



Food and Agriculture  
Organization of the  
United Nations



T.C. TARIM VE  
ORMAN BAKANLIĞI

# SUPPORTING THE DEVELOPMENT OF NATIONAL E-AGRICULTURE STRATEGY

## PROJECT INCEPTION WORKSHOP REPORT (November 4-6, 2019) ANKARA





**Project Coordinator**  
**Hakan SAÇTI**

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**Consultants**

**Prof. Dr. İlkay DELLAL**

**Gerard SYLVESTER**

## Introduction

As the world advances into a digital age day by day, there is a digital transformation going on in many sectors, including the agricultural sector. As it is so in many countries, keeping up with this transformation and ensuring the integration of digital technologies into agriculture are amongst the top priorities of Turkey. Consequently, the year 2020 is defined to be the year for going digital in agriculture, adding momentum to the ongoing activities within this scope.

The advances in information and communication technologies, the increasing area of use of artificial intelligence in agriculture, internet of things, GPS, the integration of image processing technologies into agriculture, along with the development of precision agriculture technologies and the advances in smart agricultural practices that enter into our lives with Industry 4.0 drive countries in developing policies in these areas and take action. Thus, Turkey, the country with biggest agricultural production in Europe and seventh in the world, is also immersed in policy developing process in the area due to the requirements of the age.

Within this scope, a project idea was developed, aiming at preparation of National E-Agriculture Strategy by the Ministry of Agriculture and Forestry of Republic of Turkey and in collaboration with the Food and Agriculture Organization (FAO), the project was given start with the completion date of June 9, 2020. The project has two basic outputs. First is to include all sector stakeholders in the process, and to put forth the short, medium- and long-term steps that Turkey has to take in e-Agriculture through workshops; and the second is to identify the perceptions and the expectations of the farmers on e-agriculture.

Within the scope of the Project, an initial workshop which all sector stakeholders attended was organized between November 4-6, 2019. On the first day of the workshop, 104 persons participated as panelists and participants from public sector, private sector, non-governmental organizations and universities, and a panel to put forth the current situation in Turkey was organized under three headings. On the second and third day, the workshop for the project was realized with the formed Working Group and a roadmap was provided.





In the Inception Workshop held at Atatürk Conference Hall of the Ministry of Agriculture and Forestry, Ankara, esteemed Viorel Gutu, Subregional Coordinator for Central Asia and FAO Representative in Turkey, Mr. Özkan KAYACAN, Director General of Agricultural Researches and Policies (TAGEM) and Ms. Sophie TREINEN, Information and Knowledge Management Officer, (FAO Regional Office for Europe and Central Asia) made a speech.



Underlining that the definition behind the word e-agriculture is so hard to attain, Mr. Gutu noted that everybody knows very well what the computers, software or internet infrastructure does, yet all these technologies have to be adapted to the daily life. Mr. Gutu also talked about the benefits of the national strategy to be formed under the project to the agriculture sector.

Stating that the issues, primarily the climate change in recent years and others such as increasing population, shrinking agricultural areas and decreasing amount of available water supply, aging agricultural population and migration are bringing with them some future bottle-necks, Mr. Kayacan said that they are aware of the fact that the sustainable increase in production and productivity can only be attained through integrating advanced technology into agriculture sector



Ms. Treinen said we are looking to answer the following questions while checking digital technologies in the rural area. She also said that these questions are important points to be addressed in the development of the national e-agricultural strategy.

- Are digital technologies available, accessible, and cost-effective to their needs?
- Is it possible to make the technologies used by large farmers available to small farmers?
- The users have the ability to control and use these technologies?

## Panels Organized within the Scope of the Workshop Program:

- **Panel 1: e-Agriculture in Public Sphere**

Within this scope, the use of information and communication technologies in the relations between public institutions and farmers were discussed. The subjects assessed were: the agricultural information systems, especially e-government applications, Geographic Information Systems and Digitalization activities, along with e-Agricultural practices in strengthening the bonds among the researcher-extensionist-farmer and the role of the information and communication technologies in the meteorological early warning.

- **Panel 2: e-Agriculture Practices in Private Sector and Cooperatives**

Within the scope of the Panel, especially the information and communication technologies in agriculture and the role of the GSM operators were discussed. Another heading was the e-Commerce application as a new approach in agricultural marketing. The use of digital technologies in the relations of cooperatives with their members in Turkey was also assessed under the agenda of this panel. Finally, the use of smart agricultural practices in Turkey and the domestic and national initiatives in this area were elaborated in the panel.

- **Panel 3: R&D and e-Agriculture**

In the panel that discussed R&D and innovation in e-Agriculture, the research on animal production, plant production and fisheries and aquaculture and the processes in which these researches are transferred to practice were evaluated.

## PANEL 1: Digitalization in Public Sphere



### PANEL HEADINGS

- **e-Government and Agriculture**
- **Geographic Information Systems and Digitalization**
- **Agricultural Information Systems**
- **Digitalization in Strengthening the Bonds among the Researcher-Extensionist-Farmer**
- **Meteorological Early Warning Systems**



## Moderator



Prof. Dr. İlkey DELLAL  
Ankara University

## Our Panelists



Serpil ERYİĞİT  
Department of Information  
Technologies, Software  
Development Group  
Supervisor



Murat ÖZTÜRK  
Directorate General of Agricultural  
Reform, Agricultural Information  
System, Coordination & Budget  
Working Group Supervisor



Gülşen ÖZTÜRK  
Directorate General of Agricultural  
Reform, Geographic Information  
Systems, Working Group  
Supervisor



Vuslat Mestnaz ÜSTÜN  
Department of Information  
Technologies, Geographical  
Information Systems, Working  
Group Supervisor



Dr. Yüksel NADAROĞLU  
Directorate General of  
Meteorology, Acting Chief of  
Agricultural Meteorology  
Department



Yusuf ÇAKICI  
Agricultural Engineer, MSc,  
Department of Training  
and Publication

The first panel of the workshop was chaired by Prof. Dr. İlkey DELLAL, Teaching Fellow at Agricultural Economy Department of Faculty of Agriculture in Ankara University. Prof. DELLAL cited the advances regarding the agricultural sector in the field of digitalization, primarily e-government, one of the most important practices in digitalization in the public sphere.

