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FACULTY OF TROPICAL AGRISCIENCES

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Master's Thesis

**Use of Mobile Phone by Farmers and Its Implication on Farmer's
Marketing Capacity in Lattakia Region, Syria**

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Declaration

I, George Bchara declared that the research title: “Use of Mobile Phone by Farmers and Its Implication on Farmer’ Marketing Capacity in Lattakia Region, Syria”, and the results stated here was carried out just by me under the supervision of Ing. Petra Chaloupková, Ph.D., dr. h. c., of the Faculty of Tropical AgriSciences and all the sources have been quoted and acknowledged by complete references. This work has not been submitted to any other university for any degree or academic qualification.

In Prague 6 - Suchdol

Signature.....

George Bchara

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Abstract

The use of mobile phones in development and reduce the poverty has more attention in the last decade. There are many farmers involved in market information searching in the developing country, but the number of farmers who uses the mobile phone to obtain the information is very low. The reason for that is lack of official sources and the credibility for the information. Limited access to the information leads to wrong decisions and poor planning by farmers, which had affected farmer revenue and environmental degradation. This research considers the importance of market information system in Syria as a complementary tool for the post-war reconstruction in order to take advantage of mobile phones to improve the income of the farmers. Therefore, this thesis aimed to analyse and identify the impact of mobile phones use on the farmer' marketing capacity and the importance of marketing information systems in supporting farmers' decision to marketing their products. In addition, we identified what type of agricultural information is requested by the farmers to improve their income.

The research combined the analysis of primary data gathering through a questionnaire survey among 140 farmers in the Lattakia region in August 2019. The value-chain analysis and benefit distribution among farmers were also documented.

The results showed that gender of the respondents in Lattakia region does not have any effect on the farmers selling price for their production. While the level of education has a high effect on the selling price and helps farmers to get a higher selling price than those who do not have enough education which in turn leads to having a positive impact on their income. The results of this research indicate that farmers who receive market information have the advantage to make the right decision and selling their products at a higher price, which lead to improving their income.

The mobile phone would be an important tool to eliminate the intermediary from the value chain and increase the value share of the farmer.

Keywords: Agricultural marketing, ICT, Information system, Mobile phone, Syria.

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List of abbreviations

Agricultural Marketing Information System	AMIS
Central Bureau of Statistics	CBS
Food and Agricultural Organization	FAO
Gross Domestic Product	GDP
Gross National Product	GNP
Gross Output	GO
Information and Communication Technologies	ICTs
Marketing Information System	MIS
Non-Governmental Organizations	NGOs

1. Introduction

Post-war reconstruction of countries is a complicated phenomenon with undefined outcomes and risks of setback. After the war, Syria is likely to find itself in the whirlpool of different socio-economic pressures. Agricultural markets play an important role in the lives of poor people in Syria. The concept of post-war reconstruction focuses on the peace and security build-up through investigation of socio-economic sustainable development in conflict countries. A successful reconstruction term needs more than the revitalization of housing and infrastructure but require also ideological and educational dimension.

The term 'post-conflict' is not related to complete cut-off or removal of the cause of the conflict (Fischer 2004), the term "post-conflict reconstruction" can be understood as a complicated process which include the efforts to improve the economic situation, including development and rehabilitation, while Paris (2007) commented, that efficiency of peace-building after war needs more than to learn the lessons from the past. This dimension usually includes the distribution of relief aids, infrastructures restoration and facilities, in addition, the creation of suitable conditions for the private sector development that will allow to achieve sustainable growth and economic stability.

The countries coming out of civil war are usually be unsuccessful countries need extensive institution-building in combination with the attempts of economic reconstruction, which usually include variety of actors such as multilateral institutions with its agencies, in addition, regional development banks, multilateral donors, NGOs and private companies. The research of post-conflict reconstruction focuses rather on other sectors than economic reconstruction (Coyne 2007) and deals with reconstruction economic issues only segmentally or with few specificity (Castillo 2008), despite its need for the population affected by war. The conflicts are different in duration and intensity, their impacts are in most of the cases affecting human and physical capital on varied levels, with the economic decline being moved below pre-war levels. This is the case of Syria. Within agriculture sector, agriculture plays a key role in Syria and this role confirmed by World Bank studies (1999) due to its contribution of provision of subsistence of rural populations.

For implement and design marketing information system (MIS), information communication technology (ICT) is one of the solutions in the past tense and the ICT have the possibility to improve the agriculture sector in developing and developed country (Mehra 2010). The ICT have positive impact on the farmers' income growth in developed and developing countries and that what (Jensen 2007) stated in his study in India when he evaluated the impact of the mobile phone in fishing industry.

The market information system (MIS) was very important source for policy making and researcher historically (Sulaiman 2017). Shepherd (1997) reported that provision sufficient market information has significant impact of the farmers, policy makers, government and traders. In the least developing country, the marketing information system role is to improve the rural growth, rural livelihoods and market access (Islam 2010; Boughton et al. 2007; Alemu 2006).

The goal of the agricultural marketing information system (AMIS) is to give the advantage to the farmers to have the ability to analyse, collect, access and use the information to have better response to the markets need by taking the advantage of information communication technology especially in developing countries (Sulaiman 2017).

The administration of science and education of the United State Department of Agriculture in 1980 established a new system named as 'Green Thumb' and the main objective for this system was collected the agricultural information from different source like private companies, agents and specialist then this information was received by minicomputer at the University of Kentucky and distributed daily through the country extension offices through the TV and home telephone (Warner & Clearfield 1982). The same system was entered to Africa due liberalization market period in 1990 when the government stopped to determine the price through the cereal board.

The research of Svensson and Yanagizawa (2009) studying the impact of distributed the information through the radio (FM) on two farmers group in Uganda and the result was that the farmers with access to the radio they obtain better selling price from the farmers without access to the radio. Another research in Kenya to link the farmer with the buyers the agricultural exchange commodity establish system to distribute the information (Karugu 2010). This system gave the farmers the advantage to achieve higher price to sell their production comparing to the price when they sell the production through the middleman.

Therefore, the research was conducted in the location to determine the marketing chain applied in Syria, showing what types of information are required for marketing, channels available are using to disseminate market information to farmer.

2. Literature Review

2.1 Information and communication technology

Agricultural extension plays an important role in achieving economic development (World Bank 2007) and access to information can have a positive impact on poverty reduction and development (Torero & Braun 2006). The information and communication technology (ICT) are one of the methods, which can use for development and help to involve the stakeholders in the development (Janssen et al. 2017). Fischer et al. (2009) said that we should concentrate on the ICT as a biotechnology revolution, translate the technological opportunity into economic gain it is always challenged for small holder farmers (Tadesse & Bahiigwa 2015).

The development and advancement of ICTs helped to facilitate business and economic development and has contributed to improved access to markets which lead to significant changes that have contributed to creating eligible effects in improving market efficiency (Mittal et al. 2010). Other studies indicate that economically weak developing countries will be able also to use this technology (WDR 2016). New farming system is development method, which focused on the use of information and communication technology (Wolfert et al. 2017).

The ICT in the agricultural sector has shown its ability to reach farmers (Bhatnagar 2008), The ICT sector includes mobile phones, television, internet and radio, while we can note that mobile phones have become common in the last years. Behavioural changing and awareness about the importance of information and communication technology are the most important factors that help to adopt this technology ICT (Dillon & Morris 1996). However, access to the market information was very expensive for farmers who want to sell their products at the right time and place. We can note also that the high cost to access this information through direct contact between farmers and market has also helped to use and adopt ICTs. These high costs lead to decrease the production selling price of small farmers (Holden, Shiferaw & Pender 2001). The mobile phone has helped to change the world and helped the people to communicate around the world at any time (Gartner 2016), even the people who are living in developing countries are able to connect to the mobile phone increasingly (Dan es et al. 2014).

2.2 The role of mobile phone in agriculture

An article in [The Economist \(2008\)](#) reported “A device that was a yuppie toy not so long ago has now become a potent force for economic development in the world’s poorest countries.” The mobile phone introduces the benefits for consumer and producer for the economic development in the country ([Aker & Mbiti 2010](#)). Mobile phones have the ability to reduce information asymmetry between farmers and other influencer in the value chain, adopt new technologies ([Bhatnagar 2008](#)), and reduce transaction costs ([WDR 2016](#)). More people have access to mobile phones than radios and landlines ([Aker 2011](#)). Marketing decision by farmers should be guided by market information and mobile phones improve the agricultural production practices in addition allow to adopt new practices ([Lio & Liu 2006](#)). The use of mobile phones by farmers should ensure that they have access to real information to face the challenges that keep many small farmers from accessing to the market information and markets to sell their products ([Winter 2012](#)).

The village markets are recognized by asymmetric information, where traders are more familiar than farmers about prices in main markets ([Tadesse & Shively 2013](#)) which makes the search for market information very expensive for farmers but mobile phones give the farmers an opportunity to communicate directly with market and customers for sell their product in high price ([Razaque & Salleh 2013](#)).

However, the weakness of many studies is that it ignores the importance and role of information and communication technology (ICT) in decision-making ([Doss 2006](#)). Access to market information is very important in agriculture to make agricultural decisions in production, marketing and finance. Sometimes adoption of new technology does not mean those farmers will get the high benefit from this technology ([Tadesse & Bahiigwa 2015](#)). Many of the example for adoption the mobile phone for information delivery is slow and in the early stage of development ([Mittal & Mehar 2012](#)).

[Mittal and Hariharan \(2018\)](#) show in the case study of India that most of the farmers the agriculture is the primary occupation for them, and they depended on non-governmental sources like friends and traders to get the information.

The farmers without access to mobile phones were facing many problems in selling their product and getting information regarding market compare with farmers who use the mobile

phone. According to [Tadesse and Bahiigwa \(2015\)](#), the reason for low using of mobile phones for information searching is that farmer cannot contact related officers for information to get information about market price, in addition to the missing of formal information sources.

One of the most important result in the study of South Benin shows that the pineapple producers, who selling the product to the rural market, is identified by low quality and that is a strong evidence related to their poor access to the market information (quality and prices), their level of education and weak capacity to response to the international market requirements ([Arinloye et al. 2015](#)). The important concern for many scientist and development research's is that many farmers own a mobile phone but what is the scope for this technology to help farmer in making their marketing decision ([Tadesse & Bahiigwa 2015](#)).

Limited access to the marketing information leads to information gap, which leads the farmers to wrong practice in agriculture, which in turn leads to effect the environment and decrease productivity ([Munene & Kasamani 2018](#)).

The main goal of using mobile phone to get marketing information is to reduce the gap between the large and small farmer by creating awareness ([Mittal & Mehar 2012](#)). Farmers who use traditional way to searching for marketing information through face to face with buyers requires from farmers to carrying every time small amount of the product and searching for the buyers who give them high price but this method not required in the presence of mobile phone that reduce the costs of information searching and help farmer to hold large amount from the product to the market ([Tadesse & Bahiigwa 2015](#)).

