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### **EXECUTIVE SUMMARY**

Pakistan, abundantly blessed with arable land and water, has a significant stake in the agriculture sector. Agriculture, in a broader sense, covers crop cultivation, animal husbandry, dairying, fisheries, forestry, and other associated activities. Pakistan's agriculture accounts for about 19.5% the Gross Domestic Product (GDP) and employs about 43.5% of the labor force. It also helps meet the food requirement of an ever-increasing population, provides raw materials to all the major industrial sectors including textiles, leather, and sugar; and plays a significant role in decreasing rural poverty. Out of the 19.5% being contributed to the GDP, major crops contribute 26.19%, other crops 11.03%, livestock 58.33%, fisheries 2.12%, and forestry 2.33% to the agriculture's contribution to the GDP.<sup>1</sup>

For a country like Pakistan, economic growth through agriculture has to be inclusive and provide opportunities for improving the livelihoods of the poor. Improving the productivity and profits of smallholder farmers is the key to progress. Stakeholders like government bodies at national and provincial levels, research institutions, technology companies, and multilateral organizations have a key role in developing the agriculture sector.

The agriculture sector faces many challenges posed by climate change, increase in food prices, and inefficient supply chains. However, the sector is increasingly becoming knowledge-intensive, with focus being placed on the availability of the right information, at the right time, in the right format, and through the right medium.

Digitalization provides many gains not within a given sector but across sectors and industries, in both social and economic aspects. Agriculture, being a key contributor to Pakistan's economy, has a lot to gain through sectoral digitalization and collaborations. This paper, focused on the agriculture in Pakistan, is aimed at propelling forward the agenda for digitalization in the sector. It combines a mix of research from both primary (interviewing local stakeholders from the domains of public organizations and multilaterals) and secondary research (digital reports and analysis available over the internet), while limitations are present in seeking access to certain information and statistics related to local initiatives taking place in Pakistan.

The paper opens with an overview of the agriculture sector in Pakistan, reinforcing its position as one of the key sectors contributing to the socio-economic growth in the country. The parameters defining the state of d-Agriculture, current initiatives in the digital landscape, and challenges faced by the sector are explained. International case studies are analyzed, based on the objectives, role of different stakeholders, and impact analysis for in those cases. Some of the key themes that emerge for international cases' analysis include formulation of a national d-Agriculture strategy; development of knowledge sharing platforms; provision of access to information, markets and financial services; creation of local, customized content; provision of digital literacy; and support of public private partnerships.

The paper concludes with identification of the roles of different stakeholders in the digital ecosystem along with the identification of opportunities in the digital landscape which include improving access to financial services, provision of agriculture information, improving data visibility for supply chain efficiency, and enhancing access to markets.

<sup>1</sup> "Pakistan Economic Survey (2016-2017) – Agriculture", Finance Division, Government of Pakistan, Retrieved on 13 December, 2017 from: http://www.finance.gov.pk/survey/chapters\_17/02-Agriculture.pdf

### ABOUT DIGITAL AGRICULTURE

### **1. ABOUT DIGITAL AGRICULTURE**

ICT in Agriculture or Digital Agriculture (d-Agriculture) focuses on the enhancement of agricultural and rural development through improved information and communication processes.<sup>2</sup> In this context, ICT has been used as an umbrella term which encompasses all information and communication technologies including devices, networks, mobiles, services, and applications – which range from innovative Internet-era technologies and sensors to other pre-existing aids such as fixed telephones, televisions, radios, and satellites.

d-Agriculture continues to evolve in scope as new ICT applications continue to be harnessed in the agriculture sector. It involves the conceptualization, design, development, evaluation, and application of innovative ways to use ICTs in the rural domain, with a primary focus on agriculture. Provisions of standards, norms, methodologies, and tools as well as development of individual and institutional capacities, and policy support are all key components of d-Agriculture.

Mobile Agriculture (m-Agriculture), a subset of d-Agriculture, supports actors along the agriculture value chain through the use of mobile technology. Mobile technology covers a broad range of devices and the sub-categories include voice, data, network, and connectivity technologies.<sup>3</sup>

- Some of the majorly significant and universal components of the agriculture value chain are<sup>4</sup>:
- Input providers supplying raw materials such as seeds, fertilizers, and pesticides
- Farmers managing the production of the agricultural product (also referred to as producers or smallholders)
- Associations and cooperatives organizing many individual smallholder farmers into groups to
- negotiate better prices with buyers and providing extension services
- Buyers purchasing the agriculture product and sometimes, undertaking the processing,

packaging, and marketing of the final products as well

• Customers – consuming the end products

The realistic picture of the agriculture value chain is often more complex where an actor can play more than one role. For instance, the buyers become input providers when the farmers they work with don't have a reliable supply of inputs. It also happens in many cases where buyers also supply loans for these inputs. The role of middlemen has been quite confusing – they buy at the farm from individual smallholders and sell in bulk to the more established buying companies but in doing so, they often take a huge share of the profit and offer low prices to cash-strapped farmers.

The introduction of mobile technology and portable, wireless devices has led to the creation of innovative services and applications that are used within the agricultural value chain in developed and developing countries. In developed markets where mechanization is more advanced and the agricultural labor force is significantly smaller than that of many developing countries, m-Agriculture applications tend to be implemented further up the value chain, for example with processors or consumers. In developing countries where a large proportion of the workforce is employed in agriculture, mobile technology is more commonly used to deliver services for producers and traders.

<sup>&</sup>lt;sup>2</sup> "E-Agriculture Strategy Guide", Food and Agriculture Organization of the United Nations and International Telecommunication Union, 2016, Retrieved on 20 October, 2017 from: http://www.fao.org/3/a-i5564e.pdf

<sup>&</sup>lt;sup>3</sup> "Connected Agriculture: The Role of Mobile in Driving Efficiency and Sustainability", e-agriculture.org, Retrieved on 2 December, 2017 from:

http://www.e-agriculture.org/content/connected-agriculture-role-mobile-driving-efficiency-and-sustainability

<sup>&</sup>lt;sup>4</sup> "Digitizing Agriculture Value Chains: The Story So Far", Claudia McKay and Buddy Buruku, The Consultative Group to Assist the Poor, Published on 15 January 2016, Retrieved on 2 January, 2018 from: http://www.cgap.org/blog/digitizing-agriculture-value-chains-story-so-far

# AGRICULTURE SECTOR IN PAKISTAN

### 2. AGRICULTURE SECTOR IN PAKISTAN 2.1 OVERVIEW



 
 Population Size

 7<sup>th</sup> most populous country in the world⁵, with over

 60% rural population (2015)<sup>6</sup>

Agriculture Contribution to GDP 20% agriculture contribution (2015-16) employing 42.3% of working labor force<sup>7</sup> **Expected Agriculture Growth** Plans to sustain current agriculture growth rate of 4-5% per annum by improving agricultural productivity, ensuring systematic application of better inputs, and deploying advance technology<sup>8</sup>

Agriculture in Pakistan covers crop cultivation, animal husbandry, dairying, fisheries, forestry, and other associated activities. This sector holds great promise for pro-poor economic growth. For a country like Pakistan, economic growth through agriculture has to be inclusive and provide opportunities for improving the livelihoods of the poor. Improving the productivity and profits of smallholder farmers is the key to progress.

Agriculture, a primary contributor to Pakistan's economy, employs about 42.3% of the labor force<sup>9</sup> and utilizes about 47%<sup>10</sup> of the country's land. It comprises establishments primarily engaged in growing crops, raising animals, and harvesting fish and other animals from a farm, ranch, or their natural habitats.<sup>11</sup> Replacing outdated harvesting and cultivation techniques with technological solutions and digitalization of the agriculture value chain is critical to the sector's overall growth and development.<sup>12</sup> There is a 40% yield per acre gap between Pakistan and other countries<sup>13</sup> in the same region, leaving a huge margin for improvement. The limited increase in the growth rate of agriculture from 2.7% (2013-14) to 2.9% (2014-15)<sup>14</sup> represents a clear opportunity for improvement in the way agriculture is being developed in the country and how new techniques can help it evolve more efficiently and effectively.

The 18th Amendment in the Constitution of Pakistan was a significant event that devolved powers to provinces, making certain subjects and issues a provincial concern instead of a federal one. The Amendment, passed in 2010 by the National Assembly of Pakistan, stipulates that provinces would be required by law to establish local government systems.<sup>15</sup> The provinces could also formulate and implement their own sector policies and initiatives (which includes but is not limited to education, tourism, food and agriculture, local government and rural development). Subsequently, the political, administrative, and financial responsibility and authority was also devolved to provinces' elected representatives.

https://tradingeconomics.com/pakistan/agricultural-land-percent-of-land-area-wb-data.html

<sup>&</sup>lt;sup>5</sup> "The World Fact Book: Pakistan", Central Intelligence Agency (CIA), Retrieved on 23 July, 2017 from: https://www.cia.gov/library/publications/the-world-factbook/geos/pk.html <sup>6</sup> "Pakistan: Rural Population", Trading Economics, Retrieved on 23 July, 2017 from:

https://tradingeconomics.com/pakistan/rural-population-percent-of-total-population-wb-data.html

<sup>&</sup>lt;sup>7</sup> "Pakistan Economic Survey (2015-2016) – Agriculture", Finance Division, Government of Pakistan, Retrieved on 26 July, 2017 from:

http://www.finance.gov.pk/survey/chapters\_16/02\_Agriculture.pdf

<sup>&</sup>lt;sup>8</sup> Ibid. <sup>9</sup> Ibid.

<sup>&</sup>lt;sup>10</sup> "Pakistan - Agricultural Land (% of Land Area)", Trading Economics, Retrieved on 26 July, 2017 from:

<sup>&</sup>lt;sup>11</sup> "Agriculture Sectors", United States Environmental Protection Agency, Last retrieved on 19 December, 2017 from:

https://www.epa.gov/regulatory-information-sector/agriculture-sectors

<sup>&</sup>lt;sup>12</sup> "Pakistan Economic Survey (2015-2016) – Agriculture", Finance Division, Government of Pakistan, Retrieved on 26 July, 2017 from: http://www.finance.gov.pk/survey/chapters\_16/02\_Agriculture.pdf

<sup>&</sup>lt;sup>13</sup> "Pakistan Far Behind the World in Per Acre Yield", The Nation, Retrieved on 21 July, 2017 from

http://nation.com.pk/business/18-Mar-2011/pakistan-far-behind-the-world-in-per-acre-yield

<sup>&</sup>lt;sup>14</sup> "Pakistan Economic Survey (2014-2015) – Agriculture", Finance Division, Government of Pakistan, Retrieved on 26 July, 2017 from: http://www.finance.gov.pk/survey/chapters\_15/02\_Agricultre.pdf

<sup>&</sup>lt;sup>15</sup> "Devolution - Provincial Autonomy and the 18th Amendment", Jinnah Institute, 2014, Retrieved on 1 July, 2017 from:

http://jinnah-institute.org/wp-content/uploads/2015/02/Devolution-Report.pdf

There are various actors which become pertinent to playing a critical role in the advancement and growth of the agriculture sector after the decentralization of powers in the wake of the 18<sup>th</sup> Amendment. The sector was devolved to the provincial level, with provinces being responsible for the livelihood of around 70% of the population.<sup>16</sup> Provinces are in charge of functions such as agriculture extension, and research and livestock, and have to fulfill targets and goals with their financial and capacity constraints.

