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**Financial Technological Innovation and Access is the Key to Unlocking African
Agricultural Potential: A Case Study of Dairy in Kenya.**

Kennedy Otieno Pambo

Email: kennedypambo@gmail.com

Jomo Kenyatta University of Agriculture and Technology

Abstract

In Kenya agriculture contributes 24% to the GDP yet lending to the sector is only about 4%. A major constraint to increasing efficiency in smallholder enterprises in rural areas is therefore, limited access to financial services. Lack of working capital for traders in rural areas inhibits the purchase, trade and processing of agricultural produce. This limits the amount of produce a farmer can market and acts as a disincentive to reaching his/her productive potential. Furthermore, most Microfinance Institutions (MFIs) lack a value chain approach to financing and are unable to remove the financial constraints along a specific value chain. Appropriate financing services along the value chain can help to enhance the productivity and profitability of various small-scale rural stakeholders. Therefore, the study assessed the prospects for financial innovations and access in improving dairy farmers' livelihoods through a case study approach. The findings provide a strong evidence that appropriate financial innovation is the missing link in agricultural productivity paradigm and the food security equation in African countries including Kenya.

Key words: Agriculture, Financial access, Innovations, Farmers

JEL codes: Q14



1. Introduction

Food security remains one of the key challenges that African countries confront today. This problem is most visibly evidenced by frequent food shortages and famines, such as the crisis in the Horn of Africa that lasted from July 2011 to February 2012 and impacted some 13 million people (CAADP, 2013). Access to enough and healthy food is not only a fundamental human right, but also a prerequisite for people to achieve their full physiological and cognitive potential. Food security also determines people's economic activities (Ashburner and Kienzle, 2011; FAO, 2012). Most governments, world over, have realized this important relationship between good nutrition and economic development and have since prioritized policies that are aimed at promoting food security and nutrition. These policies are also premised on the nous that food insecurity is closely related to poverty.

Thus, for sustainable development to take root, Africa must attain food security, which should be accomplished largely through increasing its own production. Unfortunately, at present, Africa's agricultural productivity is extremely low. For instance, in 2010, the continent's cereal production was roughly 1,300 kilograms per hectare, roughly half of that of South Asia (World Bank, 2012). This poor performance is a result of a number of factors. First, the percentage of arable land that is irrigated in Africa is low, much smaller than an analogous percentage for Asia, 3 percent versus 47 percent (FAO, 2012). In addition, Africa uses less fertilizer than other regions of the globe; compare its 11 kilograms per hectare of arable land versus South Asia's 169 kilograms (World Bank, 2012). It also utilizes less machinery: In 2003, there were 1.3 tractors per hectare of arable land in the sub-Saharan region, while the Asia and the Pacific region averaged 14.9 (Ashburner and Kienzle, 2011).

It is therefore, an open secret that African agriculture suffers from inadequate capital investment. The probable solution thus lie squarely on improving financial access through appropriate technologies and innovations. This is an area where most African governments has performed dismally. Taking Kenya's capital investment (budgetary allocation) to agriculture, for example, as shown in Table 1: Kenya, along with other African governments, committed itself in the 2003 Maputo Declaration to spending 10 percent of its national budget on agriculture (Wales et al., 2009). It is not easy to calculate how much Kenya actually spends on agriculture since the government provides contradictory figures, but all suggest that it is spending much less than 10 per cent. The most recent Medium Term Expenditure Framework (2012), suggests that the

government is barely a third of the way towards meeting the Maputo Declaration target. The government states that it is committed to increasing spending on agriculture to 8 per cent of the budget by 2020, thus still falling short of the target (Curtis, 2013). Kenya's failure to spend sufficiently on agriculture flies in the face of evidence that agriculture-led growth in Kenya is more than twice as effective in reducing poverty as industry-led growth. The International Food Policy Research Institute (IFPRI) calculates that increasing the share of government spending to 10 per cent, involving investments in irrigation, agricultural research and extension services to farmers, would lift 1.6 million people above the poverty line (Curtis, 2013).

Table 1:

The rest of the study is organized as follows: Section two highlights the objectives of the study then give the methods used to achieve the stated objectives; section three give insights on the need for technological innovations while implementing financial access programmes, especially for the poor; section four highlights the case study on a tripartite partnership bringing together a micro-finance bank, a service provider and a leading milk processing company in Kenya, and discusses how innovations increases milk productivity and improves the farmers' livelihoods; section five concludes the study and finally, the last section give all the cited works.