[Razaque and Salleh \(2013\)](#) showed that mobile phones have saved energy and time of farmers in addition to improve their income. Even that there are different studies showed that the impact is not strong enough to believe that mobile phones are really helping farmers to make marketing decisions ([Tadesse & Bahiigwa 2015](#)). However, market fragmentation is common ([Jeffrey R. Brown & Austan Goolsbee 2002](#)), in developing countries ([Jensen 2007](#)). Previous studies ([Aker & Mbiti 2010](#)) suggest that farmers were not using the phone because lack of their knowledge, skill and capacity, and farmers may fail to use it if they are unaware of its advantages ([Luarn & Lin 2005](#)).

From the business point of view, the farmers always try to search for methods to improve their income. In one hand, they try to reduce costs, and in another hand, they try to get better price (Wolfert et al. 2017).

According to Tadesse and Bahiigwa (2015) the number of farmers who use the mobile phone for searching information is very small. The reason for low use of mobile phone for searching information is the lack of information which can be accessed through mobile phone. The lack of mobile phone as a means for accessing agricultural information seems to be to the lack of use a mobile phone to search for agricultural information.

2.3 Factors influencing the using of mobile phones

Other studies in South Africa have also reported that the weakness of infrastructure, lack of transportation, and limited of market information have negative effect of using different market channels (Jari & Fraser 2012).

There are many factors effect on the farmer to own mobile phone which connected to the infrastructure in the developing country. Tadesse and Bahiigwa (2015) study in Ethiopia shows that the electric power has significant effect on farmer because many farmers owned mobile phone with short life battery, so they need to charge the mobile phone many times during the day.

Nyamba and Mlozi (2012) showed that there are a lot of factors which influenced the used of mobile phone in agricultural information communicating included the lack of electricity, mobile phone ownership, network coverage, agricultural information, the farmers' socio economic characteristic, poverty and lack of knowledge. The results of Kabbiriet al. (2018) shows that the socio-economic characteristics have positive and direct influence on the usefulness of use mobile phone and this variable does not have any influences on the adoption decision on mobile phone.

The use of mobile phone by farmer to provide information it also depends on how the network of mobile phone can be link the farmers to the market information (Mittal & Mehar 2012). According to Tadesse and Bahiigwa (2015) age and education are the most factors which have

a significant effect on owning a mobile phone. Young and educated household have a higher probability to own a mobile phone than an uneducated and old household. [Aker and Ksoll \(2016\)](#) suggest that farmers who receive access to use the mobile phone and learn how they can use it help them to increase the number of their products. The result showed them that learning farmers how they can use mobile phone is more important from the access. The analysis of farm gate price is obvious indicator to see the impact of mobile phone and according to [Tadesse and Bahiigwa \(2015\)](#) the result shows this impact was always insignificant also this result suggest that benefit from using the mobile phone can be useful for certain farmer to search for specific type of information.

In the study of Kenia [Munene and Kasamani \(2018\)](#), it is shown that there are many challenges facing the farmers to search for the information include spread of the information, lack of awareness, unorganized search and lack of literacy level.

Another factor, which effect on farmers to own mobile phone in Ethiopia, is the market access so the farmers who are living far from the local market have higher percentage to own mobile phone from farmers who live near the local market ([Tadesse & Bahiigwa 2015](#)). The weak impact to access to mobile phone benefits on farmer may also back to the efficiency, which created to be more suitable for traders more than farmers ([Tadesse & Bahiigwa 2015](#)).

2.4 Farmers' marketing decision process

Marketing decisions by farmer are not guided by the price information more than the structure problems such as need farmers to cash immediately ([Tadesse & Bahiigwa 2015](#)). We also suppose that the market choice by the farmer is driven by the desire of the farmer to increase profits ([Doll & Orazem, 1984](#)). Therefore, the decision-making process of the farmer is appropriate with the efficiency and costs associated with the final decision of the farmer ([Obi, Pote & Chianu 2011](#)). For example, the process of market choice may be affected by the availability of information about products, prices and quality and the cost of this information ([van Schalkwyk et al. 2012](#)). Other previous studies showed that there are factors influencing market selection for example smallholder farmers do not choose high value markets like export markets, because of low production and limited market information in addition to other factors such as farm size, land ownership, and infrastructure ([Boughton et al. 2007](#)). Another study in Costa Rica regarding mango production showed four factors influencing market selection: the

existence of contracts to protect the farmers, price characteristics, type of production, farm size and characteristic (Zuniga-Arias & Ruben 2007), bargaining power (Kabeer 2002).

A few farmers use the mobile phone to reduce the costs of information searching (Tadesse & Bahiigwa 2015). This is due to the lack of sources of information, which can provide to the farmer's daily market price. According to Mittal and Mehar (2012), the study in India showed that mobile phone reduces the information costs and increase the market efficiencies also adopt the mobile phone help the farmers to participation in the market and diversification in the crop production, improve education, better health, etc. In the study of Nyamba and Mlozi (2012) in Tanzania, the use of mobile phone makes the market information available to the farmers and improved the position of farmer in the value chain through increase their knowledge. Also using the mobile phone increase the bargaining power of farmers against other influencer such as middleman and retailers.

2.5 Marketing information system

The information system based on mobile phone have influence on the behaviour attitudes of farmers and this information will facilitate farmers to adoption new techniques, which lead to higher yield Mittal and Mehar (2012). According to Al-Shaikh (2010) there is a positive relationship between the amount of data base adopting and the right decision making by farmers. The challenges of the big amount of data is how we can confirm the privacy and security for this data (Lesser 2014; Orts & Spigonardo 2014; Sonka 2014) because when this data exists with employees and some private companies, they are afraid to give the information to any one because they fear this information will be drop in the hand of other competitors in the market (Gilpin 2015).

Because of that the access to big amount of data and build trust with the farmers are the major points for developing (Van 't Spijker 2014). Armstrong and Overton (1971) reported that all the market chain can obtain the benefit from agriculture market information system such as the consumer by provide him information about the products and prices in the market which can be effect on his purchase decision making.

Agriculture marketing information system guarantee smoothly access to the information linked to the market especially for the farmer to get better selling price and give them the advantages where they choose to sell their production (Sulaiman 2017).

2.6 Syria overview

The Syrian Arab Republic is located on the eastern Mediterranean coast. In the east and southeast with Iraq (605 km) and its southern border is with Jordan (375 km). In the north, it borders on Turkey (822 km) and in the west, Israel (76 km) and Lebanon (375 km) and the Mediterranean Sea (193 km) (ARRAF 2016). The length of the Syria borders is approximately (2,274 km). Syria is a Mediterranean developing country characterized by a Mediterranean climate of hot summers, rainy winters and two short season autumn and spring (Sulaiman 2017).

Agriculture in Syria is the major source of national glory and the Syrian identification, in addition, the backbone of the Syrian economic (Humphries 2018). Agriculture plays an important role in improvement the national economy through its contributions to the economic and social development of the country which measured by GO, GDP, and employment percentage, agriculture has impact on non-agricultural activities such as marketing, processing and to provide the raw materials for the agro-industry, agriculture in Syria has influence on the trade of non-agricultural goods and services, its role in accomplish food security and its impact on the environment sustainability (Sulaiman 2017).

The agricultural sector in Syria provided the main principles for the economic. Despite in the last years the importance of fuel and gas sector has been increased, the agricultural sector still has been significant impact in the Syrian economic. In addition, agricultural sector is one of the most important sectors in Syria for employment in the main portion of the GNP until the beginning of 2000 and after 2000, this portion starts to decrease to 14.6 % in 2010 (ARRAF 2016).

In 1970, there was 51% of the workforce was employed in agriculture compared with 28 % in 1999 and 16.4 % in 2009. However, the percentage of those who working in industry was 21% in 1970 compared with 38 % in 1999 and 32.4 % in 2009. While the percentage of those who

working in services were 28 % in 1970 compared with 34 % in 1999 and 51.3 % in 2009 (Richard & Waterbury 1990, 74; Arabic News 26.3.1999; Syria Central Bureau of Statistics).

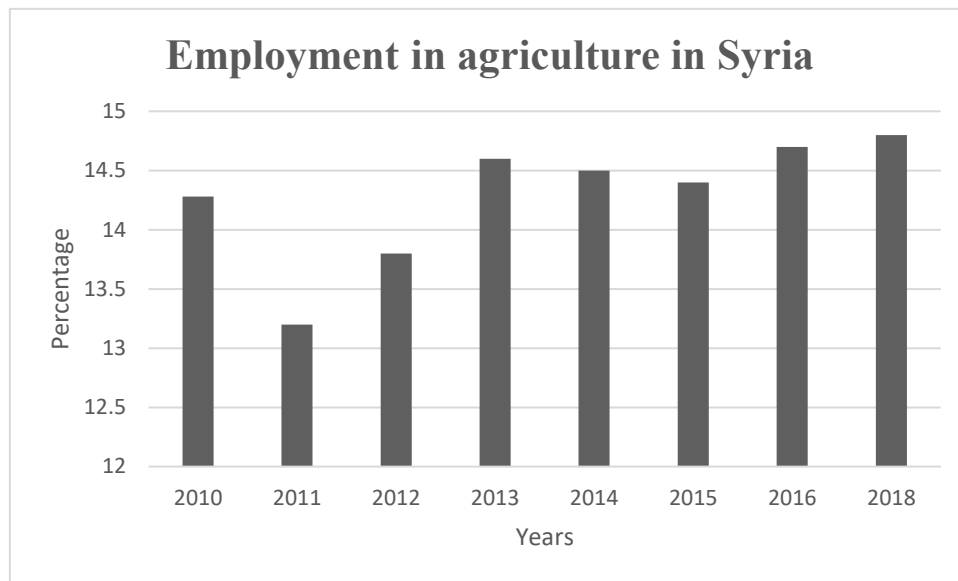


Figure 1: Employment in agriculture in Syria

Source: World bank trading economic, 2019

All, this decrease in the number of peoples who works in agricultural sector in Syria, it still counts one of the high percentages comparing to other countries near Syria like Jordan, Iraq and Lebanon with similar GNP (ARRAF 2016).

2.6.1 Importance of the agricultural sector in Syria

Before the current crisis start in 2011, the agriculture played an important role in the Syrian economy. It was contributed as much as 27 % of GDP in 2001, but this percentage decreased to 17 % in 2010 (Humphries 2018).