**Ministry of Food, Agriculture, and Livestock (MINFAL)** was also abolished, with its functions – research and economic studies on farming agriculture policies - devolved or reallocated to other ministries.<sup>17</sup> The then government was of the view that sufficient resources, financial support and personnel were available, or provided, in the provinces to perform their new roles (2012).<sup>18</sup> Some of the projects of the public sector development program were also given to the provinces such as the projects on high efficiency irrigation and crop maximization.

In 2012, the **Federal Food Security and Research Division (FFSRD)** was formed which acquired all the federally reallocated functions of the **MINFAL**<sup>19</sup> and was tasked with food security and research across the country, as well as export of agriculture items. Similarly, **Pakistan Agricultural Research Council (PARC)**, the apex national organization, was established to work with federal and provincial institutions in the country to provide science-based solutions around agriculture.<sup>20</sup> Provinces still have to seek federal approval from entities like PARC for various reasons, indicating a lack of absolute empowerment at the provincial level.<sup>21</sup>

**Ministry of National Food Security & Research (MNFSR)**<sup>22</sup> is the federal ministry primarily focused on policy formulation, economic coordination, and planning for food grain and agriculture. It also procures food grains and fertilizers, stabilizes import price of agriculture produce, serves as an international liaison, and conducts economic studies for framing agricultural policies. National Agriculture Research Center (NARC)<sup>23</sup> is the largest research center of the PARC with their programs serving as a common platform where scientists from different federal, provincial agricultural research, and academic institutions work on research activities.

Many ICT interventions have been developed and tested around the world, with varied degrees of success, to help agriculturists improve their livelihoods through increased agricultural productivity and incomes, and reduction in risks. Similarly, Pakistan is on the journey of digitalizing different aspects of sectoral value chains for delivering better services to the farmers and improving livelihoods.

**Khushal Zamindar** (launched in December 2015)<sup>24</sup> is another free-of-cost service with SMS, IVR, and user-friendly robo-call features for farmers. It provides location-specific weather forecast along with contextual agronomic advisory for relevant crop mix and tips for livestock management. It currently has a subscription of 4 million farmers across Punjab, with 20% of them being women.<sup>25</sup>

<sup>16 &</sup>quot;Devolution of Agriculture: Impact on KP", Tahir Ali Khan, Retrieved on 27 April, 2017 from: https://tahirkatlang.wordpress.com/tag/18th-amendment/

<sup>&</sup>lt;sup>17</sup> Ibid.

<sup>&</sup>lt;sup>18</sup> Ibid.

<sup>19</sup> Ibid.

<sup>&</sup>lt;sup>20</sup> "PARC Profile", Pakistan Agricultural Research Council (PARC), Retrieved on 27 April, 2017 from

http://www.parc.gov.pk/index.php/en/pakistan-agriculture-research-council/parc-profile

<sup>&</sup>lt;sup>21</sup> "Pakistan Agricultural Research Council (PARC)", Pakistan Agriculture Research Council, Retrieved on 12 April, 2017 from: www.parc.gov.pk/

<sup>22 &</sup>quot;Ministry of National Food Security & Research", Ministry of National Food Security & Research, Retrieved on 23 April, 2017 from: www.mnfsr.gov.pk/

<sup>&</sup>lt;sup>23</sup> "National Agriculture Research Center (NARC)", Pakistan Agriculture Research Council, Retrieved on 27 April, 2017 from:

www.parc.gov.pk/index.php/2013-04-11-06-13-50/narc-islamabad

<sup>24 &</sup>quot;Telenor Khushal Zamindar", OpenIDEO, Retrieved on 8 June, 2017 from: https://challenges.openideo.com/challenge/agricultural-innovation/improve/telenor-khushal-zamindar

<sup>&</sup>lt;sup>25</sup> "Creating a Digital Ecosystem", Overview – Telenor Pakistan, Retrieved on 12 February, 2018 from:

**Bakhabar Kissan** (launched in October 2016)<sup>26</sup> is a free-of-cost service with SMS, IVR, and mobile app features for farmers, providing them with latest market rates, weather forecast, agricultural advisory, best practice tips, animal husbandry section to buy products, and news related to agriculture and government schemes. There is also a free helpline for access to agri-experts for any crop or livestock-related issue, mainly in rural Punjab and Khyber Pakhtunkhwa.<sup>27</sup> Currently, Bakhabar Kissan has about 1.2 million subscribers, with 19 million SMS/month being sent out, over 420,000 IVRs/month being carried out, and 15,000 calls/month being made to the subscribers.<sup>28</sup>

**Ricult** is a marketplace where the consumers can buy crops, fertilizers and other micro-nutrients online. This website provides a platform connecting the buyers and the farmers to help them get the right price for their products.

Digitalization of the agriculture value chain is in its initial stages. The above mentioned initiatives provide a glimpse in to the enterprising nature of various actors in the current landscape and the vast scale of opportunities that exist in digitalizing the agriculture sector.

#### 2.2 PROVINCIAL SNAPSHOT

Following the 18th Constitutional Amendment (in June 2011), several additional responsibilities related to agriculture were devolved to the provinces. The provinces were also made autonomous with regard to legislative, regulatory, and policy making and could chose to either follow existing federal laws and regulations or promulgate new ones. Provinces have also been given authority to directly deal with donors and to borrow from international financing agencies such as the **World Bank (WB)** and the **Asian Development Bank (ADB)**. A **Council of Common Interests (CCI)** was also set up to allow the provinces to discuss, agree, and coordinate various issues including adopting laws and regulation related to, for instance, marketing and trade.<sup>29</sup>

**Provincial Agriculture Departments** also play a crucial role in devising policies and action plans within the province. Policy formulation has been taken up by the Baluchistan and KP provinces but is pending approval.<sup>30</sup> FATA is currently in the process of devising an agriculture policy/action plan, with the help of FAO.<sup>31</sup> Sindh Government has devised a Food Security Policy draft which is under consultation with multiple stakeholders and is pending submission.<sup>32</sup> Government of Sindh also requested FAO for assistance with a Nutrition Sensitive Agriculture Policy/Agriculture Strategy draft along with designing an Inter-Sectoral Nutritional Strategy in 2013. Punjab Agriculture Policy 2017 draft, released by the Kissan Commission's subcommittee and Punjab Agriculture Commission, aims to make the sector competitive and profitable by focusing on infrastructure research and rural development.<sup>33</sup> The policy also makes a reference to the role of ICTs in the sectoral value chain.

<sup>&</sup>lt;sup>26</sup> "Services", Bakhabar Kissan, Retrieved on 8 June, 2017 from: http://www.bakhaberkissan.com/services.php#iv-he

<sup>27 &</sup>quot;Bakhabar Kissan", Jazz, Retrieved on 8 June, 2017 from: https://www.jazz.com.pk/prepaid/bakhabar-kissan/#Other-Information

<sup>&</sup>lt;sup>28</sup> Primary information sought from team at Jazz Pakistan's Value Added Services (VAS) department (Stats updated on August 2017)

<sup>&</sup>lt;sup>29</sup> "Agriculture Policy – Khyber Pakhtunkhwa: A Ten Year Perspective (2015 – 2025)", Agriculture Department, Government of Khyber Pakhtunkhwa, Retrieved on 24 March, 2018 from: http://kp.gov.pk/uploads/2016/07/KP\_Policy\_Agriculture.doc

<sup>&</sup>lt;sup>30</sup> "Country Fact Sheet on Food and Agriculture Policy Trends", Food and Agriculture Organization of the United Nations, August 2016, Retrieved on 24 April, 2017 from: http://www.fao.org/3/a-i6054e.pdf

<sup>&</sup>lt;sup>31</sup> "Annual Report 2015-16 - Rebuilding Lives in FATA", Rehabilitation and Reconstruction Unit (RRU), Retrieved on 10 April, 2017 from:

https://fata.gov.pk/cp/uploads/downloads/147255457457c555e9858f9.pdf

<sup>&</sup>lt;sup>32</sup> "Country Fact Sheet on Food and Agriculture Policy Trends", Food and Agriculture Organization of the United Nations, August 2016, Retrieved on 24 April, 2017 from: http://www.fao.org/3/a-i6054e.pdf

<sup>&</sup>lt;sup>33</sup> "Punjab's Policy Draft on Farming", Dawn, Updated on 20 March, 2017, Retrieved on 20 August, 2017 from: https://www.dawn.com/news/1321627/punjabs-policy-draft-on-farming

#### 2.2.1 SINDH

**Primary Stakeholder**<sup>34</sup>– Sindh Agriculture Department is focused on the development of agriculture through research, extension, and water and seed management. For developing a sustainable agricultural economy, the department is making efforts for the modernization of agriculture research, advancement of mechanized agriculture, market information systems, improved agriculture extension services, water management, supply of good seeds, and other facilities.

**Provincial Contribution to Agriculture** – The agriculture sector contributes 24% of the provincial economy in Sindh.<sup>35</sup> Agricultural GDP in Sindh is estimated at about PKR 1.6 trillion, and in order to achieve a 5% growth rate, a total investment (both public and private) of around 20% of agricultural GDP (equivalent to PKR 320 billion per annum) would be needed.<sup>36</sup>

**Policy Aim**<sup>37</sup> – The Sindh Government is expected to allocate PKR 70 billion to the agriculture sector under the Annual Development Program (ADP) 2018-19, with increased investments in crops, livestock, and fisheries. The proposed allocation will be in line with the new Sindh Agriculture Policy (2018-30) which has been approved by the provincial cabinet. The new policy emphasizes the need to increase public investment in crops, livestock, and fisheries. The new policy also brings focus to an efficient public investment program, regulatory functions, and private investment. It also implies significant changes in the legislative and regulatory frameworks in the agriculture sector.

**Farming Priorities**<sup>38</sup> – Sindh contributes significantly towards the overall national agriculture production in major crops: 41% in national rice production, 31% in national sugarcane production, 14.8% in national cotton production, and 21% in national wheat production. Among horticulture crops, Sindh produces 73% of the bananas, 34% of the mangoes, and 88% of the chillies grown in the country.<sup>39</sup>

**Budget Allocation**<sup>40</sup> – The current revenue expenditure for 2017-18 on agriculture has been increased from PKR 7.7 billion to PKR 10.36 billion for 2018-19.

