

Agriculture Status Quo and the Effects of Technology on Agriculture's Success in Process

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Abstract

This research contributed to the literature of agriculture technology and to the agriculture sector overall. The research focuses on Sulaymaniyah agricultural farms, taking the Sharazur and Sharbazher farms as a sample for evaluating the awareness and perception of human resources working in the industry. Face to face interviews were conducted with 34 participants and most of them were aware of agriculture technology but unfortunately, they don't use it. They find it as a necessity for more efficient and effective production but they don't have access to the new technologies due to the factor that Iraq is a developing country and have not yet used technology sufficiently for agriculture purposes.

Keywords: Agriculture, Economy, Technology, Production

Introduction

“Technology is what separates us from the Middle Ages; indeed, it is what separates us from the way we lived 50,000 or more years ago. More than anything else technology creates our world. It creates our wealth, our economy, our very way of being.” says (Arthur, 2014).

Technology is a problem solver, it eases our daily activities, it eases the industrial activities and it eases the development of human nature. This research focuses on the effects of technology on agriculture. It elaborates the importance of using high technology for agricultural purposes in the Kurdistan Region of Iraq. Technology is using scientific knowledge for practical purposes of human lives or to change or develop the human environment for better purposes. Technology plays a big role in every sector of economics and it can be used for efficient and effective production. It is used in factories, companies, centers and any other entity.

There is a massive amount of information about technology and there is much literature about defining and explaining technology yet Arthur W.B. claims that we know very little about what technology is - after many investigations and observations about technology. He claims that we have high hopes about technology but we trust nature more than technology. The statement is that technology can proceed the activities that need to be done in an efficient way, but the promising factor for survival is our nature. This means that technology is important but agriculture is what makes us survive. Thus, if technology is used in agriculture, human fate can become more hopeful and therefore more trusting.

The origin term of technology is from ancient Greek language (Techne - logos). The word Techne stands for art and craft, and the word logo on the other hand portrays speech/word. The first time this term appeared in English language in the 17th century, was only used for (Applied Arts). After that, in the 20th century, the meaning started broadening, the processes started expanding, the ideas widened and tools and machines were appended in. In the middle of the 20th century, roughly in the years 1933 to 1965, the word technology was defined as a human activity that helped utilize and alter mankind's domain of life (Buchanan, 2020).

Technology affects nature and nature affects technology. Technology does not come into reality with no costs attached, instead it requires a significant quantity of resources from nature and in turn leaves an impact on nature that could or could not soil the entire system as a long-term result. The interconnectedness between the elements we as humans encounter in our day to day life does not leave out technology. Technology has its own effect on our lives, from the household machines we use in our homes, like TV, computers, mobile phones and others, to the bigger dimensions like car washes and big factories.

With all its impacts technology has on our lives, whether it is positive or negative, technology can harm our environment on one hand, but it can also have its own benefits on human lives on the other hand, as it has the ability to remarkably develop human lives (Arthur, 2014). But in this research, we don't focus on the positivity and negativity of technology as it might have on humanity and our nature, but rather technology's impact on agriculture, as agriculture can use the benefits and blessings of technology to improve efficiency in working and use it to a better tomorrow for a brighter future with it.

Agriculture can become an agent to prevent a country's pathway down to poverty. If developed well and given importance to in the right way, it leads countries out of scarcity and difficulties. Agriculture provides raw materials, it provides food, and also helps other sectors grow with it. If a country's agriculture is processing well, then its economy is glowing, and thus the country's political decisions are more powerful, and eventually turn the developing country into a developed country.

On another hand, agriculture is defined as the art and science of farming soil to grow crops and raise livestock (Society, 2021). In the same time, agriculture can be described as the action of preparing, using and marketing animal and plant products. There are a variety of products that result in the actions and procedures of agriculture including wool, cotton, food, fabrics, leather, wood and paper. However, the methods used in making each of these groups are different in procedures and approaches, but they are all classified under the term of agriculture (Society, 2021)

Very much like technology, the entrance of agriculture introduced another level of civilization to humanity. The ease that agriculture provided to mankind, was almost equivalent to technology's in terms of how handy everyday life was becoming.

Prior to agriculture's entrance to mankind's lives, the majority of the people were spending most of their days hunting, and looking for animal resources to kill and use as their main source of food. The history of farming goes back to 11,500 year ago, when people started making their own cereal and root crops, and slowly the dependence on farming became a virtue to live by (Society, 2021).

Also, starting from 2000 years ago, people dramatically moved towards farming and agriculture which in turn raises another critical question in the scholar's minds of why everyone would randomly start farming. The most reasonable answer among all has been the changes in climate that forced them to move for another source of food (Society, 2021)

Agriculture is of vital importance for the economy, especially for the economy of developing countries. If we take Tanzania country for instance, half the country's GDP comes from agriculture. Also, 60% of the country's total earnings of export comes from agriculture. In addition to that, more than 80% of the country's labor force is concentrated on the sector of agriculture (Kaaya, 1999).

The importance of agriculture does not only lay in the production of food for people, in the same moment it generates job opportunities for people, and therefore become an income source for the people. The use of agriculture is not only for the people to receive food from it, but at the same time, agriculture provides textile, tobacco, vegetable oil and sugar, that are other materials that are used in other forms (Kowalczyk, 2019).