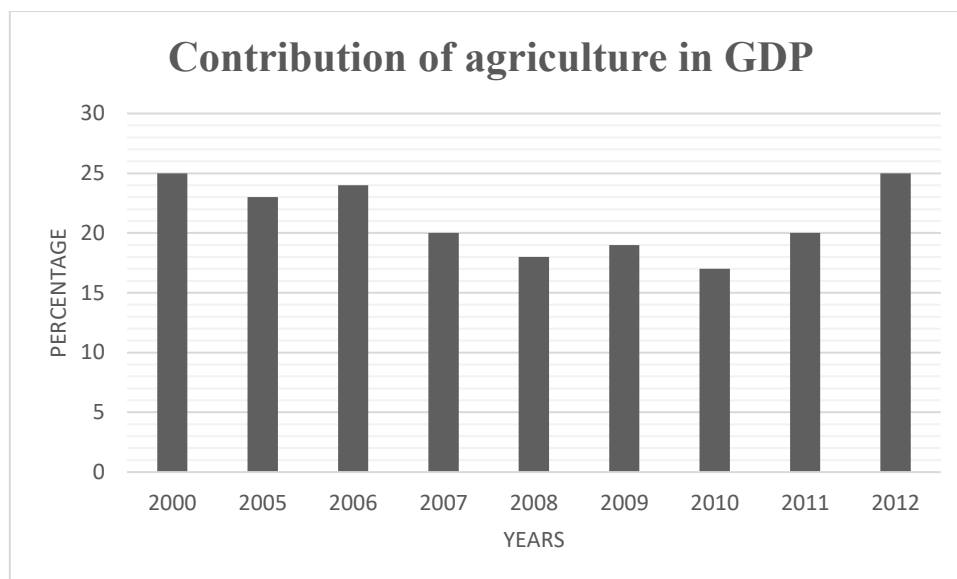


Figure 2: Contribution of agriculture in GDP

Source: CBS, 2013

From my point of view, Syrian crisis started because of different reasons including religion, political, and economics. We can note that people there were suffering from climate change particularly in the northeast part of Syria where most of the country's crops are grown. In Syria 26% of total working population working in agriculture, but in rural area about 80 % working in agriculture as their main source of income ([Central Bureau of Statistics 2019](#)).

Despite all these challenges since the crisis started and the impact of drought years from 2006 until 2009 and in 2014 in addition, the high squeeze on the country resources due the sanctions, the agricultural sector still the second largest contributor to GDP in Syria after the government service and it still play an fundamental role in Syria. The agricultural sector is one of the most productive sectors in the economy, a basic source of livelihoods and safety for the poor people in rural and peri-urban areas.

In Syrian agriculture sector there are various weakness points is still operation and provides a platform to start the recovery build and reduce the migration out of Syria. One of the major sources to improve the food security and nutrition and provide basic subsistence needs for the people who are affected by this crisis is the agriculture sector ([FAO 2016](#)).

All this huge destruction in the agricultural sector, agriculture sector still the major occupation for Syrians people and there are a lot of things that we can built up on. According to FAO the household in the rural areas, they still depend on agriculture as main source for income and livelihood. More than 75 % or rural household still produce crops for their own consumption. The food consumer prices increase 800 % in Syria between 2010 and 2016 since the conflict start this in turns lead 90 % of the household to spend more than half of their income on food compared to 25 % before the conflict (Humphries 2018). The challenge facing, donors, policymakers, institutions and assistance organizations is how to reduce the further damage of this sector.

2.6.2 Impact of the protracted crisis on food security and agriculture

The farmers in Syrian facing different problems in the production transport from the farm to the market due government loss on the highway during the crisis as well as the traders and transporters are facing high transaction cost and high security risk. In this period for example the cost of transporting fruit or vegetables from Lattakia province to Al-Hasaka province cost ten times more than it was before 2011 making these commodities unavailable. Because of that reason the supply and market have fragmented in Syria which in turn lead to restriction for the producer's movement (FAO 2016).

According to the Syrian Chamber of Agriculture and National Agriculture Policy Centre, Syria was one of the most important exporters for the agricultural goods like cash crops, fruits, vegetables cotton, olives, wheat, barley, lentils, milk, etc. The export in Syria in 2011 estimated at 7.9 Million USD and now this amount was decline to 1.7 Million USD in 2015.

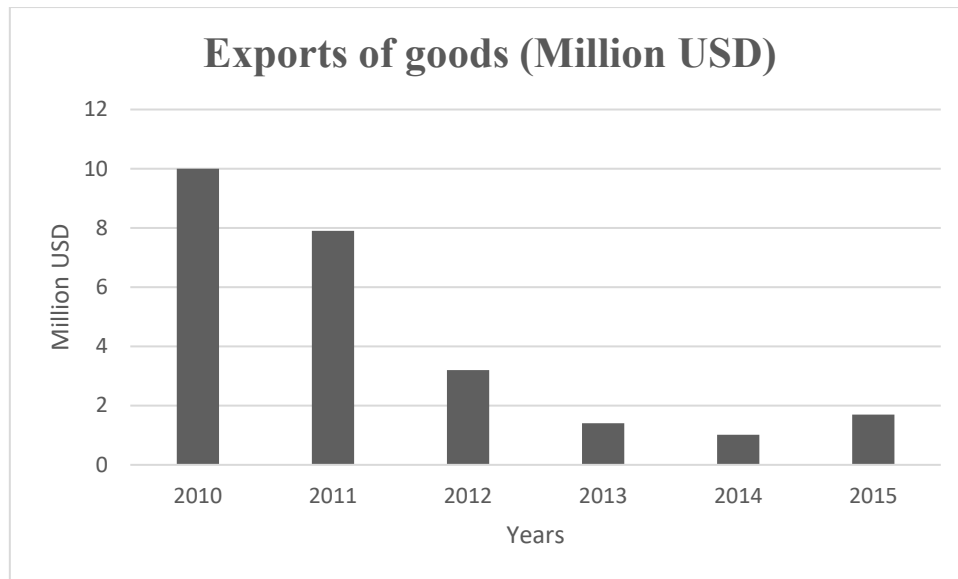


Figure 3: Exports of goods (Million USD)

Source: Chamber of Agriculture, National agriculture policy centre, (Bayram 2018)

The negative impact of this conflict it was not just on Syria, but also on the neighbouring country like Lebanon, Jordan and Iraq because of the lack of agricultural commodities exports from Syria. These countries find themselves in a huge problem as result of their Syrian refuges hosting the population start to increase and they do not have the capacity to produce sufficient food for this amount of population which in turn leads to increase the food prices in host countries (FAO 2016).

3. Aims of the thesis

The main objective of the thesis is to determine the impact of using mobile phone to access market information on selling price that farmer receive and its influence to improve farmer income. The specific objectives are to analyse the relationship between gender and use the mobile phone to access the market information on selling price, to determine the influence of level of education on the use of mobile phone to access market information by farmers on selling price and to identify what kind of information are needed by farmers in Lattakia region. In addition, based on our results, there are provided recommendations for improvements to the organization and governance of the market in the Lattakia region.

Three hypotheses were defined, as follows:

H₁: There is a relationship between using of mobile phone to access market information and farmers income.

H₂: There is a difference in gender as to the use of mobile phones to access market information leading to achievement higher selling price of the production sold.

H₃: Higher educational status leads to achievement of better commercial results expressed through higher selling price of the production sold for farmers.

4. Methodology

4.1 Research design

The transmit of marketing countries supported by state, particularly those in transmission from the organized and structured economy to liberalization has resulted in a decrease in government support like inputs, prices control of consumer and producer. Therefore, to accept this new market environment and to establish a competitive market like the western countries' market, the support from the government side must be provided and insured. Even for countries where the private sector has played an important and major role in agricultural marketing the government support is always needed like providing infrastructure (Sulaiman 2017).

A market information system is the best way to define farmers with information and communication technology by providing information services for them through these means and encouraging relationships with extension offices, which provide training and other support to the farmers.

The research question is “Which factors affect the use of mobile phone to receive AMIS by the farmers? This Master’s thesis provides general view on the use of mobile phone and its importance for farmers in agriculture to increase their production selling price and improve their income. It helps to identify the marketing capacity information needs of farmers. The results provide necessary data in order to be able to design and implement adequate education programmes to increase farmer knowledge about the impact of using mobile phone as a mean for AMIS. This study could be a good source of information for government to develop appropriate agricultural policy.

During the elaboration of this thesis, two types of data collection were used. Thesis is mainly focus on analysis of collected data from farmers. Primary quantitative data were collected through a questionnaire-based survey. Survey distribution was done from middle of August until middle of September 2019 when we distributed the questionnaires to the respondents and collected the data after the harvesting time.

Questioned farmers were selected according to their activities and their production orientation in terms of growing crops and their market orientation. Secondly, personal interviews with

representatives of local farmers and leaders of village were managed through structured interviews. Thirdly, the research is based on scientific articles, statistical information, and other databases, which were carefully analysed in order to have a clear view of studied problem. To collect as much data as possible, several methods were used, such as direct interview, observation, and discussions. It worth mentioning, no constraint of languages was faced, because the Arabic language is the mother tongue of all the respondents.

4.2 Questionnaire survey

These respondents were asked the questions related to:

- 1- Their economic and social characteristics such as, level of education, gender of the householders, and area of farmland.
- 2- Cultivated varieties, annual income, production quantities, methods of marketing the production, how to get market information and types of information needed in addition to their capacity for using ICT.

The questionnaires included 34 questions and these questions were divided in to 5 sections:

A - Farmer socio-demographic characteristics,

B - Household information,

C - Characteristics in business,

D - Production parameters,

E - Market information.

4.3 Studied area

The city of Lattakia was selected as study area of the research because it is one of the most important agricultural provinces in Syria with the highest production of citrus, olive, apple. Lattakia produce 77 % of the total production of citrus in Syria in addition 16 % from the total production of olives (United Natition 2014). Lattakia region Figure (4), contains to its geographical location it considered one of the most important cities in exporting agricultural products to neighbouring country like Lebanon, Turkey, Jordan. In addition, Lattakia is the first waterfront in Syria for exporting agricultural products to the international market and this has made it one of the strongest agricultural markets due the huge quantities of production and four major districts (Lattakia, Al-Qurdaha, Al-Haffi and Jablih), was selected as the target area.