2. Objectives and Methodology

The objectives of the research were;

- a) To document the financial challenges facing small scale farmers and the prospect of solving them through technological innovation.
- b) To identify issues from the tripartite partnership that would benefit small scale dairy farmers.
- c) To recommend a model that integrates all the value chain actors in the dairy industry in Kenya, with a possibility of replication.

The study was primarily qualitative, implying an emphasis on the qualities of entities and on processes and meanings that are not experimentally examined or measured (Denzin and Lincoln, 2000). The methodology adopted here therefore, describes the nature of answers in terms of their verbal, written, word or other descriptive nature (Laws et al., 2003). And it is hinged on the belief

that rich descriptions of socially constructed nature is paramount, an important observation for a study concerned with agriculture and its relations. This approach, uses purposive sampling and semi-structured or interactive interviews to collect data – mainly, data relating to people’s judgments, attitudes, preferences, priorities and/or perceptions about a subject – and analyzes it through sociological research techniques (Gilbert, 2005).

The targeted actors included officials from both the New KCC Company, Rafiki Micro-Finance Bank, MOBIPAY, farmers & farmer groups, and other service providers such as; extension officers, veterinary officers, agro-dealers, transporters, amongst others. A representative of all these stakeholders were involved in a focused group discussions (FGD). To get a comprehensive and wide view of the pertinent issues of the ongoing tripartite partnership participation vis-à-vis the envisaged benefits from technical innovations in agriculture, the research team engaged the different stakeholders and other interested parties, in an open small group discussions. These discussions raised pertinent issues which the questionnaires did not really raise.

Secondary data collection involved searches on literature and policy documents on agricultural transformation, financial technical innovations, and the dairy sector in Kenya. This was accomplished through review of journals, scholarly works, government publications and other documented experiences on agriculture in the aforementioned concepts.

3. Technological innovations versus financial access

Africa’s rural areas, as opposed to the urban, are characterized by higher transaction costs for both financial institutions and their clients (Temu, 2009; Curtis, 2013). Such rural economies have higher systemic risks, more volatile cash flows, economic agents with lower risk-bearing ability and high vulnerability to economic and natural shocks due to higher incidence and depth of poverty. In sub-Saharan Africa, the situation becomes even more complicated because of the desert conditions and the multitude of ways that producers succumb to the adversaries of weather, climate change, and consequences of climate change. The majority of the poorest households in Africa are directly or indirectly strongly linked to agriculture. Over 75% of the world poor, and an even bigger proportion of this category of people in Africa, live in rural areas where they not only depend on agriculture for their own food security (CAADP, 2013), but also they are expected to feed urban populations, contribute to the nation’s food reserves and provide raw materials for urban industries.

Another reason for financial technological innovations to improve financial access in Africa is the inadequate and underdeveloped infrastructure in rural agricultural areas (Temu, 2009). These areas are also characterized by distant and dysfunctional markets. Local farmers use inadequate modern farming skills and inappropriate techniques. Agricultural commodities succumb to volatile prices and unpredictable weather making it more difficult for both lenders and farmers to succeed. According to World Bank (2012), there is asymmetrical information in that on one hand, formal lenders do not understand very well the rural and the informal sectors; and on the other, rural dwellers have little knowledge of the working of formal financial institutions, leave aside the fact that the bank branches, which are located in towns, are far away from the rural populations. The rural informal sector is even more complicated than the urban and financial intuitions have a long way to go in learning how to serve them.

Furthermore, there are operational challenges in providing rural finance services. Providing financial services to the poor is expensive (Ashburner and Kienzle, 2011; Cutis, 2013). This is partly because the majority of rural dwellers have small amounts of money, they are found within low population densities and sparsely located areas, and as such, most of them do not have any credit or savings track records and production trends. Such clients also have little acceptable collateral because either the basis of the ownership of the assets they own is unclear or that these rural people lack legal documents to authenticate property rights (FAO, 2012). In short, most of these rural dwellers lacks 'Financial Identity'. Rural Africa economies are also characterized by weak contract enforcement legislation and mechanisms. In such circumstances, financial institutions are compelled to charge very high prices for providing unsecured financial services. Politically, this is often not appealing, and hence public sector banks are particularly sensitive in charging high interest rates and they fail to become operationally profitable and financially viable (Temu, 2009). To circumvent the situations, private banks concentrate their portfolios to a few wealthy individuals and corporate clients. Financial institutions will therefore not serve the rural poor clientele with the conventional products. It is only by innovating less expensive alternative methods, products and services leveraging technology that financial institutions will ever be able to serve the rural sector effectively.

