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THE ROLE OF INFORMATION TECHNOLOGY IN PROVIDING AGRARIAN INFORMATION TO FARMERS

«Knowledge for the nowadays' farm is a new value, and the technology is the tool generally for knowledge imparting, dissemination and application»

Dzuen Medoq

Methods used to transfer knowledge to farmers include technical assistance, farm advisory systems and services, training and local action groups. These measures allow farmers to seize opportunities as well as address concerns and problems associated with their farming activities.

In the past, these measures would have been considered as agricultural extension and advisory services to individual farmers. They were organised and delivered in different ways, but with the aim of increasing farm productivity and income[1]. The terms *agricultural extension* and *advisory services* were defined by Anderson (2007) as "*the entire set of organisations that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills and technologies to improve their livelihoods*".[2]

Agricultural extension is «a service or system which assists farm people, through educational procedures, in improving farming methods and techniques, increasing production efficiency and income, bettering their levels of living and lifting the social and educational standards of rural life» (Swanson, 1984).

In the RA the agrarian reforms and land privatization brought forth the objective need to create the extension (consulting) system the goal of which was to help the rural farms and other agricultural business entities by introducing new technologies, developing professional skills, improving farm running efficiency and facilitating rural farming activities.

Just in 1992, supported by the U.S. Agricultural Department, the first agricultural extension service «Agrogitaspyur» was established. The latter, within the scope of the previous rural regions, delivered professional services to the newly-created farms.

Later, in 1997-1999, in order to render information, consultation, marketing and new technologies introduction services to the entities engaged in agricultural production there were established 10 Agricultural Support Marz Centres (ASMC), and in 2002 - Agricultural Support Republican Centre (ASRC). For over 10-year activity this system has had its ups-and-downs.

In the RA one extension agent on average serves 5-6 villages that hampers rendering information and consultation to the beneficiaries timely and at the required level. In general, the extension and information is rendered through the workshops, trainings and personal consultations. The information technologies as an efficient information dissemination means are used incompletely which impedes the information and extension service provision.

In a rapid changing policy arena, farmers and their advisers share a growing need for day-to-day information on a widening range of issues, such as weather, climate change, biodiversity, agronomic, environmental and climatic conditions, production practices and innovation, land, water and other input use, markets, the economic situation and current policies and regulations. [3]

At the peak of the Soviet-era Armenia had a reputation for excellence in the science, research and high-tech industries and in 1987 the sector is estimated to have employed over 100,000 people. Since independence and notwithstanding significant economic challenges, Armenia has continued to develop and prosper in the ICT sector.

Yerevan University of Management and Information and Management Technology, offers degree programmes in ICT related disciplines and the European Regional Institute of Information and Communication Technologies is also located in Yerevan. The Armenian Government has declared that the ICT sector is a key priority for its economic development and an ICT Government Strategy has also been drafted.

According to the World Bank in 2011, the number of mobile cellular subscriptions (per 100 people) in Armenia was 103.56. During the same year, the number of Internet users (per 100 people) in the country was 32. It is estimated that currently 50% of farmers in Armenia have access to the Internet. [4]

Recent ICT initiatives include:

→ The American University of Armenia hosting the "Tech Needs Girls" forum, which was organized in celebration of the International Girls in ICT Day in 2013.

→ The United Nations Development Program (UNDP) has implemented three projects between 1999 and 2004

→ The FAO has implemented a project on Virtual Extension, Research and Communication Network – VERCON

Some of the ICT applications made in Armenia in support of agricultural extension, include:

→ The implementation of FAOs VERCON project

→ A private company Vistaa maintaining a database of 1,600 advisers/ field researchers

→ The ASRC maintaining a database of researchers and technology assessment

→ The ASRC operating the AgroWeb website to disseminate marketing information (including a listing of organisations) to the public.

During the missions to date the IC has observed how ICT is being used by public and private sector organisations involved in advice to farmers.

The 10 ASMCs have their own web pages, hosted on a server maintained by the ASRC. We study the site of Shirak MARZ Support to asses how many hits his web page had had in a recent month.

It was estimated the 32,000 hits were made on the Shirak site, the drop off in activity (reflected in the graph) attributed to downtime on the server.

In addition to Internet usage the ASMCs have been charged with developing more Interactive links through ICT by setting up Facebook pages to encourage farmers and communities to field questions and discuss issues.

The Internet presence of the private sector merchants visited during the first mission was impressive with a comprehensive listing of products and services on offer and also a significant amount of advertising of for which the merchants received some income. It was noticeable that the public sector websites had no visible advertising nor was there much evidence of sign-posting and networking.

Whilst it is too early to determine the effectiveness or not of these initiatives, it is an indication of the potential of this small but very well connected country, to develop and use tools to reach and communicate with rural based businesses and communities.

The IC had discussions with a number of individuals as to the potential for ICT in Armenia and its agricultural sector – it is recognised that there is huge potential, and all acknowledged the need to learn from other countries and develop a strategy that fits the Armenian Reality.