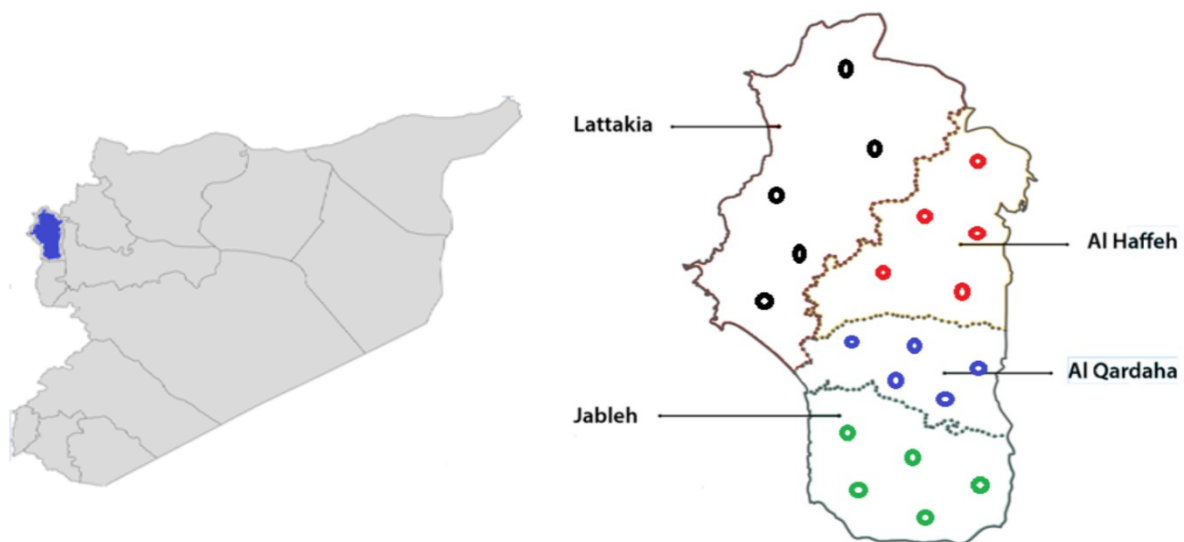


Figure 4: Map of Lattakia region

- The Al-Hafi district. Al-Hafi is a city with a wholesale market, about 27 kilometers distant from Lattakia. It consists of 17 municipalities with 96,012 inhabitants with villages and areas such as: Rabia, Defil, Alzenqokah, Pabana, Qadisiyah, Slenfeh (SBS 2012). The Al-Qurdaha district. Al-Kurdaha city and its forty-nine villages produce. It is located 30 kilometers far from Lattakia city.
- The Lattakia district. Lattakia has one hundred and twenty-seven villages. Lattakia is district of the Lattakia governorate in northwestern Syria. The administrative centre is

the city of Lattakia. The district of Latakia is divided to seven sub districts: Lattakia, Al-Bahluliyah, Rabia, Ayn al-Baydah, Qastal Maaf, Kessab, Hanadi (SBS 2012).

- The Jablih district. Jablih is a Syrian port on the Mediterranean Sea, it has an airport: "Humaimam". Jablih is situated 28 km south of Lattakia (35.37N, 35.94E) and has the following townships: Alkotailbeh, Ras Al-Ain, Ain Shkak, Al-Dalih, and the following villages: Al-Hoiz, Al-Burjan, Humaimam, Dwyer Babda, Al-Humam, Ain Al-Sharkiah (SBS 2012).

4.4 Sample size

The number of questionnaires was determined according to the variety of the respondents. Thus, sample of 50 questionnaires would address in the first stage, to calculate the respondents' standard deviation, internal consistency, validity. The final number of respondents was calculated by the formula (Thompson 1996):

$$n = \frac{N * P(1-P)}{\left[[N-1 * \left(\frac{d^2}{Z^2}\right)] + P(1-P) \right]} \quad (1)$$

Where n = sample size, N = the size of the community, Z = Confidence level at 95% = 1.960 and 2.58 at 99%, d= the error rate is equal to (0.05), P= the proportion of characteristic availability and Neutral equal to (0.50).

In total, there were distributed 150 questionnaires from the local farmers. Questionnaires were designed and addressed to 150 farmers from 20 randomly selected villages in four Lattakian districts, five villages from each. The respondents in each village were selected from farmer's records and after the harvesting time. Finally, we collected 140 completed questionnaires from the respondents.

Our research build on two groups: First group is informed group which received market information (supply / demand, crops prices in the market) through the ICT and for that we recognize that the mobile phone is suitable equipment to distribute the information because it is easy and less consuming time to send the information via SMS and call. In addition, all our respondents have access to mobile phone. Second group, considered as control group, is non-

informed group, which do not receive any information, and they depend on their own information.

The reason to have these two groups in our study is to clarification the effect of the market information and how can the mobile phone play an important role as source to deliver the information to the farmers to help them for improve income, obtain better selling price. Another reason for this research is to determine the type of information needed by the farmers. We indicate how farmers can depend on the mobile phone as relevant source for information to obtain the information through it.

4.5 Data analysis and data sources

All the data, which were gathered from farmers, were analysed and latter graphs and tables were provided to show the results of the analysis. Basically, Microsoft Office Excel was used for a better hierarchy of data and possibility of construction of needed tables and graphs, in addition to the Statistical Package for the Social Sciences 18" (SPSS 18), different type of test used to analysis the research hypothesis Chi-Square, T-test, ANOVA test to indicate the relation between the variables.

Marketing margin and producer share

Marketing margin (M) it is the difference between the net price which the farmer received (P_f) and the final price which the consumer paid for the product (retail price P_r) (Phiri et al. 2013)

$$M = P_r - P_f$$

The marketing margin show the effectiveness of the marketing system which in turn lead to show us the efficiency of the intermediaries between the producer and the consumer in the services received by them (Sapkota 2008). The first step for measuring the marginal market is to describe and analysis this market structure starting from the farmer gate then the product transportation through variety of intermediaries to the final consumer (Smith 1992).

The producer share is the price, which the farmer received representing as percentage from the retail price that the consumer pays it for the product (Phiri et al. 2013).

$$P_s = (P_f/P_r) * 100$$

Where P_s is the value of producer share, P_f farm gate price and P_r is the retailers price.

The increase in the producer share refer to high and efficiency marketing system for the producer/farmer and vice versa. When the producer share is low, it refers that the middleman obtains more and large share. It is also determining the method when the length of the market have negative effect on the farmer profit because the indicate that the middleman gain more profit than producer.

The added value is the amount that every actors or influencer add it to the chain. It is the difference between the price that this actor or influencer to buy the product and the price which he/she sells this product. The value share (VS) can be calculated by dividing the added value (AV) to the final price of the product (P_r) then multiplied by 100 to represent it as percentage (Omar et al. 2014).

$$VS = (AV /P_r) * 100$$

Where the V_s is the value share in percentage for the factors which influence on the chain, added value (AV) is the extra value add by the influencer on the product before selling (the difference between selling price for the influencer and the buying price), and the price retailer P_r is the final price were which the consumer pay for the product.

5. Results

5.1 Characteristics of the respondents

Farmers' characteristics (age, gender, and educational level) are important in understanding the differences in marketing information asymmetry and selecting channels for the dissemination of market information. Table (1) shows the results of gender distribution, where the majority of respondents were male with 62.86% and 58.57% for the informed and non-informed group, respectively. It can be observed that men who work in agriculture are more than women due to the traditional weakness of the female social position compared with male.

Regarding the age distribution, Table (1) indicates that the informed group between 31 and 35 years was found the majority with 32.86% from the total sample. This means that young people have the motivation and desire to use the ICT in their business to improve their income. On the other hand, the non-informed group illustrates a big difference in the age of the respondents, where the majority of respondents were between (41-45) years, which indicate that adult people depend on the traditional approaches for promotion of their products.

As far as the marital status of the respondents is concern, we can indicate that the married status was the highest approaches for promotion of their products in both group with 80% for the informed group and 87.14% for the non-informed group. The level of education for the informed group was higher than the non-informed group with majority of 47.14% in secondary level for the informed group. These results can be considered in order to help and facilitate using ICT. Also, it shows that high level of education helps respondents to have high ability for adopting ICT to support their decision and market their product in the right time and suitable place. The highest categories household size depicted similar results (4-6 members) for the informed and non-informed group with 60% and 72.85%, respectively. Generally, the occupation of the respondents was farming with 27.14% for informed group and 51.34% for the non-informed group.

As to farmers' means of communication in the Lattakia region like TV, Radio, personal mobile phone, personal computer, and internet are considered crucial to understand the differences in marketing information asymmetries and selecting channels for the dissemination of market information. About 95.71% of the farmers have TV, 38.57% have a personal computer, 97.14% have personal mobile phones, and 25.71% have access to the Internet. These results may

indicate the inability of disseminating market information online and indicate that most of the farmers have mobile phones. Therefore, these findings can assist to transmit market information to beneficiaries.

The results in Table (1) indicate that most of the respondents in the informed group are using mobile phone to get the market information with income between (200-300) and (301-400) thousand SP. However, the income of the majority of the responded from non-informed group were between (200-300) and less than 200 thousand SP, the results discussed, highlighted that the mobile phone could be effective tool to improve the farmers income.

Table 1: Socio demographic and socioeconomic characteristics of the respondent's characteristics

Variable	Informed group		Non-informed group	
	Total sample	%	Total sample	%
	N		N	
Gender				
Male	44	62.86	41	58.57
Female	26	37.14	29	41.43
Age				
up to 30	4	5.71	5	7.14
31-35	23	32.86	7	10.00
36-40	13	18.57	11	15.71
41-45	14	20.00	20	28.57
46-50	6	8.57	14	20.00
>50	10	14.29	13	18.57
Education				
Illiterate	7	10.00	10	14.29
Primary (1-6 years)	30	42.86	37	52.85
Secondary(7-12 years)	33	47.14	23	32.86
Higher education (university degree)	0	0.00	0	0.00
Marital status				
Single	5	7.14	7	10.00
Married	56	80.00	61	87.14
Divorced	1	1.43	0	0.00
Widow	8	11.43	2	2.86
Main occupation				
Farming	19	27.14	36	51.43
Off farm casual work	6	8.58	16	22.86
Fulltime employment	12	17.14	9	12.85
Small business owner	20	28.57	7	10.00
Student	13	18.57	2	2.86
Household size				
1-3	27	38.57	16	22.86
4-6	42	60.00	51	72.85
7-9	1	1.43	3	4.29
>10	0	0	0	0.00
Equipment own*				
Radio	65	92.86	64	91.43
TV	67	95.71	66	94.29
Personal computer	27	38.57	24	34.29
Personal Mobile phone	68	97.14	64	91.43
Internet	18	25.71	15	21.43
Car	22	31.43	25	35.71
Motorbike	32	45.71	30	42.86
Bicycle	33	47.14	34	48.57
Family Income**				
<200	0	0	34	45.71
200-300	49	70.00	36	51.43
301-400	21	30.00	0	0.00

Notes: Equipment own* the percentage for each equipment is from 100% and this is because our respondents owned more than one equipment at the same time. **Family Income**** in Syrian pound (Sp), 1 EUR = 460 SP

5.2. Analysis of differences between informed group and non-informed group

The differences between the informed and non-informed group and how can the market information influence the decision-making process of the respondents were analysed. The informed group of farmers were received on a regular basis information concerning (supply and demand, crops price). However, the non-informed group were not received any of this information.

The descriptive analysis demonstrates the difference between the informed and non-informed group for what kind of information the respondents need for their production to increase the selling price and quality for their products, which in turn lead to improve their income. The results in the Table (2) indicate that the majority of the respondents in the informed group 58.57% need information about agricultural technology while the highest percentage for the respondents in the non-informed group 55.71% was about supply and demand information.

This result can show us how the farmers in the informed group started to ask about the information related to agricultural technology and weather forecast, which can help to increase their productivity. While the farmers in the non-informed group were searching just for market information without thinking to adopt or implement any new technology.

Table 2: Type of information requested for the informed and non-informed groups

Type of information	Informed group		Non-informed group		Total
	N	%	N	%	
Crops price	0	0.00	26	37.14	26
supply/demand	0	0.00	39	55.71	39
Agricultural technology	41	58.57	3	4.29	44
Weather forecast	29	41.43	2	2.86	31
Total	70	100.00	70	100.00	140

The source of the information and the data reflect that the majority of respondents in the informed group depend on mobile phone as source of information with 85.71%. While the

respondents in the non-informed group depend on their neighbours as source of information with 62.86% as listed in Table (3). We can notice how the mobile phone could be effective and reliable as source of information to help the farmers for obtaining the information.