There are also other socio-economic development challenges that are interwoven with effective provision of rural finance. One such challenge is a gender dimension of rural development, for example, productive as women are known to be, formal and conventional banking systems have

not performed well enough in serving this disadvantaged group (CAADP, 2013; World Bank, 2013). Evidence from experiences in rural Africa further justifies the need for this focus. Women are seen as a more 'efficient' way to end poverty: they contribute higher percentage of their earnings to the household's income; for example they spend more of their earnings on children's education, clothing, leisure and healthcare and hence offer major intergenerational benefits. Women are reckoned to be more focused on savings and in creating assets and are thus more responsive to contending with lifecycle risks including healthcare and old age. They also comprise the majority of those owning informal businesses in the rural areas. Therefore, where gender inequality constitutes a barrier to full participation in the markets, in this case financial sector services, economic growth will definitely be constrained (Ashburner and Kienzle, 2011). As a result, articulating the way forward in rural finance will also require paying adequate attention to the manner in which the less privileged societal groups including women, youth and the disabled are targeted to best be served. This can best be achieved through innovations in the financial services that practically and drastically reduces the costs to these services so that they become more affordable.

4. The Case Study

The dairy industry is the single largest agricultural sub-sector in Kenya and contributes about 17 percent of agricultural GDP and 4.5 percent of total GDP (KNBS, 2014). The industry has grown tremendously since its liberalization in 1992 (Muriuki et al., 2004). Liberalization led to a rapid growth of the informal milk trade that mainly consists of small-scale operators dealing in marketing of raw milk. At that time, there was an emergence of new institutional arrangements in milk collection, processing and marketing, which included hawkers, brokers, self-help groups, neighbours and business establishments like hotels (Karanja, 2003). The informal milk market controls an estimated 70 percent of the total milk marketed in Kenya (KDB, 2014). This sector is important and is driven by among other factors the traditional preferences for fresh raw milk and its relatively lower cost. Raw milk markets offer both instant (quick) cash to producers and lower prices to consumers but with several challenges relating to quality control and standards, and the associated health and safety concerns. It is worthwhile to mention affront that the quick cash business is also a challenge, particularly to producers, who normally sell at farm-gate to middlemen-at lower prices compared to the prices offered by the formal sector. The reason being

that farmers want the cash for their immediate use. The time-lag when farmers submit their milk to the processing company to the time they receive payments, is too long. As a result, most farmers opt for farm-gate channels where they get the low pay instantly.

Due to these challenges, majority of small scale dairy farmers in Kenya are locked in a cycle of poverty, despite the lucrative dairy business in the country. Efforts to graduate them to a situation of financial independence has often been futile since majority are resource poor. For instance, these farmers harvest an average of 4.5 litres of milk per cow per day that poorly compares to large scale intensive counterparts whose yields are tenfold to say the least, in the same environment. They sell at low prices for cash at farm-gate, rather than supply for higher prices on credit, to the formal sector. Coupled with the ever increasing production cost, their profit margins, if any, are therefore very narrow. They are highly risk averse so they better retain their current ‘hardy’ but low productive stock as opposed to acquiring ‘vulnerable’ but higher productive improved breeds. These farmers actually lacks financial identity hence shy off financial institutions. Precisely, the main problem facing small scale farmer is finance (capital), with access and the related costs being critical.

This case study section primarily provides a platform for solving most of the stated challenges through innovations in agricultural and financial related technologies. The case is a tripartite partnership that brings together; a micro-finance bank (RAFIKI Micro-Finance Bank); a service/innovation provider (MOBIPAY K. LTD. Through its Agrilife platform); and a leading business entity in the dairy industry in East Africa (New Kenya Cooperative Creameries - KCC).