**Programs and Initiatives** – In 2018-19, the government has announced various interventions and projects such as: subsidy assistance of PKR 9.65 billion to be provided to the farmers on tractors, agriculture implements, solar pumps, tube wells, etc.; and produce preservation through a subsidy of PKR 509 million help the farmers preserve and store fruits and vegetables through hot water treatment and controlled atmosphere.<sup>41</sup>

<sup>&</sup>lt;sup>34</sup> "Message from Secretary", Agriculture, Supply & Prices Department, Government of Sindh, Retrieved on 23 April, 2018 from:

http://www.sindhagri.gov.pk/MessagefromSecretary.html

<sup>&</sup>lt;sup>35</sup> "Sindh Prepares Agriculture Policy", The Express Tribune, Published on 10 October 2017, Retrieved on 15 January, 2018 from:

https://tribune.com.pk/story/1526830/sindh-prepares-agriculture-policy/

<sup>&</sup>lt;sup>36</sup> "Sindh to Allocate Rs 70bn for Agriculture Sector", Dawn, Updated 20 April 2018, Retrieved on 12 May, 2018 from: https://www.dawn.com/news/1402667 <sup>37</sup> Ibid.

<sup>&</sup>lt;sup>38</sup> "Message from Secretary", Agriculture, Supply & Prices Department, Government of Sindh, Retrieved on 23 April, 2018 from:

http://www.sindhagri.gov.pk/MessagefromSecretary.html

<sup>39 &</sup>quot;Agriculture Gets Hefty Subsidies in Sindh Budget for FY19", The Express Tribune, Published on 11 May, 2018, Retrieved on 23 April, 2018 from:

https://tribune.com.pk/story/1707367/2-agriculture-gets-hefty-subsidies-sindh-budget-fy19/

<sup>&</sup>lt;sup>40</sup> Ibid. <sup>41</sup> Ibid.

Under the Annual Development Program (ADP) 2018-19, the government has earmarked PKR 5 billion for ongoing agriculture development projects and PKR 5.94 billion for foreign-funded projects in the agriculture sector.<sup>42</sup> Some of the projects, which the government has undertaken with the help of donor agencies, are:

The Sindh Agriculture Growth Project (SAGP) is for improving productivity and market access in important commodity value chains (onion, chilli, dates, and rice). Another project is for the improvement of water courses, mitigation of flood risks, introducing high-efficiency irrigation systems, and improved agricultural practices.

**The Sindh Irrigated Agriculture Productivity Enhancement Program (SIAPEP)** got an allocation of PKR 1.08 billion as part of ongoing schemes.<sup>43</sup> The government has also earmarked PKR 2.54 billion for additional lining of already improved water courses in Sindh which included government's share of PKR 1.62 billion and revised farmers' share of PKR 911.05 million.

One study by the **Food and Agriculture Organization (FAO)** has suggested the development of supplementary basic spatial information on the distribution of various crops in digital form, known as "Crop Masks".<sup>44</sup> This study – in its second phase of 'Crop Mask Development' for major seasonal crops, in the provinces of Punjab and Sindh – is designed to develop the crop masks, showing spatial distribution of rabi (wheat and potato), and kharif crops (rice, sugarcane, and cotton). The crop masks developed within this project become useful for monitoring changes in areas of kharif crops cultivated in Punjab and Sindh. This information will be used to understand the crop rotation system through satellite remote sensing data by applying spatial query with seasonal crop masks. (There is limited information available on digital projects and initiatives in the province for agriculture sector, attributed to possibly lack of information availability or lack of focus on digital programs.)

#### 2.2.2 BALUCHISTAN

**Primary Stakeholder** – The Baluchistan Agriculture and Cooperatives Department is responsible for improving agriculture in the province through transmission of modern crop technology and agricultural techniques to the growers; ascertaining the problem of growers and conveying them to the research wing; organizing fruit and vegetable shows; demonstrating new varieties and techniques by laying out demonstrations plots; multiplying foundation seed for further distribution to progressive growers; assisting **Crop Reporting Services (CRS)** in conducting surveys, collection of data; and helping farmers in taking remedial measures against pest attack.<sup>45</sup>

**Policy Aim**<sup>46</sup> – For the budget 2018-19, the provincial government has been focused on introducing uniform general sales tax (GST) at the rate of 3% on all fertilizers and reducing GST on agriculture machinery from current 7% to 5%. The government also has proposed setting up an agriculture research support fund with an initial allocation of PKR 5 billion, which would provide financial grants for research and development of modern plant and seed varieties for achieving higher crop yield.

<sup>&</sup>lt;sup>42</sup> Ibid. <sup>43</sup> Ibid.

<sup>&</sup>lt;sup>44</sup> "Improving Efficiency in Agriculture", Dawn, Published on 24 April, 2017, Retrieved on 23 June, 2018 from: https://www.dawn.com/news/1328781

<sup>&</sup>lt;sup>45</sup> "About Department", The Agriculture & Cooperative Department, Government of Baluchistan, Retrieved on 21 April, 2018 from:

http://www.balochistan.gov.pk/index.php?option=com\_content&view=category&id=1091&Itemid=52

<sup>&</sup>lt;sup>46</sup> "Govt. Proposes Mega Incentives for Agriculture Development in Budget 2018-19", Geo News, Published on 27 April, 2018, Retrieved on 10 March, 2018 from: https://www.geo.tv/latest/193085-govt-proposes-mega-incentives-for-agriculture-development-in-budget-2018-19

**Farming Priorities**<sup>47</sup> – Some of the major crops of Baluchistan are wheat, rice, maize, jowar, bajra, and barley. Wheat and jowar account for more than 50% of the total cultivated area of the province.

**Budget Allocation**<sup>48</sup> – For the fiscal year 2018-19, the provincial government has received a budgetary allocation of PKR 8.7 billion, compared to PKR 8 billion from 2017-18. Under the Annual Development Program (ADP) for 2018-19, the government has set aside PKR 3.8 billion for the agriculture sector, slightly higher than PKR 3.68 billion earmarked for 2017-18. The development funds are meant for financing a total of 178 schemes, including 116 new and 62 ongoing. Along with setting up agri-tech fund, the government has also decided to transform all the research organizations into state-of-the-art platforms for research and development.

**Programs & Initiatives**<sup>49</sup> – Following are some of the notable achivements of the province in the agriculture sector

One of the provincial agriculture projects, designed and implemented by the Food and Agriculture Organization (FAO) in assistance with USAID, is the Baluchistan Agriculture Project. This project has successfully supported agricultural development in 8 districts of Baluchistan in the last 10 years. It has impacted thousands of farm families improving food security and reduced malnutrition, affecting the livelihoods of 17,000 rural households in more than 800 poorer communities in targeted districts. One of the key outputs of this project has been Agriculture Development Policy and Strategy for Baluchistan (awaiting approval by the government).

Through the interventions in the province on agricultural techniques and methods, some of the major crops, such as cotton, have seen increased output up to 33%, from 2016's 57,000 bales to April 2017's 76,000. Wheat production in the province is also expected to reach the target of 0.9 million ton this year, despite a 5% decline in wheat sowing areas and shortage of drought like situation in rain-fed areas.<sup>50</sup> (It should be noted that there is a dearth of information on the digital programs and projects being carried out in the province for agriculture sector.)

#### 2.2.3 KHYBER PAKHTUNKHWA (KP)

**Primary Stakeholder**<sup>51</sup> – KP Agriculture Department is responsible for ensuring food security, poverty alleviation and to generate employment opportunities through achieving higher growth rate in the agriculture sector of the province.

**Provincial Contribution to Agriculture**<sup>52</sup> – Almost 80% of the KP's population lives in rural and semi-urban areas where about 85% of population, directly or indirectly, earns their livelihoods from agriculture. An improvement in this sector can directly improve the socio-economic development of the province.

http://agriculture.kp.gov.pk/page/goal\_objective\_of\_agriculture

<sup>&</sup>lt;sup>47</sup> "Agriculture Productivity in Baluchistan Province of Pakistan: A Geographical Analysis", Journal of Basic & Applied Sciences (2014), Retrieved on 12 February, 2018 from: http://www.lifescienceglobal.com/pms/index.php/jbas/article/viewFile/2159/1283

<sup>&</sup>lt;sup>48</sup> "Provincial Budget 2018-19, Glee and Gloom in Baluchistan Agri Budget", Dawn, Updated on 21 May, 2018, Retrieved on 30 May, 3018 from:

https://www.dawn.com/news/1408921

<sup>&</sup>lt;sup>49</sup> "17,000 Rural Households in Baluchistan Benefit from Baluchistan Agriculture Project", Food and Agriculture Organization of the United Nations, Published on 20 October, 2016, Retrieved on 10 May, 2018 from: http://www.fao.org/pakistan/news/detail-events/en/c/448155/

<sup>50 &</sup>quot;Baluchistan to Focus More on Agriculture", Dawn, Published on 17 April, 2017, Retrieved on 10 May, 2018 from: https://www.dawn.com/news/1327372

<sup>&</sup>lt;sup>51</sup> "Goal & Objectives", Agriculture Department, Government of Khyber Pakhtunkhwa, Retrieved on 3 January, 2018 from:

<sup>&</sup>lt;sup>52</sup> "4 Years Achievement 2013-2017", Agriculture Department, Government of Khyber Pakhtunkhwa, Retrieved on 12 January, 2018 from: http://agriculture.kp.gov.pk/page/4\_years\_achievements\_2013\_2017

**Policy Aim**<sup>53</sup> – To ensure food security and improve the living standards of small farmers through increased production and employment generation. To pursue agricultural development on sustainable basis. To facilitate value addition for exportable products. To reduce deficit in crop production through variety improvement. To convert natural resources into viable business enterprises through scientific, technical, public private partnership and marketing support.

**Budget Allocation** – A sum of PKR 3.99 billion has been allocated for the agriculture sector to complete more than 38 development schemes including 17 ongoing and 21 new projects.<sup>54</sup> Agriculture sector, previously having remained much neglected, was given significant focus after 2013 as the new government came in to power. One of the key steps taken was the allocation of funds in Agriculture Development Program (ADP) 2013-14 of PKR 1.53 billion, PKR 1.58 billion in 2014-15 and 2015-16, and PKR 3.9 billion in 2016-17 which is more than 200% increase in the last 4 years.<sup>55</sup>

**Programs & Initiatives**<sup>56</sup> – Some of the notable projects taken up by the provincial government of KP are:

- Fruit orchards established on over 12,000 acres
- Over 380,000 certified olive plants propagated
- Over 1,400 acres of adaptive research trails of wheat, maize, rice, sugarcane, pomegranates etc. conducted
- Over 1,600 new germplasm for quality varieties of grapes, pomegranates, almond, and apricot established for further propagation
- About 8 documentaries and 7 kissan melas arranged for technology transfer
- More than 44,000 officers and farmers trained
- 150 high roof tunnels established for production of off-season vegetables
- Over 34,000 metric ton of certified wheat seed and 282 metric ton of maize hybrid seed distributed
- Over 37,500 acres of rough land leveling carried out
- Over 2,000 water courses improved and over 650 water storage tanks constructed to improve water efficiency
- Over 1,000 soil conservation structures constructed
- Over 450 electric/diesel-run tube wells/dug wells solarized
- 150 fish farms constructed through public private partnership to boost trout fish farming in KP
- Over 200 civil veterinary hospitals/dispensaries constructed/rehabilitated to improve livestock health services
- 50 dairy, beef farms registered

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<sup>53</sup> Ibid.

