon dioxide. Inserting an electric current into the vessel removes carbon-dioxide and forms ammonia by reacting hydrogen with nitrogen. Additionally, a catalyst, magnetite, is used to synthetize the process to remove impurities and then sent to the farmers. Sometimes, ammonia is also converted into nitric acid to establish ease of using it as a fertilizer. The nitric acid is converted into ammonium nitrate which can then be stored until it is ready to be granulated and blended with the other fertilizer components.

Other rich fertilizer components include phosphorous and potassium, which are supplied to the farmers in the form of phosphoric acid and potassium chloride respectively. Before the fertilizers are sent to the farmers, they are granulated and blended for the most efficient use. This best possible powdered mixture is emptied on a conveyor belt which zips it equally into the bagging machine. These fertilizers are supplied to the farmers in large bags. Supply of seeds in Pakistan is well formulated that go through series formal and
informal system that results in the crop production. In the formal system, the seeds are supplied to public and private sector. The public sector included Pakistan Agricultural Research Council (PARC) which further supply seeds to Provincial Seeds Corporation. The private sector includes national and multinational seed companies and the certified importers. The informal system of seed supply works where the farmers themselves produce, disseminate, and access seeds by directing from their own harvest; through exchange and barter among friends, neighbours, and relatives; and through local grain markets.

3. **Data inventory**, for a successful food company, helps manage the supply chain, delivery of the product, and the safety of the goods for consumers. The technological advancement has helped better the monitoring of food supply via cloud-based inventory management systems. The standard benefits of this cloud-based system are to:

- Optimize food safety and can decrease food health-risk problems.
- Make processes more efficient and reduce the chances of perishable goods going to waste.
- Get food products onto shelves quicker so that the product is still ripe for customers
- Optimize transit and packaging processes that can reduce costs
- Track history of sold goods and see what future demands are

The cloud technology also has temperature gauge, which helps you plan your inventory at specific areas as per their weather, which is appropriate for the food item to store.

4. **Processing of food** is the transformation of agricultural products into food that is edible. We process food to preserve it, extend its availability and provide accessibility, and provide variety and value to our food choices. The main three types of food processing are primary, secondary, and tertiary.
• The primary processing is converting raw materials into food that can be consumed and, in some cases, food is differently edible once the primary processing is completed such as sugar cane.

• Secondary processing technique where processing is done of the food that is processed via primary processing. For example, primary processed flour is converted into dough by mixing it with water which is further baked to crate bread.

• Tertiary process is also known as “ready to eat” foods such as frozen patties or packaged chips or juices. Here, final consumable stage of the food item is sold in the market which is further consumer by the people.

5. **Stocks** are food products held by a public entity. These food products mainly consist of grains or other food staples. This stock can be national, local, regional or international and can be managed by village communities.

6. **Demands** are elements which drive the food quantity to be processed in the fields. Consumers demand for the food choice and the food security policies are made according to that.

7. **Consumption:** Different areas have different consumption patterns like the food supplied in rural is less than that of the urban due to differences in population. With growing population, there is a need to broaden the availability of food to satisfy the diversification of consumer’s food choices within in affordable range.

8. **Hoarding** refers to the major reasons of disruption that occurs in system of food supply chain. It could result in food insecurity and put a heavy burden on the complex systems which link together with farmers, agricultural inputs, shipping, retailers and many more. Other than hoarding, major disruptions include depreciation of local currency which makes international market price higher, weather conditions that impact production, soil conditions, water scarcity, outbreak of locust worms and lack of adequate fertilizers. In order to maintain food supply networks, hoarding and black-marketing of food have
added to the problem for people in the country as costs increase substantially.

2.4: Stakeholders for Data Collection

The main aim of Food Security Portal is to gather scattered data already existing at district level in public sector and synthesize it. Through consultations, the SDPI team was able to identify and develop in liaison with the district sectional heads and stakeholders regarding data input. Through these consultations, another point was highlighted that data entry in portal should be at district level (Provincial Secretaries in consultation with Food and Agriculture Departments should finalize the Data flow diagram for each province) for monitoring the performance of the developed district policy to identify areas of improvement. The portal should be able to consolidate and calculate districts level data at up to provincial and national level to enhance relevancy, efficiency, and effectiveness.

2.4.1: Punjab

1. District Officer (Industries) for data of food stocks with traders, mundis, and wholesalers
2. Assistant Director (Livestock) for data on meat, milk, eggs, etc.
3. Extra Additional Director (Agriculture) for data on availability of seed, fertilizers, and pesticides
4. Additional Deputy Commissioner (Revenue) for data on standing crops
5. District Food Controller for data on wheat stock and wheat flour.