Ms. Serpil Eryiğit, Software Development Coordinator at Department of Information Technologies of Ministry of Agriculture and Forestry, stated that the Ministry has so many services within the electronic public investments system within the scope of e-government services and they are numbered around 2600. She also noted that all of these activities are registered within the KAYSİS system under the coordination of Digital Transformation Office of the Presidency of Republic of Turkey and almost 860 of the services within this scope are present in the electronic medium. In addition, Ms. Eryiğit stated that the goal of these services is to ensure that citizens, private sector and public sector access the services of the Ministry and perform their procedures more rapidly.

Stating that as Ministry, they have integrated many services into the e-government, Ms. Eryiğit expressed another one of their goals as to simplify the documents required in processes and procedures and to minimize the number of documents. She underlined the importance of allowing citizens to receive the required documents in their systems through QR Code and barcode systems without requesting documents repeatedly and stated that they have begun the necessary preparations for the protocol within this scope.

Ms. Eryiğit also informed the participants that the personnel are provided with awareness-raising trainings in the subjects of information security, technologies and artificial intelligence etc. within the framework of institutional transformation and that they are forming common data centers to reach the goal of providing information from a single point. Also delving on the studies to unify the information systems, Ms. Eryiğit stated that there are ongoing works to roll out the inventory of different information systems within the Ministry and to form a common data center. Ms. Eryiğit underlined that the data can flow from a single point uninterruptedly and that there are currently infrastructure studies for this purpose.

Mr. Murat Öztürk, Directorate General of Agricultural Reform, Agricultural Information System, Coordination & Budget Working Group Supervisor, provided information on another issue addressed within the scope of the panel, i.e. Agricultural Monitoring and Information System (TARBİL) and stated that there are approximately fifty modules in the issues of animal and plant production. He also stated that cattle and ovine identified through TÜRKVET system and records of their breed, sex, date of birth, mobility records, business and business owner information are kept in the system, and there are also e-prescription, vaccination and drug tracking systems, and supports are managed through TARBİL.

Stating that the Farmer Registry System keeps the records of natural and legal persons' plant production activities, that there is a system that tracks and keeps the statistics of the support plant production and through this system, parcel, product, season, production type can be reported, Mr. Öztürk added that almost two million and one hundred and fifty businesses are registered in this system. Also, Mr. Öztürk talked about other systems such as fertilization tracking system, feed registry system, certified seed system, plant health and quarantine tracking system, organic agriculture and best agricultural practices, and that with the realization of these systems, data will be provided to Integrated Administration and Control System as well.

It is also stated that the farmers can access data especially on the land and animal information regarding their land and their agricultural activities, and that the e-Farmer Application that will allow real-time notifications for the farmers and Ministry units is in development.



Mentioning also the implementation process of the TARBİL Project, Mr. Öztürk stated that the first move towards digitalization goes back to 2008, and in addition there are 440 stations within the scope of TARBİL, and through the sensors at the stations, they can perform phenological observations and identify diseases using soil humidity, humidity at leaf surfaces and etc. data.

In another heading, studies in agricultural sector regarding the subject of Geographic Information Systems were discussed. Ms. Gülşen ÖZTÜRK, Geographic Information System of Directorate General of Agricultural Reform Working Group Supervisor, stated that GIS studies began in 2001, with the transfer of land maps to the digital medium. Ms. Öztürk also said that rural infrastructure maps are transferred to the digital medium within this scope.

Delving on the studies on the planted tree count, Ms. Öztürk said that olive trees in Manisa province are counted with 99% accuracy. Stating that they are using images of high spatial resolution within this scope, Ms. Öztürk noted that they have begun digitizing the grape, fig and vineyard areas within the Aegean region. Along with these, Ms. Öztürk mentioned the joint studies conducted with other public organizations; for example, they have cooperated with Gendarmerie General Command in cannabis plantation using satellite imagery and received good results.

Underlining that Land Parcel Identification System (LPIS) works have begun, Ms. Öztürk stated that the project for digitalizing agricultural parcels to provide right amount of support to the right persons at the right land has been initiated, and that the goal is to digitize the actual agricultural areas by GIS techniques and up to date satellite images using the land registry and cadaster data within this scope.

In the panel, Ms. Vuslat Mestinaz ÜSTÜN, Working Group Supervisor, shared the studies done on Geographical Information Systems under the coordination of Department of Information Technologies. Ms. ÜSTÜN talked about especially the GIS coordination works within the scope of the digital transformation studies. She expressed that they are seeking data sharing possibilities to identify which unit produces which data and to prevent duplicate data.

Indicating that they have developed CORINE-2018 project within the body of the Department of Information Technologies, Ms. ÜSTÜN stated that the goal of the project is to be able to manage the same basic data in order to form a standard database aimed at specifying the ecological changes in the land in all member countries of European Environment Agency (EEA) in accordance with the classification criteria defined by EEA, managing natural resources rationally, creating policies regarding environment. Noting that the data acquired within the scope of the Project is the only area data that shows both the land cover classification encompassing Turkey and all of the changes in the land cover in six years' period, Ms. Üstün stated that it has been identified that the data is 93.45% correct in the accuracy measurements performed by TurkStat over 2012 data.