<sup>&</sup>lt;sup>54</sup> "KP Budget 2017-2018: Huge Chunk of Rs 208 billion Earmarked for ADP", Business Recorder, Published on 8 June 2017, Retrieved on 12 January, 2018 from: https://fp.brecorder.com/2017/06/20170608186045/

<sup>&</sup>lt;sup>55</sup> http://agriculture.kp.gov.pk/page/4\_years\_achievements\_2013\_2017

- Over 250,000 artificial insemination carried out to improve livestock production
- Over 6.2 million animals treated and vaccinated along with 4.8 million poultry birds vaccinated
- One of the pilot projects which took place in the province was a partnership between USAID Pakistan, KP Government, and Telenor Pakistan to create and deliver tailored mobile solutions to get information to peach and potato growers as well as fisheries in the Swat Valley.<sup>57</sup> The pilot covers about 1,500 people and provides two basic services sending alerts to mobile phones to provide farmers with advice and information (about market prices and new techniques, weather forecasting, and diversified financial services) in their local language, and using their mobile phones to access recorded advisories from an interactive voice response (IVR).

#### 2.2.4 PUNJAB

**Primary Stakeholder** – **Punjab Agriculture Department** is responsible for transforming Punjab's agriculture into a market-driven, diversified and sustainable sector through integrated technologies transparency and value for money.<sup>58</sup>

**Provincial Contribution to Agriculture** – Agriculture in Punjab is a major contributor, accounting for over 21% of its GDP, providing employment for 47% of its workforce, and a main source of livelihood for the poor. About 80% of the country's foreign exchange originates from agriculture, and Punjab has over 60% share in this contribution. It is a main source of raw material for several industries, especially textile, edible oil, rice husking etc.<sup>59</sup>

Agriculture Census (2010) reveals that there were 5.3 million agriculture farms in Punjab, most of which are very small farms. 42% of the farms are less than one hectare. Farms ranging from one hectare to 10 hectares make up for half of the total number of farms and they occupy 68.9% of the total area. Farms consisting of 10 hectares and above are 22.2% of the total farm area.<sup>60</sup>

**Policy Aim**<sup>61</sup> – The Punjab Government has a mission to develop a science-based, vibrant, and internationally linked agriculture sector that can not only meet the food security challenges but also compete in domestic as well as in international markets, with public-private partnerships being central to this target. This implies that there is a need-gap identification from the government to include more tech-based interventions for the challenges faced by the government.

Some of the strategic priorities of the Punjab agriculture department includes: enhancing productivity for the improved livelihood in rural areas; improving government's ability to meet food security challenges; reducing regional disparity; sustaining agriculture resources; revamping of Punjab Agriculture Research Board; establishing seed units; promoting IPR based technology environment; promoting food quality, safety, and traceability through Star Farm concept; ensuring crop maximization; and establishment of Punjab Agriculture Marketing Company.

<sup>&</sup>lt;sup>57</sup> "Mobile Agriculture: A Lifeline for Pakistan's Farmers", USAID Impact Blog, Published on 6 August, 2014, Retrieved on 13 December, 2018 from: https://blog.usaid.gov/2014/08/mobile-agriculture-a-lifeline-for-pakistans-farmers/

<sup>58 &</sup>quot;Role of Agriculture Department", Agriculture Department, Government of Punjab, Retrieved on 12 March, 2018 from: http://www.agripunjab.gov.pk/vision

<sup>59 &</sup>quot;Our Strategy", Agriculture Department, Government of Punjab, Retrieved on 11 January, 2018 from: http://www.agripunjab.gov.pk/strategy

<sup>60 &</sup>quot;Overview", Agriculture Department, Government of Punjab, Retrieved on 10 March, 2018 from: http://www.agripunjab.gov.pk/overview

<sup>61 &</sup>quot;Our Strategy", Agriculture Department, Government of Punjab, Retrieved on 11 January, 2018 from: http://www.agripunjab.gov.pk/strategy

**Farming Priorities**<sup>62</sup> – Punjab is the second largest province, making 25.9% of country's total land, with total area of 20.63 million hectares. Land utilization status is accessible for 86% of the aggregate territory while 14% land remains unreported. Another 14% of the area is not available for agriculture due to either being totally infertile or being occupied by infrastructure, consequently, only 72% of the land is available for cropping.

Punjab's total cropped area, based on the statistics of 2014, was 16.68 million hectares, revealing that 5.87 million hectares was sown more than once during that year. In 2015, wheat was cropped in 42% of the land whereas cotton occupied 14%, and rice 11.3% of Punjab's total cropped area.

To fulfill the needs of livestock population of the province, fodder was cropped in 10.6%, followed by maize and sugarcane occupying 4.1% and 4.3% cropped areas respectively. Oilseeds, pulses, and vegetables were cropped only in 10% of the area.

**Budget Allocation**<sup>63</sup> – The budget assigned for development was 21.03 billion PKR in 2017-18 whereas it was 9.76 billion PKR in 2016-17. The non-development budget was 21.65 billion PKR in 2017-18 whereas it was 14.15 billion PKR in 2016-17.

**Programs and Initiatives** – The Government of Punjab set its priority of enhancing agricultural productivity by announcing "Punjab Growth Strategy 2018" back in 2013, by substantial improvements in the quality of agricultural research; improving agriculture extension and education; better on-farm water management; and improving the quality, availability, and use of agriculture inputs such as seeds, fertilizers, pesticides, machinery, and credit.<sup>64</sup>

The Government also passed a revised Seed Act in 2015 and produced a draft for Plant Breeders Act in in the same year while revising a Produce Marketing Act in 2012. The Government has focused significantly on implementing a considerable rural roads program and aims at strengthening rural institutions through the Punjab Rural Support Program (PRSP).<sup>65</sup>

Some of the notable projects that are on going in Punjab include:<sup>66</sup>

Interactive Information Dissemination System through Use of Modern Technologies for Innovative Agriculture (2016 – 2018) with the objectives of transferring of agricultural technology to farming community through FM Radio for enhancing productivity; archiving solution/storage and security of video data/footage for about 30 years which would be retrieved for production of video documentaries, TVCs, talk shows, etc. on agriculture for broadcast/telecast through Radio and TV channels; and monitoring of twelve TV channels regarding telecast of TVCs, agricultural programs, documentaries, news, tickers, etc. for confirmation according to the media released by this Directorate and improving communication strategy.

<sup>64</sup> Punjab Govt. Ignored Vital Components of Agriculture Growth Strategy", Pakistan Today, Published on 23 October, 2017, Retrieved on 10 January, 2018 from: https://profit.pakistantoday.com.pk/2017/10/23/punjab-govt-ignored-vital-components-of-agriculture-growth-strategy/

66 "Ongoing Projects", Agriculture Department, Government of Punjab, Retrieved on 23 March, 2018 from: http://www.agripunjab.gov.pk/ongoingproj

65 Ibid.

<sup>42 &</sup>quot;Overview", Agriculture Department, Government of Punjab, Retrieved on 10 March, 2018 from: http://www.agripunjab.gov.pk/overview

<sup>63 &</sup>quot;Budget", Agriculture Department, Government of Punjab, Retrieved on 12 February, 2018 from: http://www.agripunjab.gov.pk/budget

**Promotion of High Value Agriculture through Provision of Climate Smart Technology Package** (2016 – 2019) with a budget of 4.9 billion PKR with the objectives of enhancing crop and water productivity through optimal use of water and non water inputs by application of modern irrigated agriculture development technologies; supporting production of off-season vegetables through tunnel technology to meet the domestic demands and for export; promoting use of renewable energy in agriculture for promoting irrigated agriculture in remote areas; building farmers' capability at grassroots levels for growing high value crops to get higher farm returns for alleviating poverty; creating job opportunities in rural areas through introduction of climate smart technologies for high value irrigated agriculture.

**Connected Agriculture Platform Punjab (CAPP) (launched in July 2017)**<sup>67</sup> is a program initiated by the Agriculture Department of the Government of Punjab and Punjab Information Technology Board (PITB) along with Telenor Pakistan and Telenor Microfinance Bank as partners. It offers a host of initiatives and services to farmers, such as interest-free loans, subsidies, and access to consultancy and advisory services regarding crops and fertilizers. As part of CAPP Program, 500,000 plus eligible farmers will get 3G/4G-enabled smartphones, along with free SIM cards and data bundles. Also, hundreds of facilitation centers and booths will be established across the province and training of thousands of farmers and creating digital app experts at each village level.

Zarai Baithak (launched in 2011-12)<sup>68</sup> is an online interactive agricultural information portal which farmers can also access through a number of information centers established in selected villages and equipped with operators. Developed by the Institute of Agri Extension & Rural Development, this project is being implemented at the University of Agriculture, Faisalabad with support from the University's Endowment Funds Secretariat and United States Department of Agriculture (USDA). Department of Agriculture (Punjab) is also a partner of this initiative.

(Note: Information related to current statistics is unavailable through secondary research.)

<sup>67 &</sup>quot;Government of Punjab collaborates with Telenor Pakistan and Telenor Microfinance Bank for "Connected Agriculture Platform Punjab"", Telenor Pakistan, Retrieved on 20 December, 2017 from:

https://www.telenor.com.pk/about/media-center/press-release/2017/government-of-punjab-collaborates-with-telenor-pakistan-and-telenor-microfinance-bank-for-connected-agriculture-platform-punjab

<sup>&</sup>lt;sup>68</sup> "About Us", Zarai Baithak, Retrieved on 8 June, 2017 from: http://www.zaraibaithak.com/pages/about\_us

# STOP

#### 2.3 CHALLENGES<sup>69</sup>

Agriculture in Pakistan, despite the enormous size of production and variety, faces stagnant yields and low profitability for the farmers. The role of ICTs can significantly resolve some of the key bottleneck areas of agriculture in Pakistan. Some significant challenges which Pakistan face are listed in the following thematic categories:



#### 2.3.1 ECOSYSTEM ISSUES

#### Lack of a Cohesive, Enabling Ecosystem

One of the biggest challenges the sector faces is the lack of a conducive environment which supports all stakeholders and leads to overall gains. Currently, the agriculture sector landscape requires a change in mindset for both policy development and implementation. The governmental approach doesn't fully utilize the potential of public private partnerships and the benefits of capacity building. The private companies haven't been able to fully lend their core competencies and agility to help support the public sector in the execution and scalability of different projects. The technology partners haven't been able to push forward smarter solutions for communicating with the farmers.

Ecosystem development takes place through the participation of diverse stakeholders. This has set the stage for creating collateral management and warehouse companies in the coming years for Pakistan. Such opportunities will help ensure standardization for products and practices, transparency in pricing, and greater access to the market.