With this being said, technologies regarding technology are well improved by scientists and farmers. Hydroponics is one of the new techniques developed by scientists in farming and agriculture that remarkably impacts products globally when implemented. Hydroponics is the technique of planting crops without use of any soil at all, instead solutions in the form of liquid filled with nutrients for the specified plant is provided. With this procedure we could plant in the middle of the ocean and transform millions of square kilometers of water surfaces that are not currently usable into a giant farm (Kowalczyk, 2019).

It should also be mentioned that the state of technology being available and affordable, puts an important impact on agricultures' successes. The tangibility and interactivity of the products of a technology should be made available for farmers everywhere in the globe, the purchase of a new technology needs to be affordable enough for a farmer to buy and make use of it. Otherwise regardless of how good a technology could be for agriculture; a farmer would not risk his/her income and profit for a new piece of technology. (Rehman, Jingdong, & Khatoon, 2017).

Technology and Agriculture Relationship

The development of agriculture has always been very gentle and moderate for many thousand years. The first tool used in agriculture was fire, that was used by the native American in order to increase the growth of berry plants. In the beginning of its development, the beginner tools used by the farmers were axes, hand digging sticks, and other hand tools (Society, 2021).

Also, the farmers only used small areas separately that didn't have very remarkable products at the time. Then after a while, the tools used by the farmers developed from wooden tools, to bronze, iron and stone tools that increased their efficiency in working. Also, they produced and advanced their storing. People learned to keep their foods for the harder times in mugs and jars (Society, 2021).

Due to the remarkable developments in agriculture in the early years of 1700s by Great Britain and low countries that lay below sea level including Belgium, Luxembourg, and Netherlands, Inventions took place in agriculture that intern made the products of food in European colonies, especially the United States and Canada dramatically increase (Society, 2021).

Every year, different machines are invented, different inventions in technology are introduced, and that each serves a different purpose. This fact has made the production of food increased and made agriculture important (Society, 2021).

Literature Review

Research Focus, Significance, and Technology Impact on Life

This research is focusing on the impact of technology on the agricultural sector, and how it improves the industries into a better version. The research questions consist of some critical questions about the status quo of the Agricultural sector in Iraq and why they have neglected new technologies in the industries. Why does the Agricultural sector in Iraq not depend on new technologies? Is it because they are not aware of it? Or is it related to their educational backgrounds and preference to work in the old traditional ways? In this study, we have gained some information on how technology affects agricultural activities? How technology improves agriculture? And some other significant information about technology and agriculture. This research plays a significant role for Iraq, especially for the Kurdistan region due to the fertility and rich resources that could be used for agricultural purposes. People in Iraq and in the Kurdistan are suffering due to economic crises and low employment rates. This research shows the significance of improving the agricultural sector and how it will add to the economy.

In this section of this study, we will analyze and evaluate other studies that explain the agriculture technology, its effects on agriculture and farming, agriculture technology's benefits and effectiveness, and defining agriculture technology terms, on the other hand, the importance of agriculture itself for survival, its success dependency on technology, and how it develops economics. There are many studies that explain agriculture technology and yet they have not found a simple definition for it. Due to its variability and constant evolution, it is hard to simply explain the technology or agriculture technology. The central question is how technology evolves? And the argument is if it is used in a way to improve our lives? The reasons behind the way that most people use technology are unlikely to be accepted. While technology provides many benefits and blessings to humanity, people prefer to use it in the wrong way and business people or people who are authorized for economic or political decisions have neglected to take technology into consideration to improve the lives of their people in Iraq.

The resources that are found and used in this study, are clearly elaborating and explaining the importance of using new technology to increase production of agriculture, to minimize costs, to work more productively, and to work more efficiently and effectively. Most of the resources suggest that technology is an essential and necessary tool to be used in the agricultural sector and most of its consequences are positive. Affirming that technology has its disadvantages and it can be even a threat to the future of business industries and to human lives. But, for the agricultural sector most of the studies that explain technology as a blessing for food production, profit maximization and cost reduction. The focus of this study is on the benefits and improvements of technology that apply to agriculture. There are some studies about the future of technology and how it will change literally everything. This includes every sector and every aspect of life. The studies emphasize on the way that technology improved everything.

Technology made us explore and investigate from the tiniest material to the largest one. For example, if microscopes did not exist we would not be able to see cells, microorganisms, viruses, bacteria, etc. Most of the studies that are focused on technology, determine the importance of it for survival and for a better productive life. The main points of technology's importance are that it made our life easier, made businesses grow, made communication easier, learning became more interesting and new information became more accessible, increased and developed scientific research, etc. in the following paragraphs we will go into detailed information about the status quo technology's role in agriculture.

Agriculture Technology Definition and Its Importance

There is a huge difference between the way that farmers worked decades ago and how they work in the present days. The advancements of technology made farmers work more productively. The developments of information technology, sensors, devices, and machines created a routine usage of revolutionary technologies such as aerial images, a global positioning system (GPS), robots, moisture and temperature sensors, and some other advancements. ("Agriculture Technology | National Institute of Food and Agriculture", n.d.). Researchers have found using precision agriculture (PA), robotic systems, and advanced devices make the business profits, efficiency, safety and security, and environmental friendliness to get increased and to get improved. ("Agriculture Technology | National Institute of Food and Agriculture", n.d.)