Stating that within the scope of Turkey National Geographic Information System (TUCBS), there are 162 data layers, Ms. Üstün said that as of now, 95 of these have been shared with Ministry of Environment and Urbanization as shared web services. Stating that except for the restricted data that are not suitable for sharing, Ms. ÜSTÜN said that this exchange will continue, and as Ministry that administrates the whole Turkey area, they have produced so many location data and made them available to the use of institutions.

In another issue handled under the heading of digitalization in the public sphere, it was indicated that e-Agricultural practices have a certain role to play on strengthening the bonds among the researcher-extensionist-farmer. Within this scope, Mr. Yusuf ÇAKICI, from the Department of Training and Publication of the Ministry of Agriculture and Forestry informed the participants on the current situation and future studies. Mr. Çakıcı talked about the agricultural innovation and information sharing system on electronic medium and expressed that they desired to disclose the innovations developed in this system through the internet via e-mail to the technical personnel of the Ministry.

Mentioning the project on strengthening agricultural extension and advisory services implemented in collaboration with FAO, Mr. Çakıcı stated that they have reached the end of the works for national extension strategy created within this scope. Also, he added that under the same project, they have reached the final stage in the works performed for the establishment of an extension information network through internet.

Pointing that they have works aimed at expanding the marketing of the products produced at handiworks training centers through e-commerce, Mr. Çakıcı stated that in order to rapidly resolve the issues of the farmers, they receive complaints and suggestions through the agricultural communication center system formed. Showing briefing videos particular to the subject regarding the services offered by Tarım (Agriculture) TV and future internet services and indicating that they plan to realize agricultural expert television services, Mr. Çakıcı finally expressed their plans to implement a digital agriculture library within 2020.

In the final section of the panel on the meteorological digital early warning systems, Dr. Yüksel NADAROĞLU, Acting Chief of Agricultural Meteorology Department of Directorate General of Meteorology, talked about the efforts spend in the agricultural meteorology field in Turkey. Dr. Nadaroğlu said that there are many programs to know meteorological parameters in vast areas and to perform agricultural production that fits these parameters, primarily within the framework of agriculture and meteorology. Conveying that the foremost among those are the forecasting of frost and agricultural frost warning systems (plant-based and phenology based) in Turkey, Dr. Nadaroğlu mentioned that there are also drought analysis mapping and monitoring systems for all provinces and districts. Mentioning the existence of agricultural crop yield prediction program, heat-humidity index calculation program and vernalization requirements in plants program, Dr. Nadaroğlu stated that the most important issue is to reach the farmer and to enable them to take timely precautions. Within this scope, underlining the mobile application implemented in cooperation with the Turkey Chambers of Agriculture, Dr. Nadaroğlu explained in detail how the application is used and what it offers to the farmers.

## PANEL 2: e-Agriculture in Private Sector and Cooperatives



### PANEL HEADINGS

- **The Role of Information and Communication and GSM Operators in Agriculture**
- **Smart Agricultural Practices**
- **Agricultural e-Commerce**
- **Cooperatives and e-Agriculture**

## Moderator



Prof. Dr. Ufuk TÜRKER  
Ankara University

## Our Panelists



Ali BOYACILAR  
(Director of Public Sales)  
TURKCELL



Özgehan ÖZEN  
(Director General)  
GEOSYS



Fahrettin AKSAKAL  
(Director General)  
Baharsun Enerji Tarım  
Hayvancılık İnş. San./ Tic. A.Ş.



Mehmet Kemal DEMİRCİ  
(Director of  
Administrative Services)  
NURİBEY FARM



Erkan DİLAVEROĞLU  
(Deputy Director  
General)  
TARNET



In the second panel of the Workshop, the representatives of private sector and cooperative representatives delivered speeches and the panel was chaired by Associate Professor Dr. Ufuk TÜRKER, teaching fellow at the Agricultural Machinery and Technologies Engineering of Faculty of Agriculture in Ankara University. Focusing on the information and communication technologies used in agriculture in Turkey and the current situation of the activities conducted within the scope of smart agriculture, the participants were informed on the problems of the sector and the relevant studies in agricultural area through presentations given by the institutions and organizations that produce products and services in this field. The related stakeholders were brought together for exchanging ideas and they made predictions regarding the upcoming stages of the project making use of the data acquired in the workshop.

The second panel under the heading of e-Agriculture in private sector and cooperatives was opened with the oral presentation of Mr. Ali BOYACILAR, Public Sales Director of Turkcell, under the title “The Role of Information and Communication and GSM Operators in Agriculture.” Mr. Boyacılar who mentioned the agricultural applications such as Turkcell Filiz, agriculture’s doctor, farmer’s doctor, farmer’s world and village weather forecast in his presentation, provided information regarding the services they offer to the farmers in these areas and the works implemented. Delving on the Turkcell Filiz Application as an example, he stated that they provide support to the farmers with their teams formed of 15 expert agricultural engineers. He also stated that they have data regarding the land size of these farmers they provide services to and in general, they could group the agricultural businesses on the basis of scale (big, medium and small). Also, stating that they especially provide technical support to certain product groups, Mr. Boyacılar said that they plan to open the Turkey’s biggest data center to serve the public sector. Finally, touching upon the global trends in GSM based applications, he underlined the importance of following the worldwide advances.