<sup>&</sup>lt;sup>69</sup> Primary research done through stakeholders' interviews (World Bank, Asian Development Bank, Pakistan Agriculture Research Council, Pakistan Agriculture Coalition, Punjab Information Technology Board, Punjab Department of Agriculture) and analysis of secondary research based on the policy documents available – From August 2017 to February 2018

The policy making (discrepancy in supply and demand side as exhibited through distorted growth between different provinces) is a one of the core reasons which inhibit the growth of the sector. Most of the times the Policy does not take in to account the role of private sector and the need of public private partnerships. The policy also lacks emphasis on crop diversification and largely focuses on only one type of crops resulting into a distorted growth in the sector (case in point: local wheat procurement price is higher than international globalprice due to policy focus).

#### Lack of ICT Involvement and Digitalization

There is a lack of scalable and self-sustaining efforts towards digitalizing different components of agriculture. There needs to be an increasing emphasis on the role of innovation funds and incubation services, run by private entities/multilateral agencies. The issues related to low productivity and inefficacies can be best resolved by investing in R&D and proposing innovative solutions. This can be done easily in today's day and age as there is significant involvement of the educated rural youth in agriculture.

#### 2.3.2 OPERATIONAL ISSUES

#### Lack of Efficient Farm Practices

There is a lack of emphasis on high value agriculture and efficient farming techniques. The focus is lacking on improving the profitability/yield for the farmer and changing the perception of the farmer for the role of various stakeholders (such as the government). There is a dearth of focus on R&D to improve productivity and yield.

Water management (currently, supply driven) is a critical challenge for farmers to address as first, it is the access to water and then, it is the water-use efficiency (on average, 35% water wastage occurs) which creates problems. Obsolete techniques like flood irrigation are still deployed which not only create waste but are unsuitable for most type of crops.

#### Inefficiency and Distortion in Post-Harvest Treatment and Distribution

Farmers gauge the productivity next year based on the prices this year which causes glut. Fixed sellers are already present in the market and farmers end up taking the excess produce to the wholesale market. Unavailability of cold chain facilities is also a problem for securing the produce for export purposes.

#### Failure to Ensure Scalability of Projects

Scalability becomes an issue when pilot projects under public private partnerships fail to take off. The role of PPPs is crucial wherein government builds the landscape through policy and regulations and private sector leads through technology innovation and donor agencies can co-finance and bring in technical expertise.

#### Lack of Connected Databases and Linked Systems

A not-for-profit collection point is lacking where farmers bring product, connect with markets, get information, and eventually end up connecting to over 1000 companies to the rural farms. This is something which can be implemented in Pakistan in the future. There is a lack of connected systems where farmers' profiles (through BISP/NRSP access) can be used for identification, provide input on soil fertility levels of the owned land, and deliver climate data information. This has not been materialized as various databases (NADRA, GSM/telecom companies, banks etc.) do not have integrated systems which can enable holistic picture and customized solution for the farmers. There is currently an information gap as farmers cannot be identified through digital means yet which leads to losing out on capturing big data.

#### 2.3.3 ACCESS ISSUES

#### Inadequate Access to Inputs and Marketplaces

Pakistan loses on selling to export markets due to lack of proper grading, testing, and packaging while the produce itself is of international market quality. Other issues including warehousing, logistics alongside ensuring standardized outputs and selling those outputs to connected markets also need to be looked into. The issue of power distortion created by the middlemen (referred to as the "aarthi") also needs to be addressed as transparent and efficient marketplaces will provide level playing field for all players.

#### Insufficient Access to Credit and Financing

In terms of financial assistance, a farmer displays certain behavior that shows he is more accountability-driven if cash is involved and might not be as concerned if credit is involved. Government, as a partner, needs to assure sustained support and quality as subsidies alone might not be enough.

#### Lack of Awareness and Digital Literacy

Farmers lack the access to localized content and technology; communicating with the farmer through a physical layer (as farmers provide feedback through virtual mechanisms). Technology and its use is critical and experts need to educate them about tools like mobile wallets. There is a huge gap in addressing the role of underserved segments such as women farmers and focus on their digital literacy. Also, improvement needs to be made for testing mechanisms and extension services where private sector can play a role. One of the crucial factors is to provide advice and identify the touchpoints for the farmers.

# GLOBAL LEARNINGS IN DIGITAL AGRICULTURE

### 3. GLOBAL LEARNINGS IN DIGITAL AGRICULTURE

Looking at examples from around the world, there are various approaches and initiatives which incorporate ICT solutions in the agriculture sector. Inspiration can be drawn from different elements of country examples and can be proposed for implementation in Pakistan. These country examples also highlight the emerging themes where ICT solutions have added significant value.

Reviewing the selected international case studies, the provision of services for d-Agriculture are primarily concentrated around three major themes: Trading Platform, Insurance, and Access.

#### **3.1 INITIATIVES ON TRADING PLATFORM**

#### 3.1.1 E-NAM TRADING PORTAL (INDIA) - LAUNCHED IN 2015

#### **Objective**<sup>70</sup>

A national electronic trading platform for trading commodities

#### Features<sup>71</sup>

e-NAM is a pan-India electronic trading portal which networks the existing Agricultural Produce Marketing Committee (APMC) mandis to create a unified national market for agricultural commodities. Being the single window service for all APMC related information and services, e-NAM provides services such as commodity arrivals and prices, buy and sell trade offers, and provision to respond to trade offers.

#### Primary Stakeholders and their Roles

In the conventional agriculture landscape, states administer the component of agriculture marketing, based on their agri-marketing regulations. Under these regulations, the state is divided into several market areas. Each market area is administered by a separate APMC which imposes its own marketing regulations and fees. The fragmentation of markets hampers free flow of agriculture commodities from one market area to another, with multiple handling of agri-produce and multiple levels of mandi charges ending up with price escalation for the consumers without providing the benefit to the farmer. With the establishment of e-NAM, multiple stakeholders come to the forefront.<sup>72</sup>

The Government of India approved e-NAM through Agri-Tech Infrastructure Fund (ATIF) in July 2015, with a budget allocation of 200 crore INR for a period of three years to cover 585 selected regulated markets across the country.<sup>73</sup>

Cabinet Committee on Economic Affairs (CCEA)<sup>74</sup> – CCEA, representing the government, gave the approval for setting up e-NAM through ATIF.

<sup>72</sup> "How Electronic National Agriculture Market (e-NAM) is Different from Existing Agricultural Marketing? What are the Pre-requisites for States to Implement e-NAM?",

Integrated IAS General Studies by GKToday, Published on 21 September, 2017, Retrieved on 14 December, 2018 from:

<sup>&</sup>lt;sup>70</sup> "National Agriculture Market", e-NAM, Retrieved on 10 October, 2018 from: http://www.enam.gov.in/NAM/home/about\_nam.html

<sup>71</sup> Ibid.

https://academy.gktoday.in/civils/question/how-electronic-national-agriculture-markete-nam-is-different-from-existing-agricultural-marketing-what-are-the-pre-requisites-for-states-to-implement-e-nam/

<sup>&</sup>lt;sup>73</sup> "e-NAM Guidelines", e-NAM, Retrieved on 10 October, 2018 from: http://www.enam.gov.in/NAM/home/namguidelines.pdf
<sup>74</sup> Ibid.

**Department of Agriculture & Cooperation (DAC)**<sup>75</sup> – DAC helped set e-NAM through the Small Farmers Agribusiness Consortium (SFAC) by creation of a common electronic platform to be deployed in select regulated markets across India. DAC covered expenses on software and its customization for the states, with a free of cost provision for the states and union territories (UTs). DAC was also responsible for giving one-time grants up to the amount of 3 million INR per mandi for related equipment and infrastructure in the 585 regulated mandis for installation of the e-market platform.

**Small Farmers Agribusiness Consortium (SFAC)**<sup>76</sup> – SFAC became the lead agency for the development of e-NAM and selected a Strategic Partner (SP) as well. It implemented e-NAM in three yearly phases from 2015 to 2018.

**Strategic Partner (SP)**<sup>77</sup> – SP was made responsible for the designing, development, testing, implementation, maintenance, management, enhancement, and modification of the set of applications and modules of e-NAM. Nagarjuna Fertilizers and Chemicals Ltd. (NFCL) had been appointed as SP for a period of five years to develop and maintain e-NAM Portal.

**State Governments/Union Territories (UT) Administration**<sup>78</sup> – Representative bodies in agriculture (such as State Agriculture Marketing Department/Board/APMCs/Regulated Market Committees [RMCs]) in the state/UT were tasked with ensuring the provision of necessary regulatory framework and reforms to facilitate unhindered operation of e-NAM. These reforms meant making changes in their respective APMC Acts to allow single trading license to be valid across the state, single point levy of market fee across the state, and provision for e-auction/e-trading as a mode of price discovery to be facilitated by the representative bodies. They also had the responsibility to put in place the needed facilities and infrastructure for the implementation of e-NAM.

**Reverie**<sup>79</sup> – At later stages of implementation, Reverie took on the task of localizing e-NAM portal's content in five languages (Hindi, Marathi, Gujarati, Telugu, and Bengali), with real time transliteration and translation for static as well as dynamic content. It also enabled generation of real-time per user reports in local languages in multiple formats, on a daily basis.

Farmers<sup>80</sup> – e–NAM allows more options for farmers to sell their produce with market-competitive returns.

Traders<sup>81</sup> – It provides access to larger national market for secondary trading.

**Bulk Buyers, Processers, and Exporters**<sup>82</sup> – e-NAM enables direct participation in the local mandi trade, reducing intermediation cost.

<sup>&</sup>lt;sup>75</sup> "Central Sector Scheme for Promotion of National Agricultural Market through Agri-Tech Infrastructure Fund", Press Information Bureau, Government of India, Cabinet Committee on Economic Affairs (CCEA), Published on 2 July, 2015, Retrieved on 1 January, 2018 from: http://pib.nic.in/newsite/PrintRelease.aspx?relid=122932 <sup>76</sup> Ibid.

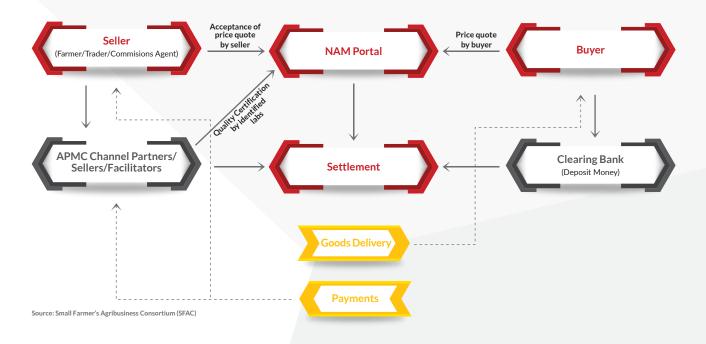
<sup>&</sup>lt;sup>77</sup> "e-NAM Guidelines", e-NAM, Retrieved on 10 October, 2018 from: http://www.enam.gov.in/NAM/home/namguidelines.pdf
<sup>78</sup> Ibid.