By using agriculture technology, farmers no longer have the obligation to work on the entire field or uniformly apply fertilizers, water, or pesticides. They can work on a small amount of field and then target specific larger areas. Also, farmers can treat each plant differently with the help of technology. In addition, some benefits of agriculture technology are listed in the following points: ("Agriculture Technology | National Institute of Food and Agriculture", n.d.)

- The crop production increases, farms are sufficiently producing crops with least energy consumption.
- The reduction of water, fertilizer, and pesticides consumption impacts the prices of food to decrease. This factor helps people not to overspend on food and that makes them to be satisfied with the low prices of food.
- Reduction of negative impact on natural ecosystems. By using technology in farming, the ecosystem gets less harmed and that is good news for humanity.
- The rivers and groundwater get fewer chemicals and help our water. Many countries are suffering due to their water insufficiency or dirty water. Thus, technology reduces the chemical materials to enter rivers.
- Workers are more safe and secure. Farmers have been safer while using technology in the process of agricultural activities.
- Monitoring systems got more reliable. Managers need accurate data in order to proceed, thus with the new monitoring systems, it is easier to get the accurate results from monitoring.
- More effective natural resources management. Natural resources need proper management, in order to have minimum waste and maximum outcome.

- Producers' control over plant and animal production gets more effective and increases. Producers need to have complete control over the production and technology helps them to do that.
- Using robotic technologies decreases costs and time efficiency is one of the most important factors for any business that demands success.

According to the study of Ku (2020) innovation's significance increases on a daily basis. Agriculture technology got a huge attention from investors and in the last 10 years, the remarkable growth of investments has surprised everyone. In the last 5 years, \$6.7 billion was invested in agriculture technology and \$1.9 billion was invested in 2019 only (Ku, 2020). Innovations in the agriculture technology impacted all the farmers and workers positively and mostly the innovators focused on the following technologies in which we provide explanations in the upcoming paragraphs in detail, the innovations are Indoor vertical farming, automation and robotics, livestock technology, modern greenhouse practices, precision agriculture and artificial intelligence (AI), and blockchain (Ku, 2020).

1. Indoor vertical farming: This type of farming is using 70% less water than traditional farming. It is defined as growing a pile of food in a controlled closed environment. Vertical shelves are used in one another and they are saving farming space to grow more food (Ku, 2020). According to the study of (Oda, 2020), indoor vertical farming maintains safety standards, needs less cost, consumes less water, and increases our food production. He predicts that by 2050, the global population will massively increase and reach 9.8 billion. If investors and farmers do not pay much attention to indoor vertical farming, humanity will fail to feed everyone. In this essence, it is found that this type of technology is saving resources and plays a significant role in the future of humanity (Oda, 2020).
2. Automation and robotics: Farm automation or smart farming is the technology that changes agriculture and its pace, it reduces labor costs, and it makes the farming more efficient. The automated technologies or robotics, are programmed to automate the production cycle. The number of companies that work on this technology is constantly increasing. Those companies are working on developing drones, autonomous tractors, high-tech harvest automation, automatic watering, and seeding robotics (Ku, 2020). Drones are mostly used by farmers in China since the country is the top manufacturer of drones. They are using drones to spray and decrease the consumption of pesticides (Billingsley, 2019). Autonomous tractors are labeled as the future of farming. The tractors don't need drivers and have their own GPS. Automatic watering is another effective and low-cost automation technology, it measures water quality, its PH, and quantity. Seeding robotics is also for helping farmers to spray and to reduce the labor force in the farming processes (Banday & Banday, 2019). High tech harvest automation is small robots that are used in nurseries and farms, they are used for adjusting pots and to boost work efficiency. That robotics don't need specific environments, they can work around humans and are programmed to reduce human labor in the farm adjustments (Billingsley, 2019). Yet those technologies are very new but there is an increased number of traditional agricultural companies that included those agriculture technologies into their processes (Ku, 2020).
3. Livestock technology: In the past 8- 10 years, the livestock industry has inevitably got improved. Although the traditional livestock industry has been receiving an inadequate low level of service regardless of its vitality. However, livestock technology provoked an insurgence in the agriculture sector. Livestock management is the business of poultry farms, dairy production farms, cattle farms,

or any other livestock agricultural business. Thus, livestock technology helped managers to use it for the purposes of nutritional, genetics and gaining information about their livestock farm. This technology increases productivity, well-being, and provides proper management assistance to the livestock business managers (Ku, 2020).