From a general perspective, the services provided as part of smart agriculture by telecommunication companies began to spread in Turkey as they have around the globe, and within this scope, information and communication technologies have had an important role in agricultural sector. Today, many institutions and organizations provide services to businesses that manufacture agricultural products using these technologies and produce data on the sector through advanced network systems. In terms of storing and securing data in Turkey, the importance given to Big Data, cloud systems and cyber security systems and the advances in these areas gained significant momentum and important steps are being taken in raising awareness with regards to information and communication technologies.

The second presentation of the Workshop was realized by Mr. Özgehan ÖZEN, Director General of GEOSYS on “Smart Agricultural Practices (Precision Agriculture)”. In his speech, he mentioned a brief history and the current activities of the GEOSYS Geographic Information Systems and Advisory Services, and within the scope of precision agriculture, he provided information on the studies and the developments regarding the use of advanced technologies such as Internet of Things (IoT), Big Data, Artificial Intelligence and 5G. The issues attached importance were: cost reduction achieved by input savings through the data acquired by precision agriculture, along with product productivity increase through data acquisition during harvest, productivity mapping and monitoring systems; sustainability; and food security. Finally, Mr. Özen

provided examples from the project (e.g. variable rate fertilization, irrigation and disinfection practices implemented in partnership with TAGEM since 2011), and mentioned the sectoral problems stated below and the global trends in this scope:

- The inadequate infrastructure data, being impractical and not shared with private sector
- The challenges the farmers face from the aspects of use and cost since the current technologies are of foreign origin
- The need for raising awareness in farmers
- The antiquatedness of the existing agricultural machine park
- Domestic and native precision agriculture products not receiving state supports and the challenges of small farmers in accessing these products
- Non-existence of soil sample database and the laboratories not being connected to a central information system

The third presentation of the workshop was delivered by Mr. Fahrettin AKSAKAL, Director General of Baharsun Enerji Tarım Hayvancılık İnşaat San. ve Tic. A.Ş. on smart agricultural practices (drone, sensor, artificial intelligence applications etc.) they employ with the producers' perspective. Stating that the average parcel size where they do production is 6.6 decares and this area was previously processed in 803 different fields belonging to 352 people, but now, it is processed as a single piece, Mr. Aksakal added that they are taking steps towards exemplary works in the use of technology in the production processes in orchards. While they use technological systems such as "Personnel Attendance Control System (PACS) with Facial Recognition System" "Radio Frequency (RF) Irrigation System", "Meteorological Stations" and "Frost Shield", they also acquire data through barcoding trees and using drones, and thereby, the production is kept under control. He also stated that they employ 600 persons in a land with the size of 5 thousand decare, and that the working conditions of the workers are constantly monitored. Also, all data received through the technology in use (labor inputs, electricity and fertilizer costs, etc. and other inputs) are collected in a single monitor, allowing for cost tracking (product kilogram costs) taking cost items separately into consideration.

Along with all these activities, Mr. Aksakal provided information to the participants regarding issues such as retaining youth in agriculture, migration from village to cities and the use of technology at scale size. Highlighting the training on how to tend the soil, Mr. Aksakal touched upon the attitude of the village people regarding big cities and moving to cities causing migration, and he underlined the importance of spreading visuals that show the life in villages is also beautiful, through cooperation with public channels or through other means, via television shows or public service advertisements. Also, upon the question as to the response of people to the use of technology, Mr. Aksakal said that technology facilitates people's lives and within this scope, there are no problems in adopting technologies, and that technology creates mutual benefits.

Following this presentation, Mr. Mehmet Kemal DEMİRCİ, Director of Administrative Services at Nuribey Farm, delivered a presentation on "e-Commerce" in agricultural sector. Mr. Demirci provided information regarding the process in which fresh fruits and some agricultural products with increased added value are sold through e-Commerce. Highlighting that agricultural e-Commerce is the only and the most productive form of sales that ensures that the product directly reaches the consumer right after it is harvested, Mr. Demirci informed the participants on the pros

and cons of the sector. Mr. Demirci delved on some issues such as the fact that fresh, organic and natural products are more easily marketable by the sector, that the products can reach to people living in different cities, and the process allows for the removal of the middle-men, and along with these positive sides, there are negative sides such as the existence of many sales channels managed by non-professional people, disinformation and confusion in terms of e-Commerce and the infrastructure problems. Finally, he stated that using social media is important within the scope of e-Commerce, and that by providing information on the product and the related production content through social media, and supporting these through advertisements, the future sales are influenced.

In addition, Mr. Demirci talked about their future plans regarding forming a system that allows for people to have a picnic in a garden and gather their fruits as a social activity and later, pay for the products they have gathered, per kilogram.

The final presentation of the second panel of the Workshop was delivered by Mr. Erkan DİLAVEROĞLU, Deputy Director General of TARNET on “e-Agricultural Practices.” In his presentation, Mr. Dilaveroğlu informed the participants about their corporate activities and about the projects jointly implemented by the Agricultural Credit Cooperatives of Turkey (TKK), and later he mentioned how the document load in TKK operations are removed through information technologies, how the communication with the partners are optimized with “Partner Card Project” and thereby unnecessary paper use is avoided, and that they are developing a mobile application with the project of “Partner Information System (ORBİS)” to ensure Agriculture Credit services reach the partners. Also, delving on the issues regarding the effective use of agricultural inputs, he underlined the importance of productivity increase within this scope, defining the needs of the farmers, attracting the youth towards agriculture, ensuring small farmers benefit from technology through cooperatives and the use of mobile applications. In following, Mr. Dilaveroğlu stated that TARNET offers services to the producer via information technologies. He also talked about the issues arising out of the average age of the farmers, an issue common to the world and Turkey, and also the issues in cost of the products and raw materials obtained abroad. Finally, he stated that they are implementing works to develop a “Mobile Game” on farming, and highlighted that through similar activities, awareness can be raised, which is a priority.