4.1. Findings

This section is primarily based on the focus group discussions held with the tripartite stakeholders and dairy farmers in the Central region of Kenya. Researchers’ observation was instrumental and a check-list was discussed with the stakeholders as well as others along the dairy value chain. Through these discussions, the research team was able to gather information on: the ‘Agrilife Platform’; the current milk production trends in the region; challenges facing farmers and the processors (New KCC); services dairy farmers sought from processors, agro-dealers, County agricultural officers, County extension officers, and farmer groups/ cooperatives; participation and potential benefits from the tripartite partnership. Most of these aspects has already been covered so this section covers in detail the tripartite partnership and its benefits.

4.2.Tripartite Partnership

4.2.1. Agrilife (from MOBIPAY LTD.)

MOBIPAY is a 7 year old for Profit Company based out of Nairobi, Kenya whose mission is to improve people's lives through the provision of technologies that drives commerce and boosts trade in Africa, as shown in Figure 1. Agrilife on the other hand is the universal catalyst to make agriculture a profitable business using farmers' mobile phones.

Figure 1

Core pillars of AGRILIFE:

- ✓ Collecting credible data e.g. farmers' bio-information, farm status-information, historical-information and production-information. This entails collating and collecting bankable information from farmers with the aim of giving them Financial Identity.
- ✓ Creating farmers' visibility to value chain-actors and enhancing Linkages in the value-chain. Entails linking farmers to the entire value-chain actors including extension, veterinary, processing, credit, marketing among others.
- ✓ Offering Convenience to farmers to access services when needed and affordably via mobile-phone platform.

Figure 2

How Agrilife Works

- ✓ Agrilife sets up an automated environment to enable Financial Institutions to conduct very high volume invoice discounting transactions.
- ✓ Agrilife enables Liquidity to be injected into the value chain with corresponding credit risk shifting to corporate Chain Captains as ultimate off-takers/ buyers

4.2.2. Rafiki Micro-Finance Bank

Through the Agrilife platform, Rafiki MFB offers payment advances to small-scale farmer groups or individuals with milk delivery (supply) contracts to New KCC (k) Ltd-upon effective milk delivery.

4.2.3. The New KCC

The largest business entity in the dairy industry in East Africa. The company is involved in food industry, processing and marketing milk products and processes 450,000 litres of milk a day during the high season, and controls 37 percent of the market share. These milk are sourced from approximately 120,000 suppliers. Seven percent of these suppliers were commercial farmers and the rest (93%) are small scale producers (Wambugu et al., 2011).

4.3. Agrilife Platform and the tripartite participation

Before this innovative partnership was launched in early 2013, majority of the 120,000 farmers that supply their milk to New KCC Company, were only offering 30 percent of their produce to the company (up to 70% sold via the informal sector for the reasons already discussed in this study). The company could also not pay farmers upfront given the time required to process the delivered milk into various products (fresh milk, fermented milk, yoghurt, butter, cheese, ghee and milk powder) and when these products are finally sold in the market, to avail the cash. The New KCC Company therefore, joined hands with MOBIPAY and Rafiki MFB to solve the problem. In this agreement, MOBIPAY via its agrilife platform collates and collect data from farmers. These data includes bio-data, economic activities, market participation and detail portfolio, as shown in Figure 2. The data provides a bankable foundation that Rafiki MFB acts on to either give the farmers an advance payment (prompt pay) or give the farmers loans with delivered milk serving as collateral. The platform is automated such that once the farmer delivers milk to the factory (New KCC), the information is sent to the bank (Rafiki) so that the farmer can be paid while in need.

What make the innovation work for the resource poor farmers is that they can access extension, veterinary and other services along the value chain even before delivering milk to the factory. For instance, if a farmer requires veterinary service prior to milk delivery, he

simply send a short message via his mobile phone to the service provider. Once the message is received, the service provider—who is also linked to the agrilife platform (veterinary officer in this case) will instantly provide his service to the farmer. He then takes the invoice together with the farmers' information to the bank (Rafiki MFB). The bank simply look at the farmer's data and the information regarding expected delivery, then pays the service provider, on behalf of the farmer. These amounts are finally deducted from farmer's dues once he delivers milk to the company.