4. Modern greenhouse practices: According to the investigation of (Ku, 2020), the greenhouse industry has transformed from small-scale facilities to large-scale facilities. In the past, farmers mostly used greenhouses for aesthetic purposes and for conducting research there (Ku, 2020). But, in the recent decade's greenhouses are being used for food production. Also, the modern greenhouses have become competitors of land-based productions. In the current studies, it is found that the global greenhouse is effective and it is producing \$350 billion vegetables annually (Ku, 2020).
5. Precision agriculture (PA): Precision farming or precision agriculture consists of some technologies such as types of machinery, robotics, and information systems to control, monitor, and predict outcomes in the process of farming (Ku, 2020). Precision agriculture is one of the most important agriculture technologies and it makes farmers be able to increase their working efficiency and reduce costs of production. Precision agriculture companies are enormously focusing on developing the technologies to provide more accurate techniques and methods for planting, growing, and harvesting crops. By precision agriculture technologies farmers can effectively control the variables of crop farming and be able to measure the moisture levels, to define the pest stress, to indicate soil conditions, and monitor micro-climates of the farm (Ku, 2020). Due to the significance of precision agriculture in agriculture technology, we will mostly focus on it in detail in the following pages.
6. Artificial intelligence (AI): Farmers use artificial intelligence to help them make the right decisions and achieve the goals that they have created for harvesting. Innovators have created remote sensors that consist of algorithms for field environment interpretations. The more the input has been collected, the more the predictions from the algorithms are accurate. Algorithms in technology are processing data, modifying, and learning according to the input or according to the received data (Ku, 2020). Through using artificial intelligence in agriculture, farmers are able to have guidance and information about their crops and management. Artificial Intelligence AI causes proper management decisions that leads to the success of the farming process as a whole.
7. Blockchain: This technology is designed for tracing and recording information on food health and security. It is the quickest way to identify and solve urgent issues related to food fraud, inefficacious supply chain, food traceability, safety, and other issues (Ku, 2020). It is storing and managing data for food insurance which is one of the most important factors for public health. Farmers are using blockchain to prevent mistakes of growing and producing food that causes foodborne diseases among people. Blockchain technology plays a big role in detecting food traces in every possible way (Ku, 2020). In the absence of blockchain, farmers wouldn't know for sure about the health of their food and products. And this leaves extreme outcomes if not know, this will lead to harvesting the food and still farming it, producing it and distributing it to customers, and this will lead to consumers having potential risks of being infected to diseases spread by the farming outcomes. But with blockchain in the equation, this can be prevented by knowing about the health of the foods the farmers produce.

Present Status of Agriculture Technology and Precision Agriculture

In the last few years, digital technologies have increasingly gotten attention and focus from researchers in the agricultural sector. Digital technologies quickly adopted the production of agriculture. The devices, robotics, sensing technologies, automation, information and communication technologies, and other agriculture technologies have effectively been adopted in the agriculture process. The technologies are corresponding to terms such as Precision Agriculture (PA), Precision Farming (PF), Smart Farming, Digital Farming, or Digital Agriculture (Walter et al., 2017; Shepherd et al., 2018; Tey & Brindal, 2012).

Therefore, the purpose of those innovations is all the same and they are for simplifying, automating processes, minimizing, or even completely transforming physical daily workloads into cognitive work and labor. This process increases profit and decreases the farm's ecological footprint. This factor results in improvements in the agriculture techniques and sustainable management decisions (Walter et al., 2017; Shepherd et al., 2018; Tey & Brindal, 2012).

The description of precision agriculture (PA) can be phrased as the following: “the application of modern information technologies to provide, process and analyze multisource data of high spatial and temporal resolution for decision making and operations in the management of crop production” (“Precision Agriculture - an overview | ScienceDirect Topics”, 2020)

According to the study of Groher et al. (2020), precision agriculture is the intellectual and practical activity of developing and improving crop production and it is applied as an assistance for managerial decisions by using the tools that were explained in the previous pages; such as AI, GPS, robotics, and etc. Precision agriculture is a contemporary technological innovation that uses a huge amount of data and information in order to provide and enhance the agricultural farming resources, productions and overall quality of the agricultural process (Groher et al., 2020). This new concept in the agricultural sector got acquired and got embraced in every part of the world. Its ability in decreasing working hours of labors, providing certainty in the effectiveness of managing fertilizers and watering procedures (Groher et al., 2020). The constant evolution and advancements in the innovation of precision agriculture made the most effective use of field management, natural resources and labor force. Thus, farmers give optimized amounts of water and fertilizers as inputs. This process intensifies quality of the food and working, productivity, and productions (Groher et al., 2020).

Precision agriculture enabling technologies (PAT) is another term that is classified in two other technologies which are driver assistance systems (DAS) and electronic measuring systems (EMS). Driver assistance systems include several driverless technologies that support farmers and exclude them to do the physical work, to spend too much time on the fields, supports crop management, and simplifies the farming processes and activities (Groher et al., 2020). Automatic steering systems is an example of driver assistance systems. Electronic measuring system is the feature in precision agriculture enabling technologies on the other hand, which is referred to as EMS. It is composed of several technologies for the measurement of water, moisture content of a soil, temperature, crop measurements, etc. (Groher et al., 2020).

In the agriculture process, crop production is the primary side that depends most on the technology in comparison to other processes in agriculture. Also, any development that has occurred in technology, has

significantly put an impact on the production of crops in turn. Crop production is home to several aspects, including field topography, soil characteristics and fertility, rotation of the crop, seeding, watering, temperature and weather, and pest control. The mentioned aspects above all act as an input for crop production systems. Also, one of the most significant outputs of the crop production system is crop yield (Thenkabail, Lyon, & Huete, 2019).

In precision agriculture PA, one of the most important topics is the management zone. Because it is a small section of a large field, in which one wants to do production in. The management zone is used by the remote sensors, for using the technological tools in the farming (Thenkabail, Lyon, & Huete, 2019). Precision agriculture has impacts on economy, productivity, and environment. The goals of PA are mainly to serve the three aspects mentioned. For instance, in the economic impact, PA aids the farming managers to maximize their profits using a minimum cost. Also, making maximum food production possible using minimum input such as, water, soil, and other natural agricultural resources. In the aspect of productivity however, it reduces the physical powers and labor powers to a minimum amount, instead the technologies replace the workers that process the field works. At the same time, in the environmental aspect, it has the least negative impacts on the environment and the least harmful emissions to the atmosphere (Thenkabail, Lyon, & Huete, 2019).