Table 3: Source of information used by the informed and non-informed groups

Source of information	Informed group		Non-informed group		Total
	N	%	N	%	
Mobile phone	60	85.71	3	4.29*	63
Market place	10	14.29	4	5.71	14
Neighbours	0	0	44	62.86	44
Middleman	0	0	19	27.14	19
Total	70	100	70	100	140

Note: The percentage of farmers using the mobile phone as source of information from non-informed group they are out of AMIS which mean they use the mobile phone to obtain the information from non-formal source and this information usually from middleman (which can be wrong or late information).

The most suitable way to identify the difference between the two groups is to analyse the selling price for their products. The data in Table (4) reflects the selling price for informed and non-informed group. We can notice from the result that the farmers in the informed group who received information through mobile phones, they sold their products with higher price comparing to the farmer in the non-informed group. About 37.14% of the respondents in informed group sell their production at 250 SP/Kg followed by 28.57% sell at 275 SP/Kg. The majority of the respondents in the non-informed group sell their production at 200 SP/Kg then 34.29% sell at 225 SP/Kg. We can note how ICT could be a very important instrument to deliver the needed information to the farmers, which in turn helps them to support their decision to market their product which leads to obtaining high prices for the product.

What we can also notice in Table (4) that 16 farmers from the informed group selling their products between 200 – 225 SP/Kg and we can return the causes of this point for their culture and traditional issue. This is because of some farmers give promises for specific middleman or wholesaler could be their neighbours, cousin, etc and they do not want to break this promise which linked to ethics even if they receive low price.

Table 4: Production price selling for the informed and non-informed group

Price selling Sp/Kg	Informed group		Non-informed group		Total
	N	%	N	%	
200	9	12.86	36	51.43	45
225	7	10.00	24	34.29	31
250	26	37.14	8	11.43	34
275	20	28.57	2	2.86	22
300	8	11.43	0	0.00	8
Total	70	100.00	70	100.00	140

*Prices in Syrian pound (SP)

5.3. Importance of mobile phone for agricultural market information

Likert scale analysis

The Table (5) shows the mean and the percentage importance, 70% of the respondents from the informed group who they use mobile phone as source of information have access to the market information. We can notice also that 68% of the informed group considered the mobile phone as an effective tool to provide the agricultural information while 40% of the non-informed group think that the mobile phone could not be useful in providing the agricultural information.

From the results mentioned above, we can recognize that the majority of our respondents in the informed group are more satisfied with the price of their products with 78.60% comparing with only 37.20% from the non-informed group not satisfied. This is another evidence shown to us how the farmer who uses the mobile phone to obtain the market information has the advantage to get a higher price more than the farmer who does not believe in mobile phone to make a change in the price. As a result, intermediaries taking advantage of farmers' weak bargaining power and poor economic conditions.

Table 5: The importance of use of mobile phone comparing preferences of the informed and non-informed groups

	Mean		Standard deviation		Percentage importance %		Evaluation	
	Informed	Non-informed	Informed	Non-informed	Informed	Non-informed	Informed	Non-informed
Access to market information	3.50	1.85	0.50	0.42	70	37	Agree	Disagree
Usefulness of mobile phone if used in delivering agricultural information	3.40	2.00	0.44	0.00	68	40	Interested	Not interested
Quality of information provided to farmer	3.42	2.40	0.78	0.49	68.40	48	Interested	Not interested
Satisfaction with production price	3.93	1.86	0.25	0.35	78.60	37.20	Satisfy	Dissatisfied

Value chain analysis

To understand the value chain, we need to know that we have two types of chains: short-chain for the informed group and long-chain for non-informed group. The differences between them are that in the short-chain, the farmer gets the information about the market (crops price and supply/demand) and this information helps them to eliminate the middleman from the chain and selling directly to the wholesaler. However, in the non-informed group, they need the middleman to get information about the market.

Short chain provides the benefit for all the factors or influencers in this chain from the farmer to the customer. This helps the farmer to sell the product in better price and helps the customer to buy the product in lower price as illustrates in Table (6). In addition, it can be noticed from Table (6) the difference in selling price between the districts from the farmer until customer purchasing price. Farmers in short-chain selling their products at better price than the farmer in long-chain in all the districts 225 SP/Kg – 260 SP/Kg and in the long-chain the price was 190 SP/Kg – 235 SP/Kg.

The results reflect the final price, which the retailer used to sell the products to the final customer. From this big difference can be observed in the final price for the product between the long and short-chain in the four districts, where the retailer prices in short-chain and long-chain was 440 SP/Kg - 474 SP/Kg and 475 SP/Kg – 525 SP/Kg, respectively.

Table 6: Value chain analysis for lemon autochthone selling price

Fruit type	Market	Selling price SP/Kg							
		Farmer		Middleman		Wholesaler		Retailer	
		Long chain	Short chain	Long chain	Short chain	Long chain	Short chain	Long chain	Short chain
Lemon Autochthone	Jablih	210	250	350		405	325	490	450
	Al-Qrdaha	190	225	345		395	325	475	440
	Al-Haffi	215	230	360		415	335	500	455
	Lattakia	235	260	375		430	345	525	475

In the short chain, the revenue was divided only between farmers with an increased share of 50.5% - 55.5%, wholesalers 16.7% - 23.1% and retailers 26.1% - 27.8% while the revenue from the selling price in the long chain was for farmers 40% - 44.7%, middleman 26.7% - 29%, wholesaler 10.5% -11.2% and retailer 16.9% - 18.1% Table (7).

Table 7: Value share analysis for lemon autochthone

Fruit type	Market	Value share %							
		Farmer		Middleman		Wholesaler		Retailer	
		Long chain	Short chain	Long chain	Short chain	Long chain	Short chain	Long chain	Short chain
Lemon Autochthone	Jablih	42.9	55.5	28.6		11.2	16.7	17.3	27.8
	Al-Qrdaha	40	51.2	32.6		10.5	22.7	16.9	26.1
	Al-Haffi	43	50.5	29		11	23.1	17	26.4
	Lattakia	44.7	54.7	26.7		10.5	17.9	18.1	27.4

5.4 Testing the hypothesis

The main objective of the thesis is to determine the impact of using mobile phone to access market information on selling price that farmer receive and its influence to improve farmer income and there are three hypothesis stated:

H₁: There is a relationship between using of mobile phone to access market information and farmers' income.

Chi-Square test used for the first hypothesis to test if there is difference between the incomes of two groups. Table (8) demonstrates that the income for the informed group was between (200-300) follow by (301-400) thousand SP, while the income for the non-informed group was between (200-300) and < 200 thousand SP. *P*-value <0.05 that indicate that there is difference between the two groups and because of that we accepted our hypothesis. It means there is difference in income for the group who use a mobile phone to obtain marketing information and for the group who use word of mouth for information transfer.

Table 8: Chi-square for the income between informed and non-informed group

Variable	Use of mobile phone						Chi-Square	Significance	Degree of significance
	Income for informed group			Income for non-informed group					
	<200	200-300	301-400	<200	200-300	301-400			
Family Income	0	49	21	34	36	0	57.63	0.00	Significant

H₂: There is a difference in gender as to the use of mobile phones to access market information leading to achievement higher selling price of the production sold.

T-Test used for the second hypothesis to realize if there is difference between the production selling price and gender. Table (9) provides information that the selling price mean for the male was 235 SP while the selling price means for the woman was 235 SP. *P*-value > 0.05 indicates that there is no difference between man and woman on selling price.

Table 9: T-Test for the selling price and gender

Variable	Male	Female	<i>P</i> -value	Significance	Degree of significance
Price of production sell (Kg/Sp)	235	235	1.41	0.14	Not significant

H₃: Higher educational status leads to achieve better commercial results expressed through higher selling price of the production sold for farmers.

ANOVA test used in the third hypothesis because we have more than two groups. ANOVA test used to visualize if there is difference between the selling price and the level of education. *P*-value was considered <0.05 to be statistically significant. From the Table (10) we can notice that the selling price mean for the illiterate was 204 SP. While the selling price mean for the primary level of education was 223 SP when the selling price for the secondary level of education was 260 SP. *P*-value < 0.05 indicates there is difference between the groups and because of that we accept the hypothesis which means there is a difference in selling price according to the level of education.

Table 10: ANOVA Test for selling price and level of education

Variable	Illiterate	Primary	Secondary	F-value	Significance	Degree of significance
Price of production sell (Kg/Sp)	204	223	260	54.14	0.00	significant

6. Discussion

Souter et al. (2005) and Frimpong (2009) reported that the majority of the ICT users tend to be young adults and this results are in line with our results were the age of farmers would be range as young age because the majority of the respondents in the informed group were between (31-35) years with 32.86%. This means the motivation and desire to use the ICT in their business to improve the income. Young farmers are more likely to obtain the advantage from using ICT, thus they expected to become more enthusiastic to improve their economic Usman et al. (2012). In case of the level of education, Nyamba & Mlozi (2012) found that 79.70% of respondent's

from primary educated and only 8.60% from secondary educated in Tanzania, while majority of our farmers in the informed group reported that secondary level was found 47.14% follow by primary level 42.86%. The educational level highlighted that if the farmers have enough knowledge to receive the information, this allow them to get the benefit from this information and improve their income (Sulaiman 2017).

From the point of view of gender, Sulaiman (2017) stated in his study that the majority of respondents were males and these results in the line with our results where the majority of respondents were males with 62.86% and only 37.14% were females for the informed group, while in non-informed group found 58.57% for males and 41.43% for females. This result could be because of culture issue in developing country where they think that agriculture its occupation for men (hard work, prestige, work for men, etc.). Also, this fact could be due to the traditional weakness of the female social position compared with male.

Communication assets results were concluded by different studies where more than 90% of the total population in Ghana is supplied by the mobile phone to obtain agricultural market information (Egyir 2010). In Lattakia region, indicated 97.14% of farmers own mobile phone and it is very important to highlight that the mobile phone is the best means to deliver the agricultural marketing information through it. This is due to that it has the advantage if we compare the prices of the mobile phone with the prices of other equipment like (computer, TV, etc.). Consequently, mobile phone plays a vital role to improve the farmers' income in Lattakia region. Annerose (2010) stated that using mobile phone by the farmers can raise their income, making the agricultural marketing more efficient and productivity, and reduce the transaction cost.

Importance of using mobile phone

Ashraf et al. (2005) in his study in Kenya and also the study of De Silva (2008) in Sri Lanka confirmed that the mobile phone can facilitate the export orientation in agricultural marketing also the mobile phone facilitate the ways of communication between farmers and between farmers and buyers to discuss and transfer the information (price, weather, supply and demand).