Early warning systems are one way of using ICT to improve farmers' management capacity. There is a growing need for early warning systems in agriculture as the vulnerability of production systems to weather incidents increases. For example in the United States, in the autumn of 2012, following the worst drought for 25 years, the United States Department of Agriculture (USDA) called

upon software developers to design a smart phone 'app' that would provide drought-stricken farmers and ranchers with one-click access to the nearest USDA service centres and drought programmes. If the ICT industry can meet the challenge farmers will have easy access to information on: government assistance differentiated by location and sector, types of loans, drought maps and localised weather forecasts. [5]

In New Zealand, the government established the FarmsOnLine initiative in 2011. This is a government-owned database which brings together existing information on the ownership and management of rural properties, land use, stock and crops. It provides a hub for rural information that is vital in a disease outbreak such as foot-and-mouth disease or rural emergencies such as flooding. Improving the response times in such events can significantly reduce losses to farmers and the country's economy. [6]

There is a growing and steady trend for farmers to use the Internet to source information and advice. In 2006, 42% of farmers in England sought advice on line and 45% of livestock farmers used the Internet to obtain information about farm inputs, although more dairy farmers used the Internet as a source of advice (49%) as opposed to 42% of sheep farmers who used the Internet for information. [7]

In France the *Institut national de la recherché agronomique* (INRA) has developed the diagnostic tool DIAGNOPLAN which can identify and localise pest diseases in the field. Farmers can send photos via smartphone of their contaminated crops and receive advice from a specialist. [8]

In the United States, estimates by the USDA of farm computer usage and ownership shows that 67% of US farms has access to a computer in 2013, up 5 percentage points from 2011. However, only 40% report using a computer for their farm businesses, with computer use increasing the larger the farm (USDA). [9]

To be effective, information must be accessible to farmers. This requires a range of communication tools and techniques to suit individual needs, and ensuring that the "message" is clear and easily understood by the target audience and relevant to the circumstances. Electronic information, particularly where based on

Geographic Information Systems (GIS), is becoming an increasingly important tool for farmers and many now have easy access to detailed map-based information about their own farms.

While evidence suggest that with the growth of the digital economy, more economic activities are taking place on the Internet and thereby reducing geographic constraints, some communities may be at a disadvantage in reaping the benefits due to lack of access to high speed broadband. For this reason it is often argued that targeted support for the provision of ICT tools would facilitate access to up-to-date information about markets, polices and weather that is needed to guide producer decision.

Nowadays in the RA a number of international programs are being implemented which would facilitate the introduction of new ways for improving the agrarian information accessibility, partially through the information technologies. From this aspect we consider that for a quick response to the climatic changes it will be more efficient to create Internet Infobase to ensure fast data access for farmers. In this case the creation of information network is very important. As we think the network members should be Ministry of Agriculture, Agricultural Support Marz Centres, Armenian State Hydrometeorological Service, Research institutes within the jurisdiction of the MoA, National Agrarian University of Armenia. It can be introduced by the following scheme:

The RA Ministry of Agriculture	Research institutes within the jurisdiction of the RA MoA	National Agrarian University of Armenia and its branches

Agricultural Support Marz Centre

Armenian State Hydro-meteorological Service

Agricultural Support Republican Centre

National Statistical Service
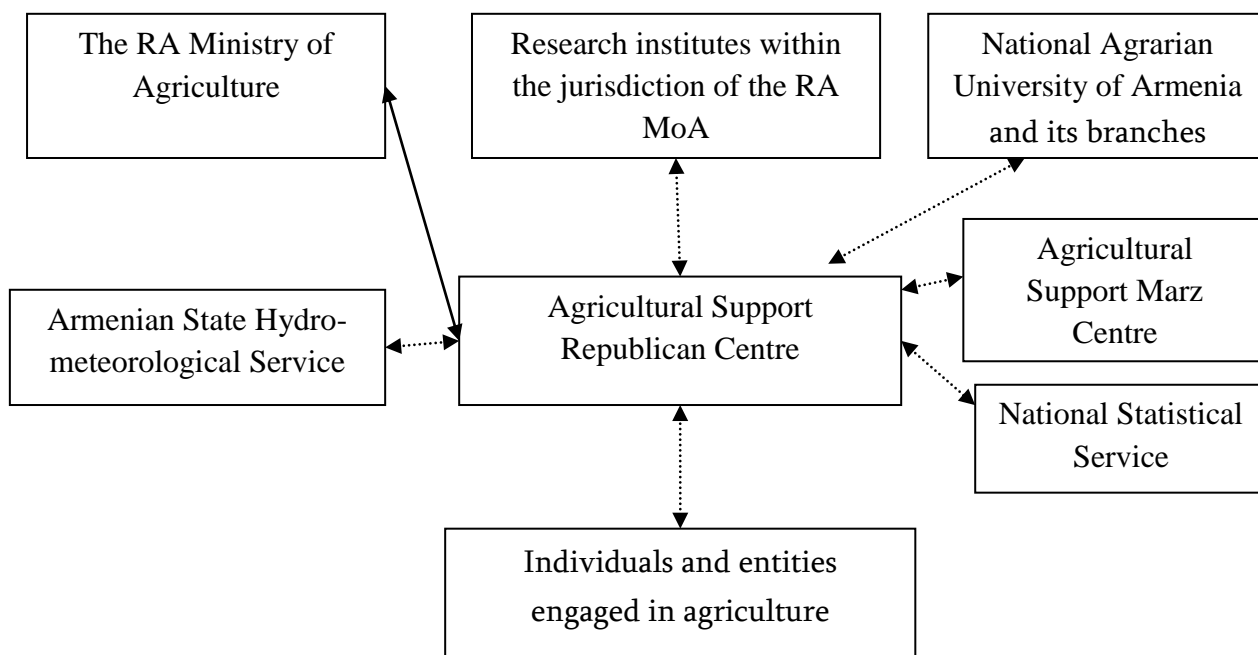
Individuals and entities engaged in agriculture

Figure 1. **Agrarian information system**

The Agricultural Support Republican Centre will provide data collection, processing and dissemination. The information got from all mentioned centres will be analysed in the ASRC and on the assumption of primary needs there will be prepared necessary extension materials which will be available to the engaged in the agriculture individuals or entities through the information technologies, partially on phones and through Internet. The efficient work of this chain will ensure increase in fast response to the climatic changes and food safety in the Republic.

Based on the abovementioned we propose to create information network which due to the information technologies will facilitate rapid information access to the farmers and entities engaged in the agriculture.

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