2.4.2: Sindh

1. Bureau of Supply for data on Prices of food stocks with traders and mundis
2. Bureau of Supply for data on meat, milk and eggs
3. Seed Cooperation for data of seeds
4. District Food Controller for data on wheat stocks and flour stocks
5. Cane commissioner for data on sugarcane
6. Market committees for data of market stocks
7. Assistant Director (Godown) for data on stocks in mills

2.4.3: Balochistan

1. Director-General Industries for data on price fixation
2. Director-General Food for data on wheat
3. Deputy Commissioner for data on private sectors at all levels
4. Deputy Commissioner for data on meat, milk and eggs
5. Deputy Commissioner for data on Ghee, pulses, etc.
6. Agriculture Department for data on seeds, fertilizers and pesticides
7. Agriculture Department for data on standing crops
8. Market Committees for data of Market Stocks

2.4.4: Khyber Pakhtunkhwa

1. District Magistrate and District Commissioner for the price data
2. District Food Controller and District Commissioner for wheat stock and wheat flour data
3. Agriculture Department for data on standing crop, seed and fertilizers
4. District Magistrate and District Commissioner for data on eggs, milk and meat
5. Assistant Food Department and District Commissioner for traders and mundis data
6. District food controller for Market Stock Data

2.5: Salient Features of Data Portal

1. **Data visualization** of essential food items at district level, provincial level and federal level. The evidence-based data visualization would inform us where a commodity is short in supply, where it is surplus, and where it is about to finish.
2. **Indicators** of surplus, sufficient, and deficit stocks: “Color coding of maps would reflect surplus, sufficient and deficit” like Green colour will represent stocks present in surplus, Red will represent shortage of stocks and or supply and
similarly Yellow will show that the stocks are just sufficient there. This would lead to ensure that a commodity remains available in each district (by arranging for transportation from surplus districts to deficit districts, or from buffer stocks to deficit district).

3. **Visualization** of storage capacity in private and public sector will help in keeping abreast of change of stock positions at district level as well as provincial level. This will ensure smooth and functional food supply chain.

Central Data Facility’s online platform will provide vast information regarding food supply chain and indicators identified above. It was agreed during internal meeting that based on consultations, the central data facility should maintain province and district-wise data so that anyone can see the ongoing positions of stocks and imports. This online system must show the data regarding all essentials commodities of household like flour, sugar, rice, chicken, vegetables, etc. Each food and nutrition data must be maintained on this platform on daily basis. This data will help a lot in policy making and open new doors of ease for policy makers. In this era of technology, it is the need of hour to have such an online database system of essential goods to facilitate markets and forecast the appropriate results.

Through consultation, it is determined that an online database must be formed as per requirement of the society. First, there must be different options to select for looking into data, graphs, and tables. There must be bar on home page of database so that the user can select province, district, categoric groups and name of product. There must be an open choice for selection of dates so that the user can view data of any date. A map of Pakistan will be displayed on the home page containing different colours based on stocks’ conditions of districts. A price trend will also be displayed on the home page with table.

Second, there will be a part of stocks in which detail of stocks will be entered. These details will carry annual, monthly, weekly and daily stocks of all districts. It
will display stocks for wheat, rice, and sugar. Same as first page, there will be a map for the presentation of stocks position with different colours. Green colour will show surplus stocks, Red color for shortage of stocks and yellow will indicates that stocks are near or equal to demand and there will be chances for shortage. Table will display details of district containing values of Production, Imports, Domestic retention, Data of processing mills input inventory, and Stocks remained at warehouses. There will be an option for download of datasheets.

Third, is the part of analysis on online database system. It will provide detailed analyses of data, in this analysis, many types of graphs will be displayed. Based on data, trends will be formed and in data part, datasheets will be available for download.

Fourth, a detailed summary of data will be displayed in which production from farm to final bag of flour will be displayed. In this section loss of wheat or flour at different levels like mills input and out level, etc. can also be determined. “Domestic Retention” will be calculated, and “Stocks Remained at Mills” will also be displayed.

This database will help take preventive measures even it will boost the food market and with the help of this data, price stability will be possible as it is recommended that this portion of the portal should be open platform for all. By having a vast data of food, it will minimize the monopolistic competition and promote perfect competition in food market and will be a win-win situation. This database will close the doors for black marketing of essential goods. It will show the data of remaining stocks by which possibility of loss of stocks minimized.

Online database will help in tax collection. It will provide right information regarding production and will increase tax collection. As “production database” will be updated on daily basis, so manipulating the data will not be an easy option. By saving our production from loss, we can save the hard work of our farmer, which will ultimately give him confidence.
Section 3: Development Plan of Central Data Facility

3.1: General Features

3.1.1 Custom Responsive Design
Custom Responsive design is a graphical User Interface (GUI) design approach used to create content that adjusts smoothly to various screen sizes. Designers size elements in relative units (%) and apply media queries, so that their designs can automatically adapt to the browser space to ensure content consistency across devices.\(^5\)

3.1.2 Custom Programming
Custom programming is the action or process of writing a computer program to meet a given need. The need may be simple or complex. Adding a feature to an existing program may be the solution. You may need a new application created. When off-the-shelf solutions fall short, custom programming can fill the gap.\(^6\)