<sup>&</sup>lt;sup>79</sup> "How localized agricultural portal e-NAM is impacting millions of farmers in India", Reverie Language Technologies, Retrieved on 1 January, 2018 from: http://reverieinc.com/impacting-million-farmers-enam/

<sup>80 &</sup>quot;e-NAM Portal and its Uses & Benefits for Farmer", Legal Desire, Published on 17 June, 2016, Retrieved on 14 December, 2017 from:

http://www.legaldesire.com/enam-portal-and-its-uses-benefits-for-farmer/

<sup>&</sup>lt;sup>81</sup> Ibid. <sup>82</sup> Ibid.



#### Impact<sup>83</sup>

Figure 1: e-NAM's working model

#### Some of the highlights of e-NAM's success and impact are:

- Major commodities such as Wheat, Chillies, Paddy, Cotton, Potato, Caster Seed, Maize, Ground Nut, Mustard, and Guar Seed being traded
- Coverage of 455 markets by May 2017, with the intention of covering 585 markets by May 2018
- Traded quantity of 11,371.72 ton worth value of 314.24 billion INR
- 96,118 buyers (traders), 5,076,501 sellers (farmers), and 51,126 commission agents registered on the portal
- Created a unified market through online trading platform (both, at state and national level) with the benefits of promoting standardization of procedures across the integrated markets, removing information asymmetry between buyers and sellers, promoting real-time price discovery, promoting transparency in auction process, and providing access to a nationwide market for the farmers

#### 3.1.2 G-SOKO TRADING PLATFORM (KENYA) - INAUGURATED IN 2015 AND WENT LIVE IN 2016

#### Objective <sup>84</sup>

Facilitating regional and national trade in grains through a trading platform

#### Features

The G-Soko Trading Platform (inaugurated in July 2015 and went live in October 2016)<sup>85</sup> is an electronic system comprising of a network of automated grain bulking/aggregation centers and certified warehouses, linked to a virtual trading platform, as well as participating banks for settlement and clearing and trading houses (grain buyers/millers) all regulated and administered by Eastern Africa Grain Council (EAGC).<sup>86</sup>

<sup>83 &</sup>quot;e-NAM Multi-dashboard", e-NAM, Retrieved on 10 October, 2018 from: http://www.enam.gov.in/NAM/home/multi\_dashboard.html

<sup>&</sup>lt;sup>84</sup> "About the EAGC G-Soko System", G-Soko, Retrieved on 20 December, 2017 from: http://g-soko.com/

es "The Way Tanzanian Farmers Going to Benefit from G-Soko Technology", IPP Media, Published on 1 February, 2017, Retrieved on 14 December, 2017 from:

http://ippmedia.com/en/features/way-tanzanian-farmers-going-benefit-g-soko-technology

<sup>&</sup>lt;sup>86</sup> "About the EAGC G-Soko System", G-Soko, Retrieved on 20 December, 2017 from: http://g-soko.com/

#### Primary Stakeholders and their Roles

**Eastern Africa Grain Council (EAGC)**<sup>87</sup> – EAGC is a membership-based organization registered in Kenya. It was registered in 2006 at the request, through the efforts of key stakeholders in all three sections of the grain value chain: producers, traders, and processors. Service providers are associate members. It operates as a non-profit, non-political, non-denominational organization, which prepares, disseminates, and promotes the exchange of information on matters affecting the regional grain industry.

**The Department for International Development (DFID) Africa Regional Department**<sup>88</sup> – DFID leads the UK's global efforts to end extreme poverty, deliver the Global Goals for Sustainable Development (SDGs), and tackle a wide range of global development challenges. It funds the FoodTrade ESA Programme through its Africa Region Department, through an investment of £36 million over a period of 5 years.

**Development Alternatives Incorporated (DAI)**<sup>89</sup> – DAI is international development company, working towards global development in the areas which include but are not limited to of conflict mitigation, effective civil society, legitimate governance, poverty reduction, economic reform, global competitiveness, and private sector engagement.

**FoodTrade Eastern and Southern Africa (FoodTrade ESA) Programme**<sup>90</sup> – FoodTrade ESA is a 5-year trade enhancement and promotion programme, focusing on staple food crops. It is funded by the UK Government (DFID) and managed by Development Alternatives Incorporated (DAI). FoodTrade ESA operates in 9 East and Southern African countries. The programme works with private sector and relevant institutions to improve storage, inputs and service markets, information and coordination mechanisms and policy and regulation, with the aim to get more people trading in regional staple food markets.

**Virtual City**<sup>91</sup> – Virtual City is a leading mobile software solutions firm supporting the supply chain and agribusiness industry in Africa.

The EAGC took the lead in the development of the trading platform. Virtual City designed and built the G-Soko ICT infrastructure. The Virtual City team worked with EAGC to validate the system and incorporate feedback received from stakeholders. The FoodTrade ESA **Programme Management Unit (PMU)** coordinated the efforts of private sector and development partners who fed into the G-Soko system.<sup>92</sup> The objective of the trading platform is to ensure that farmers growing grains have access to regional markets. The trading platform uses innovative technology to provide information on market opportunities, to track goods, enhance transparency, and connect buyers and sellers while bringing structure and consistency to trade in grains by facilitating title transfer, market transparency, and price discovery.<sup>93</sup>

<sup>&</sup>lt;sup>87</sup> "2017 Aid for Trade – Case Story on DFID G-Soko Market System", Organization for Economic Cooperation and Development, Retrieved on 2 December, 2017 from: https://www.oecd.org/aidfortrade/casestories/casestories-2017/CS-70-DFID-G-Soko-market-system%20.pdf

https://www.oecd.org/aidfortrade/casestories/casestories-2017/CS-70-DFID-G-Soko-market-system%20.pdf

<sup>&</sup>lt;sup>88</sup> "Smallholder Farmers to Benefit from Online Trading Platform" Corporate Digest, Retrieved on 2 January, 2018 from:

http://www.corporate-digest.com/index.php/smallholder-farmers-to-benefit-from-online-trading-platform

<sup>8</sup>º "Digital", Development Alternatives Incorporated, Retrieved on 15 January, 2018 from: https://www.dai.com/our-work/solutions/digital

<sup>90 &</sup>quot;Foodtrade Eastern and Southern Africa Programme" GOV.UK (United Kingdom Public Sector Information Website), Retrieved on 5 January, 2018 from:

https://www.gov.uk/international-development-funding/east-and-southern-africa-food-trade-programmed states and states a

<sup>&</sup>lt;sup>91</sup> "2017 Aid for Trade – Case Story on DFID G-Soko Market System", Organization for Economic Cooperation and Development, Retrieved on 2 December, 2017 from: https://www.oecd.org/aidfortrade/casestories/casestories-2017/CS-70-DFID-G-Soko-market-system%20.pdf

<sup>92</sup> Ibid.

#### Impact<sup>94</sup>

The G-Soko Trading Platform has brought benefits to the agriculture value chain through:
100 regionally certified warehouses for the procurement of grain
18 grain commodities and products being traded and standards
180 producer aggregation centers (linked with certified warehouses) being established and strengthened
Over 50,000 smallholders being incorporated in structured trade
Automation of the operations of all certified warehouses from grain intake to dispatch
An electronic trading platform established which links grain actors (sellers, buyers, service providers) and certified warehouses
Provision of efficient and transparent trade information that informs buyers and sellers on spot market conditions regionally

#### **3.2 INITIATIVES ON INSURANCE**

#### 3.2.1 ACRE (AGRICULTURE AND CLIMATE RISK ENTERPRISE) AFRICA (KENYA, RWANDA, AND TANZANIA) - LAUNCHED IN 2009 AND REVAMPED IN 2014

#### **Objective**<sup>95</sup>

Linking the farmers to insurance products that will both protect them from the losses suffered with failed crops and allow them to confidently invest in their farms

#### Features

ACRE Africa (formerly known as the Kilimo Salama project of the Syngenta Foundation for Sustainable Agriculture, launched in 2009) is the largest private sector index-based insurance program in both Kenya and Africa. Products including a weather-indexed insurance plan which provides farmers with a Replanting Guarantee. When farmers purchase bags of seed or fertilizer, they can register for insurance via their mobile, using a code in the bag. Their location and planting date are calculated based on their registration, and weather is monitored in that area via satellite. The insurer pays a disbursement to the farmer's mobile money wallet, allowing the farmer to buy new seed or inputs and plant again.<sup>96</sup> Product portfolio includes weather station- and satellite-based weather index, area yield index, hybrid weather index and Multiple Peril Crop Insurance (MPCI), and dairy livestock insurance.<sup>97</sup>

#### Primary Stakeholders and their Roles

Global Index Insurance Facility (GIIF)<sup>98</sup> – GIIF is a multi-donor trust fund financed by the European Union, Japan and the Netherlands, and implemented by International Finance Corporation (IFC) and the World Bank Group. Kilimo Salama is funded through the Syngenta Foundation for Sustainable Agriculture and GIIF.

<sup>&</sup>lt;sup>94</sup> "Structured Trading Systems (STS), Eastern Africa Grain Council, Retrieved on 20 December, 2017 from: http://eagc.org/services/g-soko/

<sup>&</sup>lt;sup>95</sup> "Agriculture Insurance – East Africa", Syngenta Foundation for Sustainable Agriculture, Retrieved on 20 October, 2017 from:

https://www.syngentafoundation.org/agricultural-insurance-east-africa

<sup>&</sup>lt;sup>96</sup> "About Acre Africa", Acre Africa, Retrieved on 3 January, 2018 from: https://acreafrica.com/

<sup>&</sup>lt;sup>97</sup> https://www.indexinsuranceforum.org/project/acresyngenta-foundation-sustainable-agriculture-kenya-rwanda-tanzania

<sup>98 &</sup>quot;Agriculture Insurance – East Africa", Syngenta Foundation for Sustainable Agriculture, Retrieved on 20 October, 2017 from:

https://www.syngentafoundation.org/agricultural-insurance-east-africa

**Syngenta Foundation for Sustainable Agriculture (SFSA)**<sup>99</sup> – SFSA has been working on agricultural insurance since 2009 and has been focused on developing innovative and affordable insurance tailored to smallholders in East Africa. In 2014, it created ACRE Africa, with operations spanning in three countries.

**Local Insurers**<sup>100</sup> – Local insurers carry risk, document policy, and pay claims. Insurance partners include UAP Insurance, APA Insurance, CIC Insurance Group Limited, Allianz in Kenya; Soras Insurance (Rwanda); and UAP Insurance (Tanzania).

**Reinsurers**<sup>101</sup> – They price policy and reinsure risk. They include Swiss Re and Africa Re.

**Farmer Aggregator**<sup>102</sup> – This organization is insured on behalf of farmers. It includes the likes of banks, microfinance institutions, and agribusinesses. It advances the premium and disburses compensation.

**Safaricom**<sup>103</sup> – It is Kenya's main mobile phone operator and it is helping ACRE Africa through its mobile banking product, M-PESA, to instantly pay both premiums and payouts as well as supporting easy registration and tracking of individual clients.