## PANEL 3: R&D and e-Agriculture



### PANEL HEADINGS

- R&D and Innovation Trends in Private Sector
- R&D Studies towards e-Agriculture in Plant Production
- R&D Studies towards e-Agriculture in Animal Production
- R&D Studies towards e-Agriculture in Fisheries and Aquaculture



## Moderator



Dr. Bülent SÖNMEZ  
Department Head of  
Soil and Water  
Resources Research

## Our Panelists



Selami İLERİ  
Secretary General of  
TARMAKBİR



Muharrem AKSUNGUR  
Department of Livestock  
and Aquaculture  
Research, TAGEM



Dr. Murat Güven TUGAÇ  
Field Crops Central  
Research Institute



Başat TÖMEK  
TETA Teknik Ltd. Şti.,  
Technical Coordinator



Prof. Dr. Bahattin AKDEMİR  
Namık Kemal University

The third panel of the workshop was chaired by Dr. Bülent Sönmez, Department Head of Soil and Water Resources Research.

Mr. Selami İLERİ, Secretary General of TARMAKBİR delivered a presentation on the R&D and Innovation Trends in Private Sector. In his presentation, he expressed that when a future reduction in food supply and the expected high increase in the prices of food products are considered, the only viable solution predicted under these negative conditions is to ensure a more productive agricultural production, and that this will be possible through the use of cutting-edge agricultural machinery and technologies supported by biological innovation. Mentioning the importance of data gathering and evaluation in Digital Agricultural Studies, Mr. İleri stated that in private sector the focus is on:

- Automated steering systems
- Drone technology used for the purposes of crop monitoring, soil moisture sensor and disinfection
- Variable rate fertilization and disinfection application technologies
- Smart irrigation
- Farm management animal tracking
- R&D studies such as Telematic Services,

and that there are ongoing crop development center studies towards digital agriculture.

Within the scope of the panel, there were discussions on the issue of market with highlights on the importance of a mechanism that will bring together the local technology providers and technology user companies. The panel also touched upon the need for supports and grants provided by the state to the produced smart agricultural technologies and for support plans in short, medium and long terms.

In the second part of the panel, Prof. Dr. Bahattin AKDEMİR, from Namık Kemal University, delivered a presentation on “Smart Agriculture Applications in Plant Production.” Prof. Dr. Akdemir informed the participants about the definition of Smart Agriculture and its advantages and provided examples on Smart Agriculture Applications in Turkey as well as abroad. Some of the suggestions in Prof. Akdemir’s presentation on the future of R&D studies are as follows:

- Pilot agriculture projects for a 6-year term must be developed for vegetable farming, fruit farming, cultivation of field crops and husbandry in which Public/University/NGO/Private Sector also participates, the economic yield of precision agriculture and its environmental protection impact must be identified and demonstrated to the farmer, private sector and the consumers with concrete evidence.
- The monitoring of food must be ensured and the secure food production by the farmers and the private sector must be recorded.
- It is of importance that produced technologies must reach the farmer level and that the small-scale enterprises are included in the use of technology. The strategy how smart agriculture is applied at farmer level must be identified.
- Research, production and use of systems regarding precision/smart agriculture must be supported.

The 3rd presentation was delivered by Mr. Başat Tömek, Technical Coordinator of Teta Teknik Ltd. Şti under the title of “R&D Studies towards e-Agriculture in Animal Production”. In his presentation, Mr. TÖMEK informed the participants on the technologies that increase animal

welfare and observe sustainability. Some of the suggestions in the delivered presentation on the studies that need to be done in the animal production are as follows:

- There is lack in specialization, and the farmer's needs must be identified, decision-making tools must be presented through individual animal tracking.
- As in the leaky bucket theory, the losses must be identified (whether it be in herd planning, number of eggs, feed, welfare, labor or health) and must be eliminated.
- The possible gains from health and management costs through correct and precision management system must be revealed.

In the fourth presentation delivered by Dr. Murat Güven TUĞAÇ, Department Head of the Geographic Information Systems of the Field Crops Central Research Institute, the participants were informed about the fundamental research on the Geographic Information Systems and Remote-Sensing Technologies. Dr. Tuğaç stated that they closely follow the rapidly developing information technologies and provide institutional contributions to agricultural sector in Turkey.

Below are some of the projects implemented by their research unit:

- Project on the Potential Conformity Areas of Agricultural Ecological Regions and Products in Turkey
- Forming a Crop Information System in Wheat Production for the Sustainability of Food Security
- Prediction of Wheat Productivity during Various Irrigation and Sowing Times, Using AquaCrop Model under the Central Anatolian Region Conditions
- Identifying and Mapping Areas Sensitive to Drought in Central Anatolian Region
- Project on Identifying Pasture Presence and Pasture Status Classes
- National Crop Monitoring and Productivity Prediction Project

Noting that with the Crop Productivity Prediction and Monitoring Project, the development, sowing areas and productivity of crops that have economic importance can be monitored and predicted throughout the farming season and that is important for agricultural planning, Dr. Tuğaç stated that they can identify the crop productivity a few months before the harvest. He stated that for this purpose, National Crop Monitoring and Production Prediction Project began in 2016 and was widespread for developing monitoring and productivity prediction models using agricultural meteorological models and remote-sensing methods for wheat, sunflower and corn. He also expressed that with this study, the productivity predictions made before the harvest will provide contributions to the agricultural policy and planning.