4.4.Key benefits from the tripartite partnership

- ✓ The New KCC Company has greatly benefited through increased milk supply from small scale farmers. A case has been built in this study that most farmers were selling their milk at low prices at farm gate since they needed cash for their immediate use. Evidence provided by the Kenya Dairy Board (KDB, 2014) estimate that these farmers are losing up to 11 Kenya shillings (approximately 0.12 USD) a litre, by selling cheaply at farm gate. On the other hand, the milk company also loses out on raw material thus operates at excess capacity (way below the installed plant capacity). During the focused group discussion, officials from the company reiterated that 15,000 (54,000 targeted by the end of the year-2014) dairy farmers have joined the partnership by either registering individually or through their farmer groups. The officials further confirmed that the registered farmers have increased their milk supply to the factory from the said 30 percent to around 80 percent. This rise in milk supply to the formal channels by small scale farmers, the officials confirmed, was simply due to innovative technology (tripartite partnership) that enabled the farmers obtain prompt payment.
- ✓ The farmer gets Financial Identity. Historical data and track record of the farmer is used to facilitate establishment of a financial identity and risk profile (evidence-based credit score). This proportionately improves the credit worthiness of the farmers.
- ✓ The farmer becomes bankable. Appropriate financial services and products made available that match lifestyle and lifecycle (credit, savings, insurance, etc.)
- ✓ Access to key inputs and services is key to improving the farmers' livelihoods. While improved access to these services at lower costs drives down the cost of production as well as increasing productivity. The tripartite achieves this by bringing all the actors along the dairy value chain, including service providers, on the agrilife platform. Surely this is the

real power of technology and innovation, at its best. Besides reducing the costs of production, farmers also sell at higher prices (to the company rather than farm-gate). Given that only the service providers and other actors along the value chain, other than the farmers, are charged participation fee on agrilife platform, farmers automatically increase their profit margins.

- ✓ Farmers also benefits regarding credit facilities: reduced collateral requirements-as they only require data profile and the guaranteed milk supply, faster decision turnaround times given the availability of bankable information, lower interest and fees due to reduced risk thanks to improved visibility over the value chain.

5. Conclusions and recommendations

For the successful implementation of policies that aims at promoting financial access to the resource-poor farmers, there is need to include technological innovations that lowers transaction costs and improves visibility (promotes financial identity) to the targeted farmers. This research posits that relevant technological innovations is a softer way of financial graduation capable of rendering the poor farmers' financial independence. This way the study further argues is the clearest avenue to increasing agricultural productivity and solving the puzzle of food security.

Highlighting the case of the tripartite partnership among Rafiki MFB, MOBIPAY and the New KCC Company, the study provided evidence that the use of appropriate technological innovations while implementing agricultural programmes is the surest way of improving productivity. In addition, these innovations positively impact on the farmers' livelihoods by giving them an identity, managing their risks aversions, making them more economically sound. An analysis of this study's approach revealed that dairy farmers in Kenya prefer technologies that they transact through their mobile phones that gives them some sense of identity and ownership; cost effective and available to them all the time, and do not require them to queue for services all the time. The case also highlight the fact that farmers require financial identity before rolling out programmes aiming at promoting financial access. This is because these farmers are normally risk averse and in most cases lacks the basics on financial management. Without the use of appropriate technologies, these programmes becomes elusive to the majority of farmers.

Finally, the author notes that for agricultural/financial innovations to thrive and more so in the rural areas, the government has a major responsibility of providing stable economy and a

favourable business environments for financial institutions to flourish. In addition, political stability and security are of essence to boost investor confidence in the country. The government is also required to ensure the availability of a broad range of public goods, especially infrastructure such as roads, power, electricity and telecommunications. It must be remembered from the case study that the agrilife platform hinges purely on mobile phones- a telecommunication infrastructure. As a result, the author further re-affirms the need to strengthen the public-private sector partnerships (PPP) for financial innovations to realize the envisaged outcomes. Development partners and donors have played a key role of providing research funds and technical support. There is still a need for donors to continue with this task.

Until the gaps of technological innovations in financial access programmes are filled, low agricultural productivity that causes food insecurity to large number of people, especially in developing countries, will continue to take its toll, leaving in its wake an unacceptable burden of preventable morbidity and mortality, and lost opportunities for human, social, and economic development.