#### Impact

ACRE Africa has been able to bring a holistic change in the life of farmers across Africa:

- Cumulatively, over 1 million farmers in Kenya, Tanzania, and Rwanda got insured for over 77 Million USD against a variety of weather risks
- Crops insured include maize, sorghum, coffee, sunflower, wheat, cashew nuts ,and potato
- Coverage being provided against drought, excess rain, and storms<sup>104</sup>
- Insured farmers invested 19% more and earned 16% more than neighboring uninsured counterparts (based on a 2012 impact study)
- 76% of the farmers insured by ACRE in 2016 received loans linked to the insurance<sup>105</sup>

<sup>99</sup> "Helping Farmers Grown Confidently", Syngenta Foundation for Sustainable Agriculture, Retrieved on 2 February, 2018 from:

https://www.syngentafoundation.org/file/2016/download?token=nMczyIAf

<sup>100</sup> "Insurance Value Chain", Syngenta Foundation for Sustainable Agriculture, Retrieved on 20 October, 2017 from: https://acreafrica.com/services/ <sup>101</sup> lbid.

https://www.indexinsuranceforum.org/project/acresyngenta-foundation-sustainable-agriculture-kenya-rwanda-tanzania-foundation-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-agriculture-kenya-sustainable-ag

<sup>&</sup>lt;sup>102</sup> Ibid.

<sup>&</sup>lt;sup>103</sup> "Case Study: Acre – East Africa", Climate Change, Agriculture, and Food Security, Retrieved on 20 December, 2017 from:

https://www.shareweb.ch/site/DRR/Documents/Projects/7F-05096.01/Report\_Tanzania\_CCAFS\_Report\_ACRE\_7F-05096.01\_2015.pdf

<sup>&</sup>lt;sup>104</sup> "Our Achievements", Acre Africa, Retrieved on 21 January, 2018 from: http://acreafrica.com/achievements/

<sup>105 &</sup>quot;Acre/Syngenta Foundation for Sustainable Agriculture – Kenya, Rawanda, Tanzania", Index Insurance Forum, Retrieved on 2 February, 2018 from:

#### **3.3 INITIATIVES ON ACCESS**

#### 3.3.1 FARMERS' CLUB (TURKEY) - LAUNCHED IN 2009106

#### **Objective**<sup>107</sup>

Achieving digital transformation by contributing to agricultural and rural development, and to support farmers with equal access to social and economic life

#### Features<sup>108</sup>

Farmers' Club, a social business model, offers a range of mobile services to help farmers boost productivity. It was first launched by Vodafone in Turkey in 2009. Its primary services' portfolio includes Farmers News Package Service (providing agricultural information to customers via SMS); Farmers' Training Truck Project (delivering trainings in villages to meet farmers' needs); Farmers' Guide Application (providing an app developed for smartphones); Farmer Advertisement Service (club members giving free advertisements and getting the chance to sell their products without intermediaries and at their worth); and services with Şekerbank (club members being able to utilize the financing products within the scope of "Family Farming Banking" with 15% interest discount through the collaboration with Şekerbank).<sup>109</sup>

#### Primary Stakeholders and their Roles

**TABIT**<sup>110</sup> – TABIT reaches out to agricultural professionals by using internet and mobile solutions and face-to-face communication techniques, along with developing and implementing 360-degree communication and marketing projects for customers to reach the target group of people who are living in rural areas, especially the farmers.

**Vodafone**<sup>111</sup> – Vodafone is a multinational telecom company, with operation networks in 26 countries and partner networks in over 50 additional countries.

Vodafone Farmers' Club is a packaged offering available on the Vodafone Turkey network, which includes both special tariffs and agricultural information to help smallholder farmers improve their farming practices and gain access to markets. The Farmers' Club agriculture content is managed by Vodafone's partner TABİT, a Turkish social enterprise focusing on ICT enablement for smallholder farmers, and the publisher of the agriculture information portal Tarimsal Pazarlama (Agriculture Marketing). Marketing, strategy, and distribution are managed by Vodafone Turkey, the second largest mobile operator in the country with 21 million subscribers.<sup>112</sup>

<sup>&</sup>lt;sup>106</sup> "Case Study: Vodafone Turkey Farmers' Club", GSM Association, Retrieved on February 12, 2018 from:

https://www.gsma.com/mobilefordevelopment/programme/magri/case-study-vodafone-turkey-farmers-clublescond-study-s

<sup>&</sup>lt;sup>107</sup> "Vodafone Turkey Sustainability Report 2015 -2016", Vodafone, Retrieved on 28 December, 2017 from:

https://www.unglobalcompact.org/system/attachments/cop\_2017/351701/original/2015-16\_Vodafone\_Turkey\_Sustainability\_Report.pdf?1483730523

<sup>&</sup>lt;sup>109</sup> "Mobile to Enhance the Lives and Livelihoods of Low Income Farmers", Vodafone, Published on 26 May, 2015, Retrieved on 23 January, 2018 from:

http://www.vodafone.com/content/index/media/vodafone-group-releases/2015/connected-farming.html#

<sup>&</sup>lt;sup>110</sup> "Who Are We?", TABIT, Retrieved on 15 February, 2018 from: http://www.en.tabit.com.tr/Hakkimizda.aspx

<sup>&</sup>lt;sup>111</sup> "Where We Are", Vodafone, Retrieved on 21 December, 2017 from:

<sup>&</sup>lt;sup>112</sup> "Case Study: Vodafone Turkey Farmers' Club", GSM Association, Retrieved on 12 January, 2018 from:

 $https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2015/06/GSMA\_Case\_VodafoneTurkey\_18Aug2015.pdf$ 

#### Impact<sup>113</sup>

#### Some of the highlitghts of the Farmers' Club initiative are:

- 1.2 million farmers benefitted by getting help to improve crop yields and increase farm gate incomes
- 871 million SMSs sent on 1.1 million different subjects to farmers
- Trucks visited 495 towns and villages and reached more than 225,000 farmers
- More than 38,000 farmers benefited from this advertisement service
- Developed app downloaded by 16,000 farmers

#### 3.3.2 KYAGALANYI PROJECT (UGANDA)114 – LAUNCHED IN 2015

#### **Objective**<sup>115</sup>

Driving financial inclusion through the digitization of agricultural value chains

#### Features<sup>116</sup>

Kyagalanyi Project enabled the digitalization of payments for coffee value chain, through bringing in stakeholders such as mobile operators, banks, and payment service providers to research how new solutions can support digital financial inclusion for the coffee farmers. The solution allowed to reach marginalized communities via bulk payment initiatives which are complemented with DFS such as saving and lending products.

#### Primary Stakeholders and their Roles

**United Nations Capital Development Fund (UNCDF)**<sup>117</sup> – UNCDF is focused on working with the world's 48 Least Developed Countries (LDCs). Mobile Money for the Poor (MM4P), UNCDF's flagship program, has been in operation since 2012 and is funded by UNCDF, the Swedish International Development Cooperation Agency, the Australian Department of Foreign Affairs and Trade, the Bill & Melinda Gates Foundation, and The MasterCard Foundation. This program will improve the access of mobile-enabled delivery channels for financial services to the most economically disadvantaged people in Africa.

**Mobile Money for the Poor (MM4P)**<sup>118</sup> – MM4P Uganda reaches marginalized communities via bulk payment initiatives which are complemented with digital financial services (DFS) such as saving and lending products.

**Kyagalanyi Coffee Ltd (KCL)**<sup>119</sup> – Founded in 1992, Kyagalanyi Coffee is the oldest licensed coffee exporter in Uganda and remains to be one of the leading green coffee exporters in Uganda with export volumes of about 400,000 bags a year. It is working with over 12,000 farmers across Uganda to improve the yields and quality of their coffee through its sustainability initiatives.

**Mobile Telephone Networks (MTN)**<sup>120</sup> – MTN is the largest telecom company in Uganda, connecting 22 countries across Africa and the Middle East. It introduced its mobile telephone-based banking product known as Mobile Money in 2009 and it controlled 80% of the mobile money market in Uganda.

Retrieved on 21 January, 2018 from: http://www.mastercardfdn.org/mobile-money-for-the-poor-expanded-to-enable-millions-more-people-in-africa-to-access-financial-services/ <sup>118</sup> "When Stakeholders Work Together, We Make Progress", United Nations Capital Development Fund, Retrieved on 12 January, 2018 from:

<sup>&</sup>lt;sup>113</sup> "Vodafone Turkey Sustainability Report 2015 -2016", Vodafone, Retrieved on 28 December, 2017 from:

 $https://www.unglobalcompact.org/system/attachments/cop_2017/351701/original/2015-16_Vodafone_Turkey_Sustainability_Report.pdf?1483730523$ 

<sup>114 &</sup>quot;When Stakeholders Work Together, We Make Progress", United Nations Capital Development Fund, Retrieved on 12 January, 2018 from:

http://www.uncdf.org/article/1645/when-stakeholders-work-together-we-make-progress-migration

<sup>&</sup>lt;sup>115</sup> Ibid. <sup>116</sup> Ibid.

<sup>117&</sup>quot; Mobile Money for the Poor Expanded to Enable Millions More People in Africa to Access Financial Services", MasterCard Foundation, Published on 23 October, 2014,

http://www.uncdf.org/article/1645/when-stakeholders-work-together-we-make-progress-migration

<sup>&</sup>lt;sup>119</sup> "About Us", Kyagalanyi Coffee Ltd, Retrieved on 15 January, 2018 from: http://kyagalanyi.co.ug/about-us/

<sup>&</sup>lt;sup>120</sup> "Uganda: Inside MTN Mobile Money Saga", All Africa, Retrieved on 25 January, 2018 from:

**Fenix International**<sup>121</sup> – A pay-as-you-go solar provider, Fenix International provides a high-quality solar power ecosystem that transforms sunlight into energy to run devices such as phones, lights, radios, and TVs.

**Yo! Uganda**<sup>122</sup> – Yo! Uganda is a mobile money payments and mobile commerce aggregation system, currently servicing a multitude of accounts.

MM4P began working in 2015 with several companies to digitize the coffee value chain in Uganda. The coffee bulk payer was KCL which aims to digitize payments to its farmers. KCL, being the third largest coffee exporter in Uganda, sought to complement its sustainability initiatives with financial inclusion for farmers. MM4P worked with KCL to improve its financial systems with technological improvements (engineered by Yo! Uganda) so that its systems can capture and engage farmer payments using mobile money or cash, effectively enabling digital payments. MM4P also partnered with MTN Uganda to provide customized mobile money services to KCL farmers. Initially, MM4P worked with MTN to improve network coverage in the mountainous target geography by installing a mobile base transceiver station, which MM4P guaranteed against losses for the first year. Subsequently, in 2016, MTN introduced the first mobile financial product, MoKash, to the Ugandan market. With Fenix International, MM4P designed a financial product (lease to own) to facilitate cell phone and solar solution ownership amongst farmers, especially women.<sup>123</sup>

#### Impact<sup>124</sup>

#### Some of the highlitghts of the Kyagalanyi Project are:

- MM4P's work in Uganda to modernize payments systems and provide financial services has the potential to affect millions of people as approx. 85% of the total population is based in rural areas
- The coffee value chain itself employs 2.5 million people, while the tea value chain employs 0.2 million and the dairy value chain employs 1.2 million
- Youth are heavily employed in these value chains, as are women
- By building a DFS ecosystem, the project supports employment of agents (predominately mobile money agents) who serve as cash-in/cash-out points and provide critical customer support to DFS users

<sup>123</sup> "When Stakeholders Work Together, We Make Progress", United Nations Capital Development Fund, Retrieved on 12 January, 2018 from:

http://www.uncdf.org/article/1645/when-stakeholders-work-together-we-make-progress-migration <sup>124</sup> lbid.