The last presentation of the panel was delivered by Mr. Muharrem AKSUNGUR, from the Department of Livestock and Aquaculture Research of Directorate General of Agricultural Research and Policies (TAGEM) with the title "Research and Trends in Digital Technologies in Fisheries and Aquaculture". Within this scope, Mr. Aksungur has stated that they are conducting studies within the scope of:

- Fisheries Management and Technology Program
- Rehabilitation and Production in Aquaculture Program
- Aquatic Genetic Resources Program, and
- Natural Resources and Environment Program

Finally, providing information on the **Implementation of Stock Assessment in Fisheries Activities (IFISH Project)** that is compatible with the previously established system by the Ministry, BAGİS, Mr. Aksungur stated that with this project all developments above and below the water can be instantly monitored.



## Methods Training and Workshop Studies



On November 5, 2019, a workshop was realized with a group of 35 persons with the participation of farmers, representatives of public institutions offering services in the field of agriculture, representatives from the Ministry of Transport, Maritime and Communications, representatives from Digital Transformation Office of the Presidency of Republic of Turkey, a representative from the Directorate General of Meteorology, a representative from Chambers of Agriculture, representatives from Development Agencies as well as representatives from universities and research agencies.

First of all, Mr. Gerard SYLVESTAR, the technical consultant of the Project, talked about the commonly used methodology in strategy forming and the challenges faced in implementation in different countries. Mr. Sylvester delivered a presentation and informed the participants on what kind of approach must be taken in the upcoming stages.

In this workshop, the existing state of Turkey in the field of agriculture and its policies and plans were shared with the participants by the representatives of the Directorate for Strategy Development of the Ministry of Agriculture and Forestry. Within this scope, main priorities in accordance with the national development plans and strategic plans are as follows:

- Increasing prosperity in rural areas, ensuring stable food supply by increasing productivity and quality in agricultural production
- Ensuring food and feed security from production to consumption, taking precautions to ensure the welfare and health of plants and animals
- Protecting fisheries and aquaculture, ensuring sustainable management
- Ensuring sustainable management of soil and water resources
- Actively fighting against climate change, desertification and erosion
- Protection biodiversity and ensuring sustainable management
- Developing institutional capacity





Mr. Gökhan Tok, the representative of Ministry of Transport, Maritime and Communications informed the participants on the State of Information and Communication Networks in Turkey and Ms. Hilal AR, from the Ministry of Agriculture and Forestry, delivered a presentation on the current state of the information and communication technologies in rural areas. Following the briefs and presentations, sub-working groups were formed and a workshop was conducted taking the country priorities into consideration. Within this scope, 49 priorities and 57 challenges were identified. Challenges and the related Information and Communication Technologies solutions that need to be developed for each challenge will be addressed within the scope of the coming workshop. The working group gathered on November 6, 2019, and made evaluations on the future studies to be performed under the project and defined a roadmap.



## APPENDIX-1

(TCP // 3703 TUR) Project Inception Workshop on “Supporting the Development of National e-Agriculture Strategy”  
Atatürk Conference Hall, Ministry of Agriculture and Forestry  
November 4, 2019 Ankara, TURKEY

09.00-09.30	<b>REGISTRATION</b>
<b>OPENING SPEECHES</b>	
09.30-10.00	<b>Opening Speeches:</b> <b>Mr. Viorel GUTU</b> Subregional Coordinator for Central Asia and FAO Representative in Turkey <b>Mr. Özkan KAYACAN</b> Director General of Agricultural Research and Policies
10.00-10.30	<b>Brief on Project and Workshop:</b> <b>Mr. Hakan SAÇTI</b> Agricultural Engineer, MSc/ National Project Coordinator <b>Ms. Sophie TREINEN</b> , – <i>Information and Knowledge Management Officer, FAO Regional Office for Europe and Central Asia</i>
10.30-10.45	<b>Global Perspective:</b> <b>Mr. Gerard SYLVESTER</b> , Investment Officer (Digital Agriculture), FAO Central Office
10.45-11.00	<b>Coffee Break</b>
<b>Panel I: Digitalization in Public Sphere within the scope of e-Agriculture</b>	
11.00-12.15	<b>Moderator: Prof. Dr. İlkay DELLAL</b> <ul style="list-style-type: none"> <li>e-Government and Agriculture</li> <li>Agricultural Information Systems</li> <li>Geographic Information Systems and Digitalization</li> <li>e-Agricultural Practices in Strengthening the Bonds Among the Researcher-Extensionist-Farmer</li> <li>Digital Meteorological Early Warning Applications</li> </ul>
12.15-12.30	Q&A
12.30-13.30	<b>Lunch Break</b>
<b>Panel II: e-Agricultural Practices in Private Sector and Cooperatives</b>	
13.30-14.45	Moderator: Assoc Prof. <i>Ufuk TÜRKER</i> <ul style="list-style-type: none"> <li>The Role of Information and Communication Technologies and GSM Operators in Agriculture</li> <li>Agricultural e-Commerce</li> <li>Cooperatives and e-Agriculture</li> <li>Smart Agriculture Applications</li> </ul>
14.45-15.00	Q&A
15.00-15.15	<b>Coffee Break</b>
<b>Panel III: e-Agriculture and R&amp;D</b>	
15.15-16.45	Moderator: Dr. Bülent SÖNMEZ <ul style="list-style-type: none"> <li>R&amp;D and Innovation Trends in Private Sector</li> <li>in Animal Production,</li> <li>in Plant Production,</li> <li>R&amp;D Studies and Trends in e-Agriculture in Fisheries and Aquaculture</li> </ul>
16.45 – 17.00	Q&A
17.00 – 17.30	Evaluations on the workshop by the working group and defining the next steps
<b>Closing</b>	