Our results supported by the study conducted by (Jensen 2007) in South Indian who found that the mobile phone have the ability to help the farmer to reduce the production cost by providing them quick access to agricultural information and open new market possibility for them. The

result revealed that the mobile phone diverse advantage in AMIS were 68% of the farmers considered the mobile phone as an effective tool to obtain the agricultural information. In this study, the difference between the farmers who use mobile phone to get the agricultural information and those who depend on traditional communication methods shown 70% of the farmers in first group agree that they have access to the market.

The results found by [Nyamba and Mlozi \(2012\)](#) conducted in Tanzania indicated that half of the respondents reported that the mobile phone help them to obtain the agricultural information, which allowed them to have better decision to sell their products at the right time and suitable place. This result is in agreement with our study's findings were farmers can take the advantage from the mobile phone to get information about prices at different marketplace. This can explain from the findings in our Likert scale between the two groups, where it shows the using of mobile phone helped the farmers to get better price for selling their products and make the farmer satisfied. We can observe from our finding were 78.60% of the farmer in the informed group was satisfied with their selling price.

Type of information needed by farmers

[Tadesse and Bahigwa \(2015\)](#) study in Ethiopia showed that 90% of the farmers searched for market information before they sell their products in the market were majority of the respondents in our research had lack of the information about the market (crops price, supply and demand). Even though market information is very essential to get access to market, majority of the respondents in this study lack information about market in terms of price, supply, and demand. It can be observed that from the non-informed group 55.71% of the farmers seek for supply and demand information while 37.14% need information about crops price.

The results was also in the line of [Binayee \(2005\)](#) study in South Asia who found that when the farmers obtain the market information before they sell their products, they have the advantages to sell their production at higher price which also lead to reduce the transaction cost. That what we can observe the behaviour of the farmers after they get this types of information, they start to search how can get information about the weather and implement new technology and this is clear from the result in the informed group and from this point we can indicate the main problem of the farmer in Lattakia region is connected to the lack of market information.

Previous studies conducted in developing countries show that the mobile phone become one of the most important means in ICT to help the farmer getting the market information ([Furuholt & Matotay 2011](#); [Minten et al. 2011](#)). It is important to think about mobile phone as means to deliver information to farmers comparative to radio and TV, delivering information to farmers through mobile phone is more flexible, less time consuming and direct communication by way of SMS and voice call.

Source of information

We found that all the farmer being sufficient with the equipment of ICT specially the mobile phone, but a majority of those farmer did not receive the information through the mobile phone, while they depend on their neighbours to get the information. This result match the finding in Nigeria where the agricultural information was distributed among the farmer through friends, families, and neighbours ([Orbunde 2010](#)). The finding in our study indicated that 62.86% of the farmers in the non-informed received their information from their neighbours and 27.14% from middleman. The same results were noticed in Pakistan where farmer obtain their agricultural information from informal source family, friends, and neighbours ([Naveed et al. 2012](#)).

[Abbas et al. \(2003\)](#) found that majority of sugar cain producer in Faisalabad were getting the basic information from their friends even with high percentage of ownership on ICT equipment (radio or television). We have the same situation in our study area were that the farmers going to obtain the information from neighbours or friend even that the farmers are sufficient with the ICT to get the information through it.

As found by ([Katengeza et al. 2010](#)) in Malawi, majority of farmers do not like to bring the production to the far central market due to lack of information about price in the market. It is clear evidence that lack of formal source for right information makes farmers decide to sell their production at the farmgate to middlemen at a relatively cheaper price.

Small percentage who depend on the mobile phone as source of information they used the mobile phone to obtain the information from other sources through contact the middleman, trader, and marketplace. Another study in Ethiopia reported that all the farmers who search for

market information depending on the traders and development agent (Tadesse and Bahigwa 2015).

Value chain analysis

Value chain results were very similar to the results in other studies like (Kafle 2007) who found that 55% of the producers share in mandarin marketing in Kaski region in Nepal. Also, Gangwar and Singh (1998) found the similar producers share in orange in India. From the farmer response we can focus on the short chain which eliminate the middleman, however in the long chain the revenue distributed through farmer, middleman, wholesalers and retailers where the retail prices in long-chain was between 475 SP/Kg – 525 SP/Kg and wholesale prices was between 395 SP/Kg – 430 SP/Kg and middleman prices was between 345 SP/Kg – 375 SP/Kg with lowest revenue for the farmer 190 SP/Kg – 235 SP/Kg.

While in the short chain the revenue was divided between only farmer, wholesaler and retailer with increased in the share for every influencer in this chain, where retail prices was between 440 SP/Kg – 475 SP/Kg and wholesale prices between 325 SP/Kg – 345 SP/Kg with increasing in farmer revenue 230 SP/Kg – 260 SP/Kg.

Sabir et al. (2010) study in Pakistan shown that by reducing the number of the intermediaries in the marketing chain not just the purchasing price for the consumer decrease but also the producer received higher price. As final result the short chain allows the farmer to sell their production directly to the wholesaler which in turn make efficient marketing system which lead to reduce the cost and have strong negotiation power with the traders.

This study has identified that the middleman decreased the marketing margin for the farmer in Lattakia. The aim of this chain is to reduce the power of the middleman through take them out of the chain or through enhance the position of the farmer by providing them the information in the right time and place.

The respondents of the informed group managed to achieved income between 301-400 thousand SP while the non-informed group income was between 200-300 even some of them <200 thousand SP which means the income increased for informed group. Similarly, as the finding of Chong et al. (2005) in Peru whose study found positive relationship between the use

of public telephone and farmers income. The farmers in the group who is using the public telephone increased their income 13% compares with the group whose did not using the public telephone.

Hypothesis H₂ which attempted to confirm the gender differences between groups of men who access market information and groups of women who access market information on selling price can not be confirmed as *p*-value higher than 0.05 probability value, so we can say there is no relationship between the gender of groups to access market information on selling price. This result is in accordance with [Frimpong \(2009\)](#) who found out no differences between males and females in ICT's use to communicate agricultural information. This result however is contradicted with [Nyamba and Mlozi \(2012\)](#) result who confirmed that gender had statistically significant ($P<0.05$) on the ownership and use of mobile phones to receive agricultural information.

The results indicate that the selling price mean for the illiterate was 204 SP while the selling price mean for the primary level of education was 223 SP when the selling price for the secondary level of education was 260 SP. We can conclude that the farmers can benefit from education levels in the application of technology. On the other hand, farmers can benefit from the technological development to achieve better commercial results expressed through higher prices for the products sold. The effect of education levels on achieving better commercial results expressed through the higher price of the products sold for farmers, was confirmed as *p*-value lower than 0.05. This result is in the line with [Koskei et al. \(2013\)](#) who found out that access to basic education has a clear impact improving the access and use of agricultural information and adaptation to new technologies which in order help to achieve a higher price by selling the product.

6.1 Limitations

I have faced during my study several limitations. Firstly, the lack of previous studies in the research area which also affected the discussion chapter.

Secondly, the current circumstances of the farmers in Lattakia region whose suffered from the long civil war about ten years led to decrease the confidence between them and official institutions like Agricultural extension offices.

Thirdly, regarding to the situation some time we faced a problem for movement among villages to meet the farmers to collect our data.

7. Conclusion and Recommendation

The mobile phone becomes one of the most important tools in agricultural marketing information. The research provides evidence on the impact of using mobile phones in agricultural markets. Our study concluded that lack of information limits the capability of the farmers in Lattakia region to be involved in the markets. The acceptance of mobile phone technology in rural areas in Lattakia region is increasing which can have a positive impact on the economy. In addition, use of mobile phone allow the market information to be available to the farmers and give them the opportunity to improve their position in the value chain through increasing their knowledge and awareness to be able to make informed market decision and support the bargaining power of farmers against the middleman.

In addition, using a mobile phone contribute to reduce the information costs because the farmers could be communicated directly and verbally without any limitations. The results in this research suggest that farmers who receive market information have the advantage to join the market and sell their products at a higher selling price. Based on the study results and discussion the following conclusion is made:

- The information needs of farmers were different between the group received the information and the group without information.

- The mobile phone becomes an important source for the information with the informed group comparison to the non-informed group where they still depend on the traditional source of information.
- Using a mobile phone to obtain the information leads to an increase in the price on the farmer gate which means give them the advantage to have a higher selling price for their products which in turn leads to have a positive impact to improve their income.
- The mobile phone helps to disconnect the middleman from the value chain and increase the value share of the farmer.
- The difference in gender of our respondents in Lattakia region does not have any effect on the farmers selling price for their production. While the level of education of the farmers have a high effect on the selling price and allow the farmers to get a higher price than those who do not have enough education.

Recommendation

The following recommendations have been formulated:

Link the farmers to the market should occupied high priority through different methods. One of this method could be ICT means or develop the role of official institution as source of information to help the farmers to receive the information through meeting.

Eliminating the information asymmetry between farmers and traders in the Lattakia region should be the aim of the government, which could be achieved through establishing an Agricultural Marketing Information System.

The Syrian government should implement Agricultural Marketing Information System through agricultural means to help the poor and illiterate farmers to receive agricultural information regularly through ICT means especially mobile phones.

The results of this study should be the base for future studies, which focus on the agricultural sector and getting benefit from ICT technology in the agricultural sector.

Access to the market information would help the market board to organize the marketing operations and predict the market trend based on this data.

The implementation of AMIS after the conflict in Syria should be implemented step by step with a focus on the educated farmers to realize the system.

Policy action is required to improve and insure the distribution gain of the market among the farmers and traders and to protect the farmers exploitation from the middleman due lack of information through some laws and regulation.

References

- Abbas M, Muhammad S, Nabi I, Kashif M. 2003. Farmers' information sources, their awareness and adoption of recommended sugarcane production technologies in the central Punjab. *Pakistan Journal of Agricultural Sciences*, **40** (3-4): 202–206.
- Aker C. 2008. “Does Digital Divide or Provide? The Impact of Mobile phones on Grain. Markets in Niger” [online]. University of California, Berkley. Available at http://www.cgdev.org/doc/events/2.12.08/Aker_Job_Market_Paper_15jan08_2.pdf (accessed on 15 January 2013).
- Aker J. 2011. Dial A for agriculture: Using ICTs for agricultural extension in developing countries. *Agricultural Economics*, **42**(6).
- Aker C, Mbiti I. 2010. Mobile Phones and Economic Development in Africa. In: *Journal of Economic Perspectives* **24** (3): 207-232.
- Annerose D. 2010. “Manobi: ICT for Social and Economic Development.” Presentation to the World Bank, Washington, DC, August.
- Arabic News.com, 26.3.1999, Agriculture in Syria and in the Euphrates.
- Armstrong J S, Overton T. 1971. Brief vs. Comprehensive Descriptions in Measuring Intentions to Purchase. *Journal of Marketing Research*, (8): 114-117.
- Arraf F. 2016. The Agriculture Sector and its Impact on Syria's water basins between 1980-2010.
- Ashraf N, Gine X. and Karlan D. 2005. Growing Export Oriented Crops in Kenya: An Evaluation of Drum Net Services. Ottawa: IDRC.
- Bayram M. 2018. Future Projection for Syrian Food Industry at: <https://www.researchgate.net/publication/331812264>
- Bhatnagar S. 2008. Benefits from rural ICT applications in India: reducing transaction costs and enhancing transparency? LIRNE Asia presentation at public lecture on ICT in Agriculture, Colombo, Sri Lanka, http://www.lirneasia.net/wpcontent/uploads/2008/02/bhatnagar_public_lecture.pdf.