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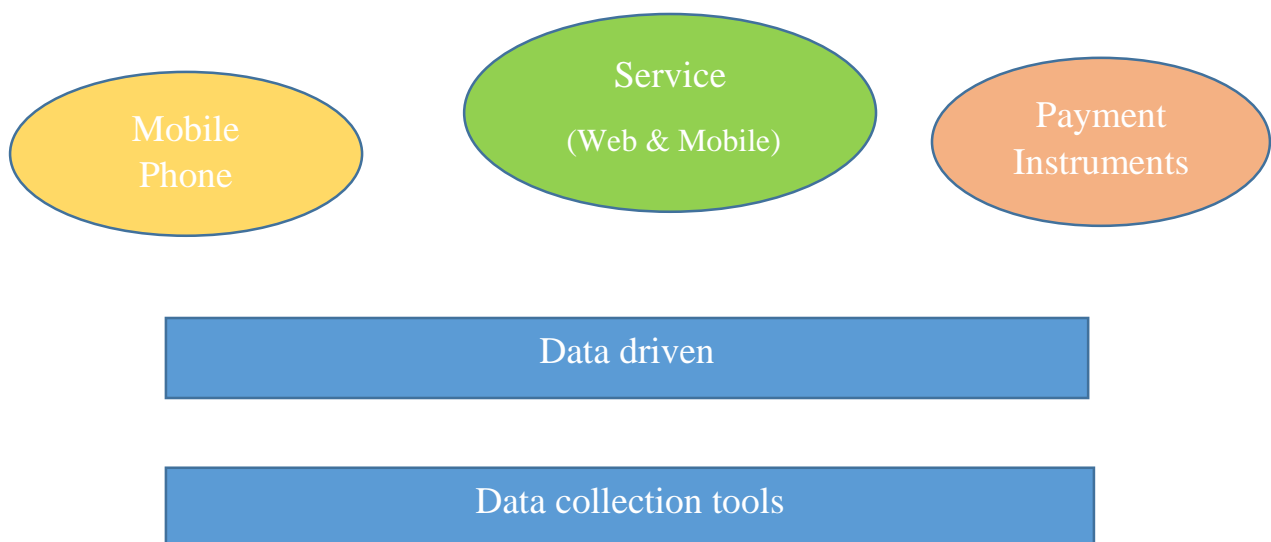
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Table 1: Share of agriculture sector budget in the national budget

Year	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Share (%)	3.4	2.9	4.5	4.6	4.8	4.7	4.3

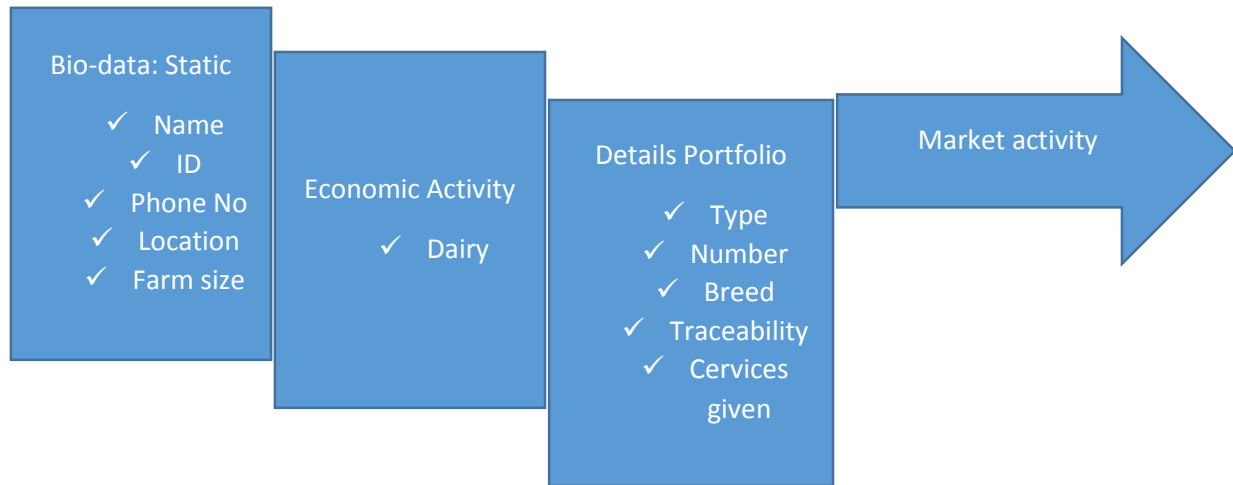
Source: Economic Survey, 2014.

Figure 1: Agrilife platform



Source: MOBIPAY, 2014

Figure 2: Profiling data collected



Source: MOBIPAY, 2014

“The highest use of capital is not to make more money, but to make money do more for the betterment of life” Henry Ford