(TCP // 3703 TUR) Project Inception Workshop on “Supporting the Development of  
National e-Agriculture Strategy”  
Atatürk Conference Hall, Ministry of Agriculture and Forestry  
November 5, 2019 Ankara, TURKEY

09.00-09.30	<b>REGISTRATION</b>
09.30-09.45	<b>Opening Speeches</b> <b>Mr. Hakan SAÇTI</b> Agricultural Engineer, MSc/ National Project Coordinator <b>Ms. Sophie TREINEN</b> , – <i>Information and Knowledge Management Officer, FAO Regional Office for Europe and Central Asia</i>
09.45-10.00	Brief on TCP <b>Ms. Sophie TREINEN</b> , – <i>Information and Knowledge Management Officer, FAO Regional Office for Europe and Central Asia</i>
10.00-10.20	Session 1: Developing e-Agriculture Strategy <b>Sn. Gerard SYLVESTER</b> , <i>Investment Officer (Digital Agriculture), FAO Central Office</i>
10.20-10.45	Session 2: State of Agriculture in Turkey: Policies and Plans Representative of the Ministry
10.45-11.00	<b>Coffee Break / Photoshoot</b>
11.00-11.30	Session 3: State of ICT Networks in Turkey and e-government TAGEM/ IT Department
11.30-12.00	Session 4: Evaluation on Agricultural Goals and Outputs
12.00-12.30	Session 5: Identifying Agricultural Priorities and Challenges
12.30-13.30	<b>Lunch Break</b>
14.00-16.00	Session 6: Identifying e-Agriculture Solutions
16.00-16.15	<b>Coffee Break</b>
16.15-17.00	Session 7: Formulating e-Agriculture Vision and Outputs
17.00-17.45	Session 8: Forming e-Agriculture Action Plan Draft
17.45-18.00	<b>Closing and Evaluation</b>

(TCP // 3703 TUR) Project Inception Workshop on “Supporting the Development of  
National e-Agriculture Strategy”  
Atatürk Conference Hall, Ministry of Agriculture and Forestry  
November 6, 2019 Ankara, TURKEY

09.30-10.00	<b>REGISTRATION</b>
10.00-12.00	Defining Roadmap for Future Studies
12.00-12.30	<b>Closing and Evaluation</b>

**APPENDIX-2**  
**PROJECT INCEPTION WORKSHOP ON “SUPPORTING THE DEVELOPMENT OF**  
**NATIONAL E-AGRICULTURE STRATEGY”**  
**PARTICIPANT LIST**  
**(November 4 – 6, 2019)**

	Institution	Name Surname	Title
1	Directorate General of Agricultural Research and Policy	Özkan KAYACAN	Director General
2	Directorate General of Agricultural Reform	Muhsin YAZICI	Deputy Director General
3	Directorate General of Plant Production	Burhan DEMİROK	Deputy Director General
4	Directorate General of Agricultural Research and Policy	Dr. Hasan GEZGİNÇ	Department Head
5	Directorate General of Agricultural Research and Policy	Dr. Bülent SÖNMEZ	Department Head
6	Directorate General of Husbandry	Adem BÖLÜKBAŞI	Department Head
7	Directorate General of Fisheries and Aquaculture	Hüseyin AKBAŞ	Department Head
8	Department of Training and Publication	Aysel ASIL	Acting Department Head
9	Department of Information Technologies	Tansu EROL	Department Head
10	Directorate General of Food and Control	Yalçın OCAK	Coordinator
11	Directorate General of Agricultural Research and Policy	Mustafa GEZİCİ	Coordinator
12		Hakan SAÇTI	Engineer
13		Hilal AR	Engineer
14		Melek AKAY	Engineer
15		Esra AKÇELİK	Engineer
16		Arzu ÖNDER	Engineer
17		Ruken YILDIRIM	Engineer
18		Muharrem AKSUNGUR	Engineer
19		İsmail ARAS	Engineer
20		Deniz ALTUN	Engineer
21		Ödül BEĞEN	Engineer
22		Önder SÖZEN	Veterinarian
23		Derya ÜNAL	Engineer
24		Şahin ÇAKIR	Veterinarian
25		Handan ERKAN ŞAHİN	Engineer
26		Assoc. Prof. Dr. İrfan DAŞKIRAN	Engineer
27		Dr. Berrin TAŞKAYA ERDEM	Engineer
28		Dr. İlkem DEMİRKESEN MERT	Food Engineer
29	Dr. Erkan TAÇBAŞ	Veterinarian	
30	Directorate for Strategy Development	Atike BERKET ALTEKİN	Engineer
31		Pınar AVŞAR	Veterinarian
32		M. Zeki GÜVEN	Department Chief
33		Ziya Erdem BİNAT	Expert
34		Deniz DÖNMEZ	Engineer
35		Vijdan KURNAZ	Engineer
36	Directorate General of Agricultural Reform	Serkan IŞIK	Coordinator
37		Ömer ÖZEL	Engineer
38		Ayhan DEMİRCİ	Technician



