Internet of Things. E-Farming

Dhonat KOTE

Abstract—Agriculture plays a vital role not only in meeting the needs of people for food supply, but also in the economy of many countries. However, farmers face a number of challenges that arise as a result of unsustainable farm management. Orientation towards more sustainable forms should be a priority for all farmers and policy makers. IoT can significantly improve the farm management mode. Through the adoption of IoT farm productivity can be increased, a more sustainable resource management can be achieved and data can be stored and analyzed in order to make accurate forecasts for the future, etc. Agriculture is a very important part in the Albanian economy. This paper analyzes how the IoT can be adapted by Albanian farmers so that the farm's efficiency and effectiveness is improved.

Index Terms—E-farming; Internet of Things; Sustainability.

I. INTRODUCTION

Internet of Things (IoT) is a broad concept used to describe the interconnection of various everyday objects through the Internet. IoT connects individuals and devices through a widespread network. The goal of the IoT is to connect every person and every object through the internet, to create an intelligent environment [1].

The Internet of things has a great technological, social and economic importance. By collecting, analyzing and distributing data it creates opportunities for access to more information and knowledge, and consequently it transforms the way of how we work, are educated or live.

The technological advancements of recent years have made it possible to connect more and more devices at a lower cost and more easily. IoT can be applied to different areas, to people, homes, distribution systems, offices, factories, cities, agriculture, etc. [4].

The use of IoT has been growing. Cisco predicts that more than 24 billion devices will be connected to the Internet by 2019 [2]. Moreover, McKinsey's Global Institute predicts that the financial impact of IoT in the global economy will be from $3.9 to $11.1 trillion by 2025 [3]. IoT is viewed as an opportunity to reduce the gap between rich countries and poorer countries around the world.

One of the areas that IoT has begun to be implemented and used is agriculture. In this paper, we will analyze the importance of the adaptation of IoT to farms in developing countries, focusing on Albanian farms.

This paper is structured as follows: in the second section a review of the literature on the application of IoT in agriculture is done. The third section analyzes the situation of Albanian farms. The fourth section introduces the way how Albanian farms can become more efficient using IoT. Conclusions are presented in the last chapter.

II. E-FARMING: LITERATURE REVIEW

United Nations predict a global population growth of over 11 billion by 2100. This will be accompanied by a significant increase in demand for food. Farmers today face a number of challenges: climate change, pressure on the orientation towards sustainable development, rising global food demand, increased demand for healthy products, etc.

The way in which a large number of farms currently operate in the market is unstable economically, socially and environmentally. Consequently, farmers’ orientation is needed to adapt more sustainable forms of functioning.

Farms and agriculture as a whole can be empowered through the use of IoT. E-Farming involves conceptualization, design, development assessment and application of innovative ways by using IoT in agriculture. In recent years there has been increasing interest in the potential contributions that IoT can offer to the efficiency and productivity of farms.

Information technology and Internet of Things has created new opportunities for farmers. Efficient use of technological advancements as far as the actual IoT is concerned, can significantly increase farm efficiency and their competitiveness in the market.

The use of IoT is seen as an alterantive to reduce the gap between developed and developing countries. One of the main sectors of economy of the developing countries is the agricultural sector. Most of the people are engaged and employed in this sector. However, in most cases, the agricultural sector in these countries consists of small and inefficient farms. Most farmers face numerous challenges such as the physical barriers they have with the market, lack of data, lack of market access, ineffective resource management, increased competition, increased demand for detailed information on the product by consumers, economic barriers eg low access to financial capital, etc.

Using information technology can help improve the productivity of farms, especially those in developing countries.

How can IoT affect specifically the agricultural sector?

There are several ways and methods that have been applied in different countries and have had immediate impact on the agricultural sector. IoT can help in:

- Development of precise agriculture. Precise farming is a way to ‘apply proper treatment at the right place in a timely manner’ [6]. Through equipment and systems such as: Auto-Guidance Systems (AGS), Global Positioning System (GPS) Web Map Service (WMS), Phononet Project, Observation Service Sensor (SOS) etc. farmers can monitor real-time soil parameters and plant conditions and have accurate information on the level of humidity or other components on the ground. In this way farmers know

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D. Kote is with University of Tirana, Department of Applied Informatic (e-mail: kotedonatos@yahoo.gr)

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III. FARMS STRUCTURE IN ALBANIA

The agricultural sector plays a very important role in the economy of Albania. The contribution of this sector to GDP is about 20% and the employees in this sector account for about 50% of the employees.

This sector faces many problems. Most of the sown crops are small, making it difficult to mechanize these crops or access to the financial market. Consequently, most of the production processes continue to be carried out in a traditional form through the hand work. In this way, the productivity and competitiveness of farms remains at a low level.

Division in small plots and lack of co-operation between farmers makes the bulk of agricultural products to be addressed only to the domestic market and few farmers can compete with their farming crops in the region or beyond. The lack of stable markets for Albanian products is linked to a number of other important factors. Most Albanian agricultural products are not labelled or certified, and an unmarked and unqualified product cannot be competitive in the global market. The promotion of Albanian agricultural products remains at low levels.

The costs of producing agricultural products are high and this is due to poor management of resources. For example, no farm in our country uses moisture monitoring sensors, which means that irrigation of farm crops is done by farmers without accurate information on the plant's moisture and if the plants really need irrigation.

The same applies to the amount of pesticides used by farmers. The use of sensors that trace the biological parameters of the soil and the plant provide the farmer with information on the amount of pesticides that he / she should use (resource efficiency) and food safety guarantees for consumers.

In order to improve the productivity of the Albanian farms, IoT can come to help. In the next section we will analyze some of the most suitable forms for farms in our country.

IV. IOT USE IN ALBANIA

The architecture of the system designed for the case of Albanian farms consists of a web platform called e-farming. The web programming language will be php, while the design of the screen will be programmed in HTML5 and CSS3. My sql will be used to create the database.

This platform collects and provides information in three directions, the farmer, the client and the administrator. Every farmer has the right to create his own account, and after the opening of which he can record the products that he will offer in the market with all the information on the product. After the registration of products, every farmer can make modifications, changes in product categories and plantations. On the other hand, the farmer can obtain detailed, accurate and up-to-date information on market prices, demand and product offerings. Web product registration enables farmers to promote their products in a wider market and access more remote markets at a minimal cost.

The information provided by the farmers is valid for the clients and system administrators at the same time.

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Customers can be informed in real time about the products offered, their characteristics, the production process, the manufacturer and the place of production of the products. The increase in available information creates a perceived risk reduction for consumers and increases the quality of the products they consume.

On the other hand, creating a database leads to the opportunities for accurate market prediction, for a more efficient allocation of subsidies to farmers, and in selecting the crops that the market needs.

![Fig. 1 System structure](image)

This system is suitable for the conditions of Albanian farms because it has low installation and maintenance costs and is very easy to use.

V. CONCLUSION

The agricultural sector is an important sector in the Albanian economy. However, it is characterized by numerous problems. Part of the problems faced by Albanian farmers can be overcome or reduced through the use of information technology. The system proposed by us serves to link the producer to the market, providing detailed and real-time price information and creating a reliable database that helps predict the market in the future.

Such a system makes farms more efficient. It also has low installation costs and is easy to use.

REFERENCES