- Binayee B. 2005. Marketing Information System: An overview of agriculture marketing systems in South Asia. Marketing Information System: An overview of agriculture marketing systems in South Asia, available on: <http://www.ansab.org/wp>.
- Boughton D, Mather D, Barrett B, Benfica R, Abdula D, & Tschirley D. 2007. Market participation by rural households in a low-income country: An asset-based approach applied to Mozambique. *Faith and Economics*, (50):64–101.
- Brown, Jeffrey R, Austan G. 2002. "Does the Internet make markets more competitive? Evidence from the life insurance industry", *Journal of Political Economy*, **110**(3): p.481-507.
- Castillo G. 2008. *Rebuilding War-Torn States: The Challenge of Post-Conflict Economic Reconstruction*. Oxford: Oxford University Press.
- Central Bureau of Statistics Syria 2019.<http://cbssyr.sy/index-EN.htm>.
- Chong A, Galdo V, Torero M. 2005. "Does Privatization Deliver? Access to Telephone Services and Household Income in Poor Rural Areas Using a Quasi-Natural Experiment in Peru" [online]. Inter-American Development Bank Working Paper No. 535. Washington, DC. Available at <http://www.iadb.org/res/publications/pubfiles/pubwp-535.pdf>.(Accessed on 22 may 2013).
- Coyne J. 2007. Reconstruction and Reconciliation: What's Economics Got to Do With It? *The Whitehead Journal of Diplomacy and International Relations* **8**(1): 1-15.
- Danes M, Jellema A, Janssen S. 2014. *Mobiles for agricultural development: exploring trends, challenges and policy options for the Dutch government*. Alterra Report 2501. Alterra, Wageningen-UR, Wageningen :p. 25. <http://edepot.wur.nl/297683>.
- De Silva H. 2008 *Using ICTs to Create Efficiencies in Agricultural Markets: Some Findings from Sri Lanka*. Paper presented to IDRC 23 May 2008. Ottawa.
- Dillon A, Morris M. 1996. User acceptance of new information technology: theories and models. In: In: Williams, M. (Ed.), *Annual Review of Information Science and Technology*. Information Today, Medford NJ, **31** pp. 3–32.
- Djalalou-Dine A, Stefano P, Anita R.L, Ousmane N, Geoffrey H& Onno S, Omtab. 2015. *Marketing Channel Selection by Smallholder Farmers* *Journal of Food Products Marketing* Publication details, including instructions for authors and subscription information: <http://www.tandfonline.com/loi/wfpm20>.

- Doll J P, Orazem F. 1984. *Production economics: Theory with applications* (2nd ed.). New York, NY: Wiley.
- Doss C R. 2006. Analyzing technology adoption using microstudies: limitations, challenges, and opportunities for improvement. *Agric. Econ.* 34, 207–219. *Economics* **122** (3): 879-924.
- Egyir S, Al-Hassan R M, Abakah J K. 2010. *The Effect of ICT-based Market Information Services on the Performance of Agricultural Markets: Experiences from Ghana*. Unpublished draft report, University of Ghana, Legon.
- Fischer M. 2004. *Recovering from Violent Conflict: Regeneration and (Re-) Integration as Elements of Peacebuilding*. Berlin: Berghof Research Center for Constructive Conflict Management, Berghof Handbook on Conflict Transformation. http://www.berghofhandbook.net/uploads/download/fischer_handbook.pdf.
- Fischer R A, Byerlee D, Edmeades G.O. 2009. *Can Technology Deliver on The Yield Challenge To 2050? Expert Meeting on “How to feed the World in 2050”*, Food and Agriculture Organization of the United Nations and Economic and Social Development Department, Rome.
- Frimpong G. 2009. “Comparison of ICT Knowledge and Usage among Female Distance Learners in Endowed and Deprived Communities of a Developing Country”, *Journal of E-Learning* 6, 167-174pp.
- Furuholt B, Matotay E. 2011. The developmental contribution from mobile phones across the agricultural value chain in rural Africa. *The Electronic Journal on Information Systems in Developing Countries*, **48**(7): 1-16.
- Gangwar L, Singh S. 1998. Price Spread and Marketing Margins for Nagpur Mandarins: A Case Study. *Indian Journal of Agricultural Economics*. **53**(3):394.
- Gartner. 2016. *Top 10 Technology Trends Signal the Digital Mesh*. Gartner Inc. Accessed online at: www.gartner.com/smarterwithgartner/top-ten-technology-trends-signalthe-digital-mesh/.
- Getaw T, Bahiigwa G. 2015. *Mobile Phones and Farmers’ Marketing Decisions in Ethiopia* <http://dx.doi.org/10.1016/j.worlddev.2014.12.010>
- Gilpin L. 2015b. *How Big Data Is Going to Help Feed Nine Billion People by 2050*. TechRepublic. <http://www.techrepublic.com/article/how-big-data-is-going-to-helpfeed-9-billion-people-by-2050/> (Accessed: 7 May 2015).

- Holden S, Shiferaw B, Pender J. 2001. Market imperfections and land productivity in the Ethiopian Highlands. *Journal of Agricultural Economics*, **52**(3), 53–70.
- Humphries D. May 2018. Resilience through Humanitarian Assistance: Agriculture in the Syria Conflict Global Communities.
- Jari B, Fraser G. 2012. Influence of institutional and technical factors on market choices of smallholder farmers in the Kat River Valley. In H. D. Van Schalkwyk, G. C. G. Fraser, A. Obi, & A. van Tilburg (Eds.), *Unlocking markets for smallholders. Lessons from South Africa* (Vol. **10**, pp. 59–89). Wageningen, the Netherlands: Wageningen Academic Publishers.
- Jenny C, Christopher K. 2018. Can mobile phones improve agricultural outcomes? Evidence from a randomized experiment in Niger *Food Policy* **60**, 2016. 44–51 *Technological Forecasting and Social Change* Volume **131**, June 2018, Pages 253-261.
- Jensen R. 2007. The Digital Divide: Information (Technology), Market Performance and Welfare in the South Indian Fisheries Sector, Vol. **122**, No. 3 (Aug., 2007), pp. 879-924.
- Kabbiri R, Dora M, Kumar V, Elepu G, Gellynck X. 2018. Mobile phone adoption in agri-food sector: Are farmers in Sub-Saharan Africa connected? *Technological Forecasting and Social Change* Volume **131**, June 2018, Pages 253-261.
- Kabeer N. 2002. *The power to choose* Bangladeshi women and labour market decisions in London and Dhaka. London, UK: Verso Books.
- Kafle A. 2007. Analysis of Production and marketing system of Mandarin in Kaski district of Nepal. Master dissertation. Institute of Agriculture and Animal Science, Rampur, Chitwan, Nepal.
- Katengeza S P, Mangisoni J H, Okello J J. 2010. The Role of ICT-based Market Information Services in Spatial Food Market Integration: The Case of Malawi Agricultural Commodity Exchange. African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa Conference, Cape Town, South Africa, September 19-23, 2010.
- Koskei E.C, Koskei R.C, Koske, M.C, Koech H.K. 2013. Effect of Socio-economic Factors on Access to Improved Water Sources and Basic Sanitation in Bomet Municipality. *Research Journal of Environmental and Earth Sciences* **5**(12): 714-719.
- Krugu W. 2010. "Kenya Agricultural Commodity Exchange (Kace): Linking Small Scale Farmers to National and Regional Markets". GIM Case Study No. B068. New York: United Nations

- Development Programme, 2010. Available at http://growinginclusivemarkets.org/media/cases/KACE_summary.pdf.
- Lesser, A. Big data and big agriculture. Gigaom Research; 2014. Link: <https://gigaom.com/report/big-data-and-big-agriculture>.
- Lio M, Liu M. 2006. ICT and agricultural productivity: Evidence from cross-country data. *Agricultural Economics*, **34**(3), 221–228.
- Luarn P, Lin H.H. 2005. Toward an understanding of the behavioral intention to use mobile banking. *Comput. Hum. Behav.* **21**, 873–891.
- Mehra A. 2010. "Small Technologies Fuel Big Results in the Developing World" [online]. Available at http://www.huffingtonpost.com/amit-mehra/small-technologies-fuel-b_b_715274.html.
- Minten B, Reardon T, Chen K. 2011. The Quiet Revolution of “Traditional” Agricultural Value Chains in Asia: Evidence from Staple Food Supply to Four Mega-cities. Mimeo, International Food Policy Research Institute, Washington DC.
- Mittal S, Mehar M. 2012. How Mobile Phones Contribute to Growth of Small Farmers? Evidence from India, *Quarterly Journal of International Agriculture* **51** (2012), No. 3: 227-244.
- Mittal S, Gandhi S, Tripathi G. 2010. Socio-economic Impact of Mobile Phone on Indian Agriculture. ICRIER Working Paper no. 246. International Council for Research on International Economic Relations, New Delhi.
- Mustafa S. 2010. The Effect of Marketing Information System on Decision Making.
- Naveed A M, Anwar M A, Bano S. 2012. Information seeking by Pakistani farmers: A review of published research. *Pakistan Journal of Library & Information Science*, **13** (2012).SSN 1680-4465, Available at <http://pu.edu.pk/images/journal/pjlis/pdf/pjlis-13-naveed.pdf>.(Accessed on 18 June 2013).
- Njeru K, Bernard S. 2018. *International Journal of Computer Applications* · February 2018 DOI: 10.5120/ijca2018916334 publication at :<https://www.researchgate.net/publication/323220401>.
- Nyamba S.Y, Mlozi M.R.S. 2012. Factors Influencing the Use of Mobile Phones in Communicating Agricultural Information: A Case of Kilolo District, Iringa, Tanzania Volume **2** No. 7, July 2012

- Obi A, Pote P, Chianu, J. 2011. Market access: Components, interactions, and implications in smallholder agriculture in the former homeland area of South Africa. In A. Bationo, B. Waswa, J. M. Okeyo, F. Maina & J. M. Kihara (Eds.), *Innovations as key to the green revolution in Africa* (pp. 1161–1167). Springer Netherlands.
- Omar I, Janifa U A, Haque S, Alam M, Hossain T. 2014. Analysis of Marketing Efficiency, Value Addition and Spatial Co-Integration of Mozambique Tilapia (*Oreochromis mossambicus*) Fish in Some Selected Areas of Bangladesh, *Journal of Economics and Sustainable Development*. **5**(9):79-88.
- Orbunde A K. 2010. Communication as an effective tool in Agricultural Marketing Information System (AMIS) dissemination: Implications for the future. 9th European IFSA Symposium, 47 July 2010, Vienna (Austria):1-7.
- Orts E, Spigonardo J, 2014. Sustainability in the Age of Big Data. IGEL/Wharton, University of Pennsylvania, Pennsylvania, US, p. 16.
- Phiri L, Dzanja J, Kakota T, Hara M. 2013. Value Chain Analysis of Lake Malawi Fish: A Case Study of *Oreochromis* spp (Chambo), *International Journal of Business and Social Science*. **4** (2):170-181.
- Razaque A.C, Salleh H. H. 2013. The Use of Mobile Phone among Farmers for Agriculture Development in *International Journal of Scientific Research* **2**(6):95- 98 July.
- Richard A, Waterbury J. 1990. A political economy of the Middle East: state class, and economic development. London: Westview Press.
- Sabir H M, Khan M B, Hussain Z. 2010. Marketing Margin of Mandarin. A case of Sargodha Region, Pakistan. *Pakistan Journal of Social Science*, **30** (2): 275-291.
- Sander J.C. Janssen, Cheryl H. Porter, Andrew D. Moore, Ioannis N. Athanasiadis, Ian Foster, James W. Jones, John M. Antle. 2017. Towards a new generation of agricultural system data, models and knowledge products: Information and communication technology *Agricultural Systems* **155** (2017) 200–212 journal homepage: [www.elsevier.com/ locate/agsy](http://www.elsevier.com/locate/agsy).