39		Sebahattin KESKİN	Engineer
40		Dr. Ali BERK	Engineer
41		Murat ÖZTÜRK	Coordinator
42		Gülşen ÖZTÜRK	Coordinator
43	Directorate General of Plant Production	Tuğkan TAŞ	Physics Engineer
44	Directorate General of Husbandry	Bilgehan ÖZEN	Engineer
45	Directorate General of Fisheries and Aquaculture	Murat TOPLU	Coordinator
46		Burak ÖZERCAN	Engineer
47	Department of Training and Publication	Yusuf ÇAKICI	Engineer
48		Ebrahim Tuncay KESKİN	Veterinarian
49		Bülent SEZER	Engineer
50	Directorate General of Meteorology	Yüksel NADAROĞLU	Acting Department Chief
51	Directorate General of Agricultural Enterprises	Hicran S. KESKİN	Programmer
52	Ankara Provincial Directorate of Agriculture	Osman Çağrı KILIÇOĞLU	Engineer
53	Department of Information Technologies	Ercan EROĞLU	Statistician
54		Serpil ERYİĞİT	Coordinator
55		Vuslat Mestnaz ÜSTÜN	Coordinator
56	Ankara University	Prof. Dr. İlkay DELLAL	Teaching Fellow
57	Ankara University	Prof. Dr. Ufuk TÜRKER	Teaching Fellow
58	Ankara University	Prof. Dr. Füsün ERDEN	Teaching Fellow
59	Ankara University	Dr. M. Ali DAYIOĞLU	Teaching Fellow
60	Namık Kemal University	Prof. Dr. Bahattin AKDEMİR	Teaching Fellow
61	Field Crops Central Research Institute	Murat Güven TUĞAÇ	Chief of Department
62	Directorate of Plant Protection Central Research Institute	Dr. Numan BABAROĞLU	Coordinator
63		Zühal SAÇTI	Coordinator
64	GEOSYS	Hasan İmge ÇELİK	Director of Business Development
65		Özgehan ÖZEN	Director General
66	TURKCELL İletişim AŞ.	Ali BOYACILAR	Director of Public Sales
67		Emine BEYAZ	Sales Manager
68	Nuribey çiftliği NÇS Tarım A.Ş.	Kemal DEMİRCİ	Director of Marketing
69	TARNET A.Ş.	Erkan DİLAVEROĞLU	Deputy Director General
70	TETA TEKNİK Ltd. Şti.	BAŞAT TÖMEK	Technical Coordinator
71		Sümer TÖMEK BAYINDIR	Director General
72	AVEO Bilişim	Dr. A. AYŞEN KARAKAŞ	Agricultural Engineer
73	Maptus Harita Müh. San. ve Tic. Ltd. Şti.	Gökhan GÜRSES	Engineer
74		Tevfik UYAR	Company Director
75	Baharsun Enerji Tarım ve İnşaat AŞ.	Fahrettin AKSAKAL	Director General
76	HEKTAŞ A.Ş.	Elif TOPAY	Business Development Expert
77		Gürkan KAYA	Software Expert
78	Toros Tarım AŞ.	Ali Hikmet TATARHAN	Chief of Digital Marketing
79	Tekfen Tarım AŞ.	Pınar TÜRKMEN	Digital Agriculture and Innovation Leader
80	Konya	Mehmet KOCATÜRK	Farmer
81	Konya	Kamil YAZGAN	Farmer
82	Konya	Cemil SEZER	Farmer
83	Konya	Mithat ATAĞ	Farmer
84	Ankara	Mustafa AYDINBELGE	Farmer

85	Ankara	Hüsnü AYDINAT	Farmer
86	Ankara	Mehmet YÜKSEL	Farmer
87	Ankara	Mehmet NAM	Farmer
88	Ankara	Ahmet POYRAZ	Farmer
89	Agricultural Credit Cooperatives Central Union	Özkan ÇELİKTEN	Director of Software and Data Management
90	TARMAKBİR	Selami İLERİ	Secretary General
91	Aquaculture Cultivators Central Producers Union (SÜYMERBİR)	Aslıhan BEKTAŞ	Aquaculture Engineer
92	İzmir Chamber of Commerce	Mustafa YAĞCIOĞLU	Chief of R&D
93	Information and Communication Technologies Authority	Gökhan TOK	IT Expert
94		Fethiye ÇUHADAROĞLU	Assistant IT Expert
95	Digital Transformation Office of the Presidency of Republic of Turkey	Turgut HASPOLAT	Engineer
96	Ministry of National Education	Nurullah TÜRKER	Teacher
97	Ministry of Commerce	Şamil Burak ÇOBAN	Customs and Commerce Expert
98		Merve KUMTEPE	Official
99	Directorate General of Communication	Mehmet Akif ASLAN	Transportation and Communication Expert
100	Ministry of Industry and Technology	Ahmet YILDIZ	Representative of the Presidency of 4 <sup>th</sup> Industrial Revolution
101	Presidency of Strategy and Budget	M. Raşit ÖZDAŞ	Expert
102	PTT A.Ş.	Şahin DEMİRBİLEK	Department Chief
103	KOP	Süleyman ARMAĞAN	Engineer
104		Gökhan AKKAYA	Engineer
105	Ankara Development Agency	Coşkun ŞEREFİOĞLU	Chief of Department
106		Bora SÜRMEİ	Agriculture Economist
107	FAO	Viorel Gutu	Sub-regional Office Coordinator
108		Dr. Sheikh AHADUZZAMAN	Program Official
109		Şebnem GÜRBÜZ	Expert
110		Şafak AKSÖYEK TOROS	Communication Expert
111		Sophie TREİNEN	Information and Communication Management Expert
112		Gerard SYLVESTER	Investment Official
113		Nuno SANTOS	Economist
114		Frank HOLLİNGER	Economist
115		Ege AKTÜRK	Intern
116		Gözde ARAS	Program Assistant
117		Hakkı Emrah ERDOĞAN	Consultant