When comparing traditional agriculture to precision agriculture, we can easily observe the difference in the input and output in each. If the same input is given to a precision agriculture as the traditional agriculture needs, the amount of output such as production is exponentially higher in precision agriculture (Thenkabail, Lyon, & Huete, 2019). It is due to this very reason that makes the farmers and researchers heavily attracted towards precision agriculture, and prefer it to the same old traditional methods of agriculture (Thenkabail, Lyon, & Huete, 2019).

According to the findings of (Thenkabail, Lyon & Huete, 2019), precision agriculture system is divided into four sections that are classified as follows:

1. Having sensation towards recognizing differences in the differences that are available in the fields, and taking in information about the field it is used upon.
2. Having the ability of aiding the decision-making process, as it provides the numerous options of decisions onto the user's manual.
3. The precision has a full control on the entire field.
4. The ability of giving a reliable result to the user, and aids the operations to the maximum efficiency possible.

To figure out the rate of success of precision agriculture, we reflect on the four points mentioned above. The decision-making section is one of the core components in the precision agriculture system. Any field has specific characteristics and properties that make it unique in a way it is different than any other fields away or near it. But with the decision-making section in the precision system, you can make the right choice about the right field at the right time. This maximizes the health, and in turn the production rate as a result. Because the decisions given in a precision agriculture system are based on the collected data, and this makes the decisions utterly accurate to the specified field of work (Thenkabail, Lyon, & Huete, 2019).

It is due to this very reason that agricultural engineers give a special importance and a singular effort into remote sensors and information extractions, precision field controls and operations. Sensing and extraction of information is of high importance because the system requires to have a precise data given in a specified time in the day, a specified season in the year, and a specified temperature of the time, because of the variability of the data mentioned with respect to the conditions of the field (Thenkabail, Lyon, & Huete, 2019). Because it is inarguable that data taken from a field in the day is most definitely varied taken in the night from the same spot in the same field. Likewise, data from a field taken at a cooler temperature is different from the same soil's data taken at a higher temperature. Also, different locations give different data. For the sensing and data extraction, varied sensors need to be used according to the field's conditions. Because of this, when you are able to obtain raw data from the field, one can develop a special algorithm for extracting field information (Thenkabail, Lyon, & Huete, 2019).

To put all in a nutshell and conclude, from the literature review, we could determine the definitions of agriculture technologies and find out the positive sides of how beneficial it is to food production and livestock. Also, the improvements it provides in the economy, as it aids the farmers to optimize their works and as a labor force side, it has altered the ways of working. Workers are much safer, in this way farmers and workers provide an environment in which workers don't require to provide the strengths in their muscles, instead cognitive functions are needed in the system. Agriculture works pace towards a safer sector as it has never been in the history of mankind. The devices and technologies made in the agriculture sector, has reduced the overconsumption in the natural resources.

Now due to the technologies developed in the sector, water usage is managed, human labor and field usage are all managed and optimized in a way none are over consumed, and the outputs are yet maximized to an unbelievable rate. The crop yields are intensified and food production has never been higher. It is in the light of this fact, that most of the studies claim that agriculture technologies are the true savior of the human race's future. As the world population rises and food usage increases, the question remains unanswered as to how we can survive with the little resources and food around and many more mouths to feed day after day.

The Technologies used in agriculture however, cover the answers in a clever, yet a precise manner to optimize our outcomes. Using the technologies in agriculture we could answer the question with intelligence, and provide a solution to the potential disaster that faces our race. Also, we found out that precision agriculture PA plays an important role in farming and agriculture productions. Precision agriculture PA is continuing to proceed with technology evolutions and new innovations, and due to this it has turned and updated the agriculture sector continuously. So farmers and researchers that consider agriculture technologies are showing a high productivity and big outcomes in their works.

These factors prove the reason why the farmers are choosing to use the technologies in their farms, because if the farmers refuse to use the technologies in the farming's, they will fail to compete with the market. If the farmers proceed with the traditional methods of farming, they will have a small outcome with a huge input, in comparison to an agriculture entity that uses technologies in the farming, as they will have better products, higher number of outcomes using minimum resources and inputs. It is because of this very reason that many countries use the technologies developed in agriculture, only a few countries have left in the world that still use the traditional methods and ways of agriculture and farming. In this

study we figure out the usability of technology in the agriculture sector in Iraq, and the rate of which the country uses the technologies in the sector, or Iraq doesn't use technology and still continues on the traditional methods of agriculture. Which may lead to the reason that agriculture doesn't necessarily add to the economy of Iraq.

Present Status of Agriculture in Kurdistan Region of Iraq

Kurdistan region of Iraq has been the most productive and most fertile for wheat and barley production. The majority of food production such as vegetables and fruits are also in the northern part of Iraq. Yet, Iraq and Kurdistan are constantly importing food in the last decades. Meanwhile this importing negatively affected the capacity and economy of the agriculture sector due to the cheap prices of foreign food products. However, International organizations are still highlighting the important roles of agriculture in Kurdistan and Iraq's economy, job creation and political stability. But, the current system of agriculture and food sector of Kurdistan and Iraq is not fruitful and it is controversial, and it is not helping the sector to grow (Jongerden, Wolters, Dijkxhoorn, Gür & Öztürk, 2019). Kurdistan region of Iraq has the capacity to depend on agriculture for economic growth and also the sector can provide for the whole population but the problem is in the policy makers and it is in the system of approaching the sector (Jongerden, Wolters, Dijkxhoorn, Gür, & Öztürk, 2019).