3.2: Modules
Modules are common website components that are used like building blocks to create pages. Each module is a collection of "generic" elements — images, text, buttons, etc. Many modules are combined to build a page. This breaks complex problems into smaller components that are easier to understand, communicate and build.\(^7\)

3.2.1: Admin Module (Features)
The System Admin will be able to control all the functions of the Interactive Dashboard System. The main module for Admin user is:

1. Administrative Control Panel/Dashboard

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\(^5\) [https://www.interaction-design.org/literature/topics/responsive-design](https://www.interaction-design.org/literature/topics/responsive-design)
\(^6\) [https://eniture.com/custom-programming/](https://eniture.com/custom-programming/)
\(^7\) [https://www.knucklepuckmedia.com/blog/why-you-should-adopt-website-modules/](https://www.knucklepuckmedia.com/blog/why-you-should-adopt-website-modules/)
2. System Setting – Crops Management, Crops Flow Management (from production to consumption), Local Agents,
3. Mills/Industries Management, Org Details, Default Email, Contact Information etc.
4. Data Attributes Inputs (as per given Details)
5. Stakeholder Management
6. Users Management with Roles
7. Master Reporting Module

3.2.2: Special Modules

1. Data Entry (Addition, Upgradation, Deletion)
2. Reports Preparation based on DATA entered, RBMLs
3. Reports Exports to Excel, CSVs and PDFs
4. Custom Dashboard (as per User Role)
5. Graphical Views on Dashboard
6. Widgets for Partner Website – to show the real-time data on their websites

Section 4: Limitations

The desired Central Data Facility will be developed, but it will have some limitations in it as well. The biggest challenge will be the availability of internet at district and Tehsil level offices. As data will be collected at Tehsil level and shared to districts. At district level, Data will be entered into the portal on daily basis as well as at different frequencies of time. For this data entry purpose, the district office must bear a good internet connection for timely data updating. Similarly, at provincial and federal level to run the analysis, comparisons and projections, they should also need a good package of internet.

Another limitation of this central data facility will be the time bar to enter the data; the district offices will have 24 hours to update the daily data; in these 24 hours they can edit it, delete it, and reenter this data but after 24 hours, they will not be able to make any changes in the last day data, as it is an error check as well as
a performance check on the data entry, which will ensure that no data fudging took place.

Another limitation of the portal is the limited selection at analysis level to let graphs and projections perform logically and in a certain design. The central data facility will be bound to allow selections of maximum 4 variables. It can be four provinces, two provinces and two districts, one province, two districts and two indicators, it can be one province, one district and two indicators and two timelines and so on. It will allow portal to draw a visible and easily comprehensible graphs and analysis.

The final and very important limitation of the portal is its development which will be done in different phases. It requires at least one year of development for a final product free of bugs and errors.

**Section 5: Recommendations**

The major suggestions the stakeholder consultations regarding the dashboard were that depending upon the resources for this Food Security Portal, this portal can be improved further in future by adding data of more essential commodities related to agriculture. Moreover, data regarding livestock and fisheries can also be added. Furthermore, the data of other staple crops as rice and maize will also be included. The current price data can be elaborated further by adding wholesaler price, ex-mill prices and retailer prices. This dashboard can be helpful in the future and may be converted into a big data portal. Another future development can be to add the supply chain of byproducts of the crops like sugar, fruits, etc.
Section 6: References


4. Foundation, I. d. (IBDI). What is responsive design. Interaction design Foundation, IBID.


13. technology, E. (IBDI). What is custom programming. Eniture technology, IBID.


Section 7: Annexures

7.1 Annexure 1: Supply Chain Diagrams

7.1.1: Supply Chain Diagram of Wheat

![Supply Chain Diagram of Wheat](image-url)
7.1.2: Supply Chain Diagram of Sugar

Producers

- Desi Sugar, Shakkar
  And Gur Formation

Sugar Mill
- Purchase Centre

Sugar Mills

Sugar
- Wholesalers
  - Retailers

Bye Products
- Paper Mills
- Utility Stores
- Confectioners

Consumers
7.1.3: Supply Chain Diagram of Rice

- Producers
  - Local Traders /Commission Agents
  - Procurement Centre
  - Local Consumer

- Rice Mills
  - Export
  - Wholesalers
    - Retailers
      - Consumers
  - Industrial Uses
### 7.2 Annexure 2: List of Stakeholders

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<td>Finance</td>
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<td>Crop Reporting</td>
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<td>Food</td>
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<td>Industries</td>
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7.3 Annexure 3: Finalized Input Sheets for Food Security Portal

Two Sheets were finalized after consultations with Provinces to input data in the Food Security Portal.

Sheet 1: To be updated daily of Daily Consumption, Stock Positions and Daily Market Price

Sheet 2: To be updated weekly of Wheat and Sugar Supply Chain
7.4 Annexure 4: Demo Screenshots for Food Security Portal