- Sapkota J B. 2008. Need for Formal Broiler Marketing System among Small-scale Farmers in Chitwan District, Nepal. Master dissertation. Van Hall Larenstein University of Applied Sciences, Wageningen, the Netherlands.
- Siwel Y. N, Malongo R.S. Mlozi. 2012. Factors Influencing the Use of Mobile Phones in Communicating Agricultural Information: A Case of Kilolo District, Iringa, Tanzania Volume 2 No. 7, July 2012 ISSN 2223-4985 International Journal of Information and Communication Technology Research.
- Wolfert S, Lan Ge, Cor Verdouw, Bogaardt M. 2017. Big Data in Smart Farming – A review Agricultural Systems 153 (2017) 69–80 journal homepage: www.elsevier.com/locate/agsy.
- Smith L D. 1992. Cost, Margins and Returns in Agricultural Marketing. Department of political economy, university of Glasgow. FAO, Rome September 1992.
- Sonka, S. 2014. Big Data and the Ag sector: more than lots of numbers. International Food and Agribusiness Management Review 17, 1.
- Souter D, Scott N, Garforth C, Jain R, Mascarenhas O, McKemey K. 2005. ‘The economic impact of telecommunications on rural livelihoods and poverty reduction: a study of rural communities in India (Gujarat), Mozambique and Tanzania’, Commonwealth Telecommunications Organisation report for UK Department for International Development.
- Sulaiman H. 2017. A Marketing Information System for Citrus Crops in the Lattakia Region, R. A. SYRIA.
- Mittal S, Mehar M. 2012. How Mobile Phones Contribute to Growth of Small Farmers Evidence from India Quarterly Journal of International Agriculture 51 (2012), No. 3: 227-244.
- Mittal S, Hariharan V.K. 2018 Mobile-based climate services impact on farmers risk management ability in India journal homepage: www.elsevier.com/locate/crm climate risk management 22 (2018) 42-51.
- Svensson J, Yanagizawa D. 2009. Getting prices right: The impact of market Information services in Uganda. Journal of the European Economic Association, 7 (2-3): 435-445.
- Syria Central Bureau of Statistics, (various years). Available in: <http://www.cbssyr.org/index-EN.htm>.

- Tadesse G, Shively G. 2013. Repeated transaction in rural grain markets of Ethiopia. *Journal of Development Studies*, **49**(9),1172–1187.
- Torero M, Von Braun j. 2006. Information and Communication technologies for development and poverty reduction – The potential of telecommunication. The Johns Hopkins University Press and IFPRI, Washington, DC.
- Usman J M, Adeboye J A, Oluyole K A, Ajijola S. 2012. Use of information and communication technologies by rural farmers in Oluyole local government area of Oyo State, Nigeria. *Journal of Stored Products and Postharvest Research* **3**(11), pp.156-159.
- Van Schalkwyk H. D, Groenewald J. A, Fraser G. C. G, Obi A & van Tilburg A. 2012. Unlocking markets for smallholders: Lessons from South Africa (Vol. **10**). Wageningen, the Netherlands: Wageningen Academic Publishers.
- Van 't Spijker A. 2014. *The New Oil - Using Innovative Business Models to Turn Data into Profit*. Technics Publications, Basking Ridge.
- WDR. 2016. World Development Report 2016: Digital Dividends. World Bank.
<http://www.worldbank.org/en/publication/wdr2016>.
- Welfare in the South Indian Fisheries Sector. In: *Quarterly Journal*.
- Winter S. 2012. A growing lifeline: Mobile technologies in agricultural development. Retrieved August 23, 2016, from <http://www.technoserve.org/blog/a-growing-lifeline-mobile-technologies-in-agricultural-development>.
- World Bank. 2007. *Agriculture for Development*. World Development Report 2008. The International Bank for Reconstruction and Development/World Bank, Washington, DC.
- World Bank. 1999. *The Transition from War to Peace: An Overview*. Washington DC: The World Bank.
- Zuniga-Arias G, Ruben R. 2007. Determinants of market outlet choice for mango producers in Costa Rica. In R. Ruben, M. A. J. S. van Boekel, A. van Tilburg, & J. Trienekens (Eds.), *Tropical food chains: governance regimes for quality management* (pp. 49–67). Wageningen, Netherlands: Wageningen Academic Publishers.

Appendix

Dear respondents,

This survey is prepared to collect data with regard to roles of different stakeholders on the use of mobile phones to communicate agricultural information. The study is conducted for academic purposes, results are meant to provide input to my Master thesis. Feel free to provide your responses to the questions. All responses will be confidential.

General Information:

Region....., Village.....

District: Latakia, Jablih, Qurdaha, Haffih

A- Farmer socio-demographic characteristics:

1) Age in years:	<input type="checkbox"/> up to30, <input type="checkbox"/> 31-35, <input type="checkbox"/> 36-40, <input type="checkbox"/> 41-45, <input type="checkbox"/> 46-50, <input type="checkbox"/> >50
2) Gender:	<input type="checkbox"/> Male, <input type="checkbox"/> Female
3) What is your level of education?	<input type="checkbox"/> Illiterate, <input type="checkbox"/> Primary (1-6 years), <input type="checkbox"/> Secondary (7-12 years), <input type="checkbox"/> Higher education (university degree)
4) Marital status:	<input type="checkbox"/> single, <input type="checkbox"/> Married, <input type="checkbox"/> Divorced, <input type="checkbox"/> Widow, <input type="checkbox"/> Widower

5) Total number of household members (household size)?

1-3, 4-6, 7-9, 10 and above

6) What is your main occupation?

Farming, Off-farm casual work, Fulltime employment, Small Business owner, Student, Other (Specify).....

B- Household information

7) What equipment do you have:

Radio	TV	Personal Computer	Personal Mobile Phone	Internet connection	Car	Motorbike	Bicycle
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8) What is your main reason for farming?

mainly food for family, Cash, Other (Specify):

9) Farm size (in hectare)?

Small (≤ 1 ha), Medium (1.01- 5 ha), Large (> 5)

C- Characteristics in business:

10) Net family income from agriculture (farm income) per year (S.P):

<200.000	200.000-300.000	300.001-400.000	>400.000
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11) Production and marketing of agricultural crops:

Agricultural crops	Total production (kg)	Amount sold annually to traders collecting from farm gate/village (kg)	Price average per (kg)

12) What is the cost of production per year?

Particular	Amount	Unit cost	Total cost
Seedling			
Manure			
Labour			
Fertilizer			
Pesticide/chemical			
Irrigation			

D- Production parameters:

13) Do you make packaging for your product?

Yes, No

14) Who is your main buyer of your production among the following?

Farmer collector, Road head collector, Wholesaler, Retailer, Consumers

15) Do you have a contractual agreement?

Yes, No

16) If yes, when do you get the contract?

Beginning of the season, Just before harvesting/pre-harvest

17) If buyer tells you that prices in the urban market are very low do you have any way to verify this information?

Yes, No

If yes, explain the verification means:

18) Who decides on the price of products?

Bargaining process between myself and buyer, Buyer

19) What is the selling price for your production (SP/Kg)

20) The number of sales (transactions) that you made:

Crops types	Total numbers of Transactions	Numbers of Transactions done at farm gate (Volume)	Prices average at farm gate	Numbers of Transactions done at market (Volume)	Prices average at farmers market

21) Have you delayed/anticipated the harvesting in order to get better price?

Yes, No

If "Yes", how many days you delayed/anticipated the harvest timing, to obtain an "optimal prices per 1 Kg. of crops

If "No", continue to the next question

Agricultural crops	Date of sales	No. of delayed days, after harvest "optimal time"	No. of anticipated days, before harvest "optimal time"	Product sale price on the first day of harvest "optimal time"	product price on the sale days	Profit/Loss / kg (S.P.)

E- Market information:

22) What kind of market information do you need?

Crops price, supply demand, Input price, weather forecast, Agricultural technology

23) From which sources do you get market information and crops prices?

Agricultural extension, NGO, Neighbours, Mobile Phone Market place, Middleman

24) Do you have access to the market information?	<input type="checkbox"/> Strongly agree	<input type="checkbox"/> Agree	<input type="checkbox"/> Undecided	<input type="checkbox"/> Disagree	<input type="checkbox"/> Strongly disagree
25) How do you rate the usefulness of Mobile phone if used for delivering agricultural information?	<input type="checkbox"/> very interested	<input type="checkbox"/> interested	<input type="checkbox"/> neutral	<input type="checkbox"/> not interested	<input type="checkbox"/> not at all interested
26) How would you rate the quality of agricultural information provided to you?	<input type="checkbox"/> very interested	<input type="checkbox"/> interested	<input type="checkbox"/> neutral	<input type="checkbox"/> not interested	<input type="checkbox"/> not at all interested
27) Are you satisfied with the price you get for your production?	<input type="checkbox"/> very satisfied	<input type="checkbox"/> satisfied	<input type="checkbox"/> neither satisfied nor dissatisfied	<input type="checkbox"/> dissatisfied	<input type="checkbox"/> very dissatisfied

28) Do you own mobile phone?

yes, No

29) Do you use mobile phone to communicate agricultural information?

Yes, No

If yes, who you contact to obtain the information

If No, you do not need to complete the question, you can stop here.

30) For how long have you owned mobile phone?

Less than a year, 1-2 years, 2-3 years, 3-5 years, Above 5 years

31) How frequently do you seek agricultural information using the mobile phone?

Daily, Weekly, Monthly, Seasonal

32) What kind of information do you send or receive through mobile phone?

Weather forecast, Transport costs, Market information, Availability of agricultural inputs, Crop varieties, Credit availability, others.....

33) Are you a member of?

Agricultural cooperatives, Peasant union, Agricultural chamber,

None of the above

34) How do you prefer to source for or receive the information?

SMS, CALLS, email, FB, WhatsApp