Another problem in the Kurdistan region of Iraq's agriculture sector is in the techniques that the farmers use. Since they are still traditionally implementing the agricultural activities, it leads them to more costs with a moderate amount of production, another issue in the agriculture sector is the disagreement between government and the locals. The government has not been supporting the farmers with services and also the land yields have been decreasing since 2000 as a result of nonagricultural support. This research shows that the agriculture sector is dying in Kurdistan region of Iraq due to the low functioning of traditional agriculture (Eklund, Abdi, & Islar, 2017). This factor is demotivating the hope for transforming into agriculture technology while traditional agriculture is not productive in the region.

Methodology

Research Design

In this research, we have conveyed the study with meetings face to face with farmers in Sharazur and Sharbazher, and with technology experts that provide goods in the agriculture sector to the farmers. Every data that is collected in this research is primary and the research is qualitative research. I used a qualitative method to measure the perception of farmers about agriculture technology.

Data Collection

The data that I have collected are from organic face to face meetings with the contributors in farming and experts of technology areas. There were very evident scenes that showed the low levels of awareness and lack of new techniques in the farms. The tools were very basic and the methods as they seemed, were too traditional. We could rarely spot a cutting-edge technology in the farms, the tools were limited from hand

shovels to old barely working tractors, which implies the insufficiency and unproductivity in the farmers' works in general. The problem of the research is on the present ignorance towards technology. The way farmers work shows a lack of necessary awareness towards today's technologies, and that they suffice with the minimum production they currently have.

Participants and Sampling Method

For this research I have developed an 11-question survey and gained contribution in answering them from 33 farmers and technology experts from Sharazur, Sharbazher and city center of Sulaymaniyah for the technologies that are present. The 33 data were collected in 5 days. In the survey, it begins with some simple questions on their name, mail address (if any) and several other questions in demography like gender, age, marital status, nationality, education and their current occupation (what they are busy with). After these questions, come three Likert scale from 1 to 5, questions on the followings:

- How often technology is used in their works?
- How aware are they of the cutting-edge technologies?
- How necessary do they believe technology is to agriculture?

The questions were not read to them but rather explained in a very delicate way in order to get the most delicate and tangible information from them. The method of sampling I have performed is research is called Purposive sampling, in which I have selected the contributors based on specific criteria. The results of the survey are listed in the sections below.

Results and Findings

Figure A: In the bar chart below; there are 33 men and only one female that has answered to the interview request. This result is adaptable, because it is expected that farming and agriculture sector works require muscle strength more than cognitive skills, this is why the males make 97% while the females only make the remaining 3%.

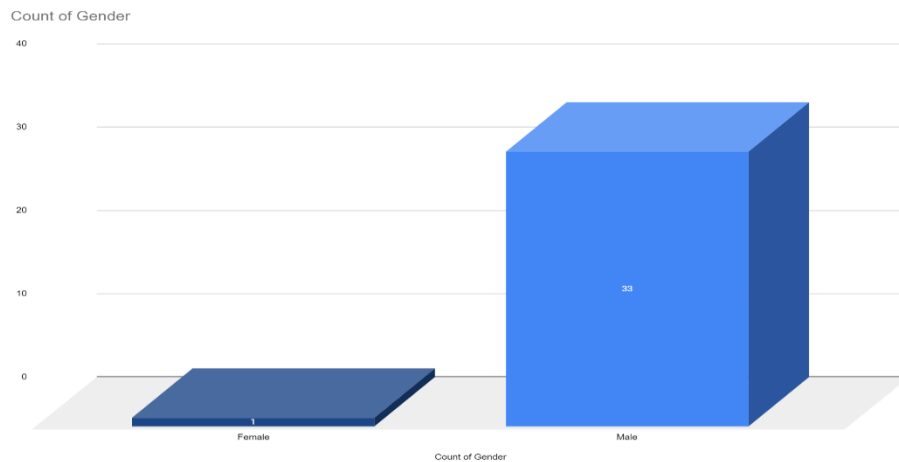


Figure 2 The participants

The people that are in the farming and agriculture sector are 18 to 24 years old, turn out to be 15 out of 34, which make roughly 44.1% of the contributors. This number is from both farms and technology areas; this is why people below 24 years old show more in the graph chart below. The second place in the chart that represents mostly farmers in the graph below are ages between 35 and 44 that make up to 29.41% of the participants. The rest of the contributors in 25 to 34 years old make 23.53% and the ages of 45 to 55 make only 3%.