<sup>&</sup>lt;sup>121</sup> "Product", Fenix Intl, Retrieved on 2 February, 2018 from: https://www.fenixintl.com/product/

<sup>&</sup>lt;sup>122</sup> "About Yo!", Yo Uganda Limited, Retrieved on 3 February, 2018 from: www.yo.co.ug/about-yo/

# OPPORTUNITIES IN DIGITAL AGRICULTURE

# CONTINUE

### 4. OPPORTUNITIES IN DIGITAL AGRICULTURE<sup>125</sup>

The scope of the sector and room for interventions both allow for the tremendous opportunities that can be capitalized on to bring sustainable growth to the sector:

#### Improving Access to Financial Services

- Mobile Payment System Method of sending payments via cellular networks for registered users
- Micro-Insurance System Automatic funding of additional insurance premiums at the time of purchase of input goods
  - Micro-Lending Platform Provided by person-to-person (P2P) transfers and/or by advertising to external investors

#### Improving Provision of Agricultural Information

- Mobile Information Platform Choice of receiving a set number of push messages per week, alerts only, or information on demand
- Farmer Helpline Voice-based information-on-demand service, staffed by agricultural experts
- Inclusion in Academic Curriculum e-Agriculture programs in the academia to be made part of the curriculum in specialized programs and universities

#### Improving Data Visibility for Supply Chain Efficiency

- Smart Logistics Mobile-enabled tracking devices used to communicate vehicle movements to fleet management systems
  - Traceability Recording of movements of products along the food chain 🖪
- Mobile Management of Supplier Metworks Mobile technology for produce buyers to manage their grower networks
  - Mobile Management of Distribution Networks Mobile technology for input supply companies to manage their inventory and rural distribution networks
  - Utilization of Big Data Goverment bodies allowing sharing and access to data to be able to utilize Big Data in the e-Agriculture services

#### **Enhancing Access to Markets**

Agricultural Trading, Tendering, and Bartering Platform – Use of a mobile (and online) portal to bring together farmers and traders for the purposes of buying and selling goods, tendering for services and bartering at the national and/or provincial levels

<sup>125</sup> "Connect Agriculture: The Role of Mobile in Driving Efficiency and Sustainability in the Food and Agriculture Value Chain", Accenture and Vodafone, Published in September 2011, Retrieved on 3 January, 2018 from: http://www.vodafone.com/content/dam/vodafone/about/sustainability/2011/pdf/connected\_agriculture.pdf

## RECOMMENDATIONS FOR DIGITALIZING AGRICULTURE IN PAKISTAN

# ACCELERATE

### 5. RECOMMENDATIONS FOR DIGITALIZING AGRICULTURE IN PAKISTAN

Some of the significant themes emerging from the analysis of the international context can guide Pakistan to focus on the development of a cohesive, holistic ecosystem rooted in the following pillars<sup>126</sup>:

#### **5.1 RECOMMENDATIONS' SUMMARY**

- Formulation of a National d-Agriculture Strategy
- Development of Knowledge Sharing Platforms
- Provision of Access to Information, Markets, Financial Services
- Creation of Local, Customized Content
- Provision of Digital Literacy
- Support of Public Private Partnerships

<sup>&</sup>lt;sup>126</sup> "E-Agriculture Strategy Guide", Food and Agriculture Organization of the United Nations and International Telecommunication Union, 2016, Retrieved on 20 October, 2017 from: http://www.fao.org/3/a-i5564e.pdf

#### 5.2 RECOMMENDATIONS' PROFILING



#### Formulation of a National e-Agriculture Strategy

Ensuring the development and implementation of a national e-agriculture strategy, focused on providing reliable and affordable connectivity and integrating ICTs in rural development to support food security and hunger eradication

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#### **Development of Knowledge Sharing Platforms**

Fostering collaboration and knowledge sharing in agriculture via electronic communities of practice in order to showcase and promote models, methodologies, and good practices, and the adoption of interoperability standards, for effective and equitable use of ICTs for sustainable agriculture and rural development



#### Provision of Access to Information, Markets, Financial Services

Ensuring provision of valuable resources like information and advisory services, marketplace access for trading, and the access to financial services which will lead to overall improvement in the productivity of the farmers and subsequent positive change in the communities



#### **Creation of Local, Customised Content**

Promoting the creation and adaptation of content including in local languages and contexts from reliable and trusted sources, including, ensuring equitable and timely access to agricultural knowledge by resource-poor men and women farmers, foresters and fisher folk in rural areas



#### **Provision of Digital Literacy**

Fostering digital literacy of institutions and communities in rural and remote areas taking into consideration local needs and constraints by providing appropriate learning opportunities for all which will enhance individual and collective decision-making skills



#### **Support of Public Private Partnerships**

Promote Public-Private Partnerships in cooperation with relevant CSOs/NGOs, cooperatives, farmer organizations, academia, research institutions in the agricultural sector (which also includes forestry and fishery) for inclusive, efficient, affordable and sustainable ICT services and initiatives in agriculture and rural development which will promote the wide scale use of ICT and foster sustainable agri-business models

#### 5.3 STAKEHOLDERS AND ROLES 127

The development of a holistic ecosystem is possible only through the involvement of diverse and multiple stakeholders, with the converging agenda of improving the sector's health. The vision and goals, led by the top-most echelons of national policy-making has to eventually be translated in to SMART targets which are subsequently monitored and evaluated. For this whole process to work, the collaboration of various partners is needed:

#### **Private Companies and Entrepreneurs**

- Capacity to create new job opportunities with growth potential
- Ability to create opportunities which deliver much-needed services to farmers (e.g.: soil testing, financing, logistics, farm machinery etc.)
- Local examples; Ricult, Cowlar, Jazz, Engro

#### Farmers

- Role of progressive farmers in deploying smart agriculture techniques
- Focus on lowering costs
- Emphasis on increased productivity and income
- Focus on better risk mitigation (e.g.: pests, disease, weather etc.)
- Greater access to expert information, services, and best practices

#### **Governments (National and Provincial)**

- Ownership of policy development and implementation
- Appropriate governance structure at national & provincial levels
- Deployment of technology infrastructure (such as, access to broadband and mobile handsets)
- Formulation of supportive and transparent regulations
- Emphasis on economic growth and job creation in rural areas
- Drive towards greater food security
- Improved relationships with rural communities
- Local examples: Khyber Pakhtunkhwa Information Technology Board (KPITB), Punjab Information Technology Board (PITB), National Agriculture Research Center (NARC), Pakistan Agriculture and Research Council (PARC)

#### Market Aggregators

- Ability to directly and cost-effectively source produce in bulk
- Ability to optimize market efficiency by connecting buyers and sellers
- Examples: Pakistan Agriculture Coalition (PAC)

<sup>127</sup> "eAgriculture: Using Technology to Empower Farming Communities", Intel World Ahead Program, Retrieved on 2 February, 2018 from: https://www.intel.de/content/dam/www/public/us/en/documents/corporate-information/eagriculture\_program\_cs.pdf

#### **Suppliers**

- Direct, inexpensive, and transparent access to larger groups of farmers
- Better forecasting for greater efficiency and fewer losses
- Stronger relationships with farmers

#### **Technology Companies**

- New business opportunities using a proven model that increases readiness for technology adoption
- Ability to reach new customer base early, for longer-term benefits
- Opportunity to achieve business and social benefits by increasing access to technology
- Local examples: Jazz

**Research Universities and Extension Offices** 

- Direct access to otherwise unreachable farmers
- Ability to test and validate academic research and innovation in real-world applications
- Opportunity to solve practical problems and share best practices with aggregated groups of farmers
- Enhanced student learning through hands-on projects
- Local examples: University of Agriculture Faisalabad, ITU Lahore

#### **Multilateral Agencies**

- Ability to create the bridge between grassroots and the governments
- Expertise and best practices brought in from other markets and countries
- Availability of technical assistance and funding
- Access to the grassroots and on-ground problems
- Local examples: USAID, World Bank (WB), Asian Development Bank (ADB)

The development and growth of a sustainable ecosystem for d-Agriculture is possible when all the relevant actors play their part. The governments play a huge role in developing conducive policy frameworks and supporting strategic priorities which are then translated by the rest of the ecosystem players. Private entities and technology partners bring in the feasibility and access to solutions. Multilateral agencies have the ability to provide both monetary assistance and technical guidance to projects undertaken within the specified priority areas. Microfinance institutions also resolve the issue of access to credit and funding to farmers. Market aggregators and suppliers bring efficiency and profitability gains to both the supply and demand side of the value chain. Universities amass that knowledge which becomes crucial in providing extension services to the farmers. When all the actors come together to lend their core competencies for the agenda of improving and sustaining d-Agriculture, only then we get to witness the gains and growth which digitalization brings to all the actors in the agriculture sector.

### CONCLUSION

d-Agriculture transforms the way actors in agricultural value chains collect, analyze, store, and share agricultural information for their daily decision making purposes. It leads to greater efficiencies in rural markets through lower transaction costs, less information asymmetries, improved market coordination, and transparent rural markets. It also reduces wastage in various stages from the field-to-fork value chain. d-Agriculture development stimulates investment in ICT infrastructure and human capital.

The policy interventions can only be possible through ownership of the agriculture policy and aligned vision at the highest level, along with a predefined and prominent role of ICTs in the sector. Pakistan needs to focus on improving agricultural extension and advisory services, promoting environmentally sustainable farming practices, implementing disaster management and early warning systems, developing frameworks for food safety and traceability, ensuring financial inclusion, insurance, and risk management, enhancing capacity building and empowerment, and improving the regulatory and policy landscape. The role of the government needs to be more facilitating towards the regulatory and policy side.

Private sector participants such as technology partners and banking partners, governmental bodies such as agriculture departments and information technology boards, and multilateral agencies such as donor agencies can come together to lend expertise and focus on improving both value chains and yields. Farmers need awareness and access to information. The assessment of value chains is key – the role and placement of different partners, which crops to be focused on, what type of IT interventions are necessary, how to create awareness and knowledge amongst end-users, how to develop a layer of diagnostics, and how to facilitate the farmer through intermediaries.

An integrated system approach is needed where diverse stakeholders come together to contribute towards building and sustaining a digital landscape for the agriculture sector. A conducive ecosystem can be built based on – identifying and allowing all stakeholders to play their roles, strategizing around clear objectives of improving farmer yields and productivity, and creating a connected network of digital portals and applications which will result in a technologically savvy, sustainable, and robust d-agriculture sector eventually contributing positively to national economic growth and prosperity.