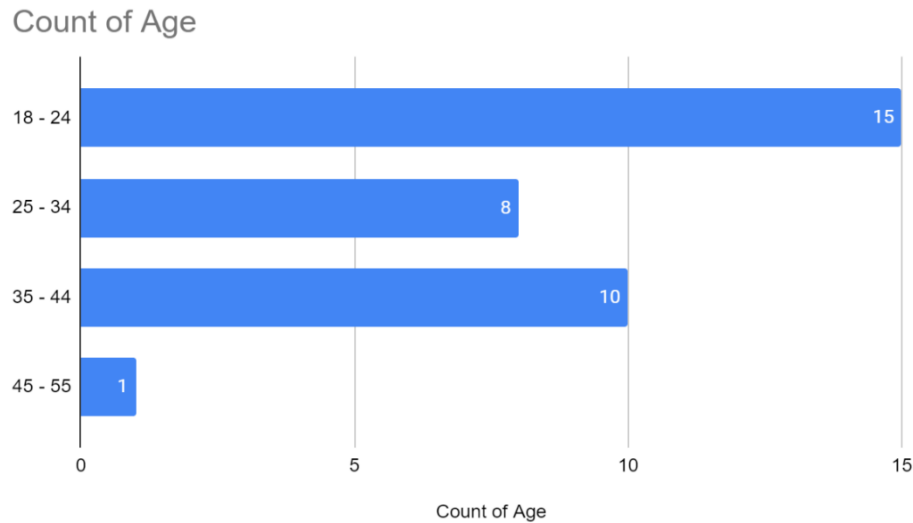


Figure 3 The participants' ages

The rate between married and single participants are close to each other as can be seen in the chart below; 44.1% are married and 47.1% are single. A minority of them are engaged or divorced, which is 5.9% and 2.9% of all. This shows, that farmers and technologists are either providing for their families or they are young adults joining the crew fresh.

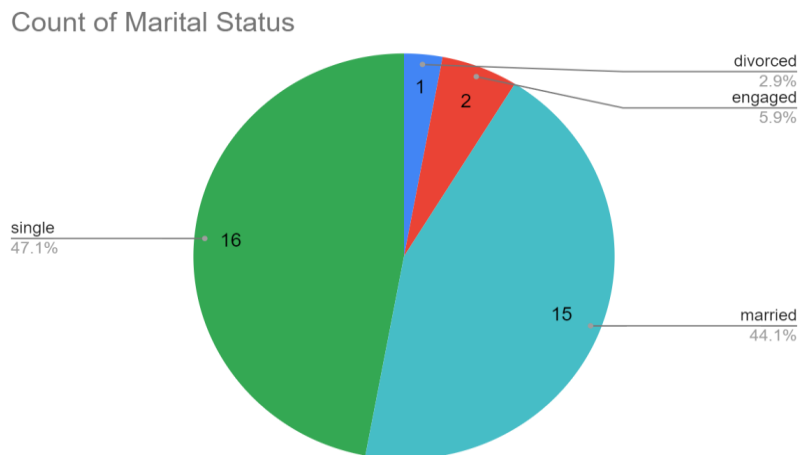


Figure 4 The participants' marital status

33 out of 34 which is 97% of participants in the survey, are Kurds, and only 3% which is only one out of 34 contributors is Arab. The majority living in those areas are Kurds.

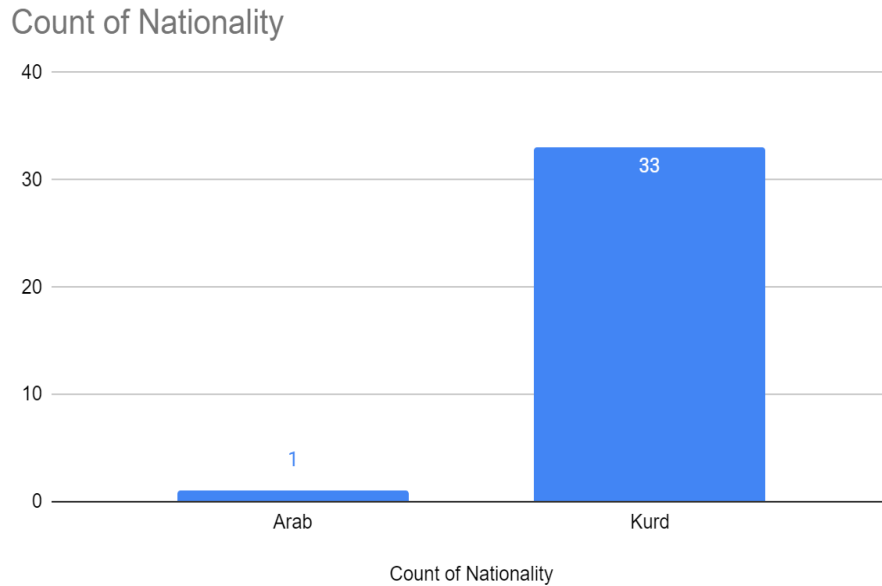


Figure 5 The participants' nationality

As seen in the graph, 14 out of 34, which is roughly 41.17% of the farmers don't ever use high technologies in their farms due to their lack of awareness in the field and lack of knowledge about what technology can be used in their farms. Only 11.76% of the participants often use technologies in their farming works.

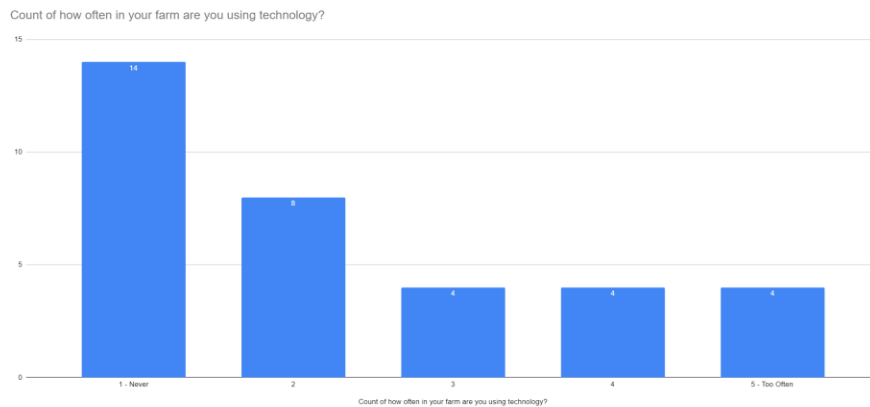


Figure 6 The use of technology in farms

Most farmers apparently don't use technology often in their farming and agriculture activities, while 35.29% of them claim to be very aware of agriculture activities. Only 8.8% claim to have no awareness in the field's technologies.

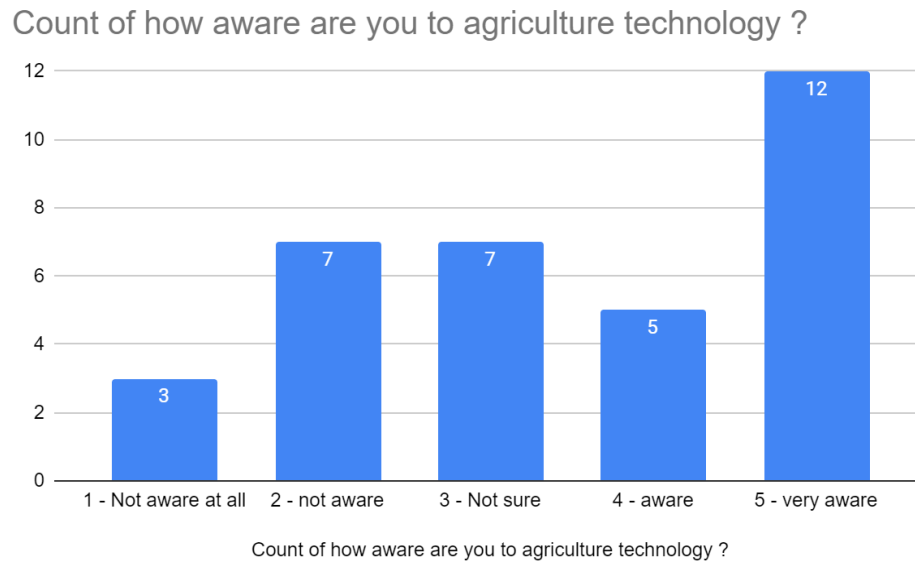


Figure 7 The awareness of the participants' use of technology in farming

79.41% of the participants have strongly agreed and believe that technology is a necessity for agriculture success. This means the people don't need awareness, they rather need access for new technologies.

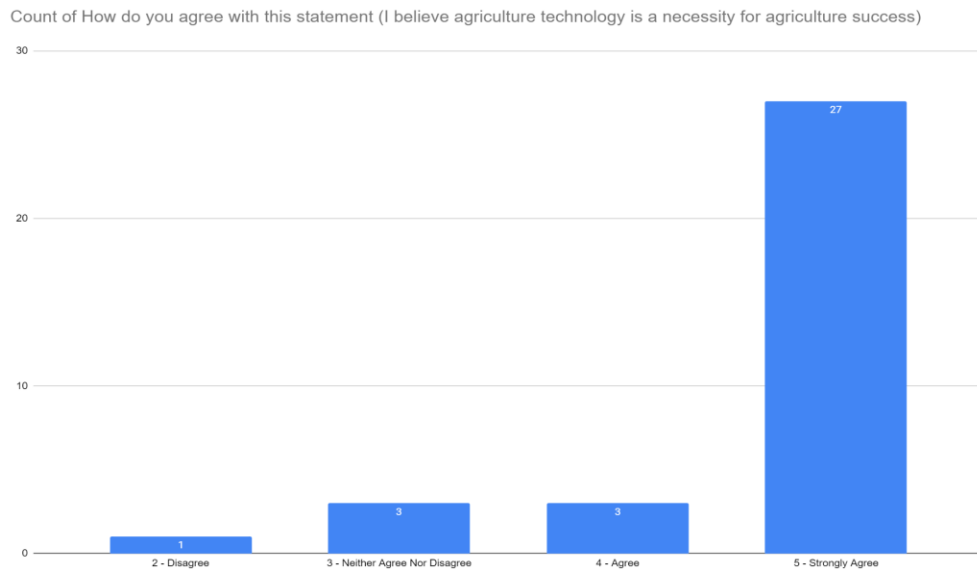


Figure 8 The participants' opinions about the use of technology in farming

Conclusion

The research focus is on the Sulaymaniyah agriculture sector and why it doesn't use agriculture technology. Due to this reason, 34 participants are interviewed face to face and I have found that they are completely aware of the importance of agriculture technology but they are not using it. The reason behind that is the inaccessibility of agriculture technology in Kurdistan.

This research contributes to business people who are able to invest in an expansion of a business. And agriculture technology is a great industry to invest in for more productions and for expanding the agriculture sector. It is a great investment for the future since after some decade's resources will decrease so the agriculture production will also decrease. This would lead to a problem of scarcity of food production. Agriculture technology should be taken into consideration by the farmers, business owners, or any other entity that is willing to expand the agriculture sector in the Kurdistan region of Iraq. Sulaymaniyah especially should focus on agriculture technology due the high number of youths. They can be trained and educated to learn about agriculture technology and this would lead to job opportunities for them as well as developing the agriculture sector.

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