

Sharing App for Farm Mechanization: Gold Farm's Digitized Access Based Solution for Financially Constrained Farmers

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Abstract

India continues to experience strong challenges in the agriculture sector due to its increasing supply-demand gap, which is attributed to the increasing population, rapid urbanization, low productivity, absence of automation, weak infrastructure support, small and scattered land holdings, and migration of labour force to other sectors. Farm mechanization is one of the potential solutions to most of the above-listed challenges as it increases the produce as well as reduces the input resources. However, due to severe financial constraints experienced by majority of the Indian farmers, adoption of farm mechanization has continued to remain beyond their reach. In this paper, we propose how digitized access based solution can help in overcoming the financial constraints experienced by the farmers in accessing expensive farm equipment. We validate our proposed solution by documenting the experience of the firm "Gold Farm", which has developed and implemented a digitized sharing mobile app that can enable farmers to adopt farm mechanization. Gold Farm's sharing app offers access based solution for accessing farm equipment at affordable prices. Pay per usage, reduction in ownership risks, removal of upfront financial investment constraints, continuous monitoring and tracking of vehicles and increased utilization are the key advantages of digitized Gold Farm's sharing app. We discuss research, practice and social implications of implementing digitized access based solution for agriculture.

Keywords: Access based solution; Sharing economy; Digitization; Agriculture; India.

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1.0 Introduction

Agriculture is one of the main contributors of employment to world population. While it is being appreciated that the world economy is slowly moving towards service sector, the agricultural sector still contributes to more than 26% of the total employment in the world (World Bank, 2018). India is ranked third in agricultural output globally. Geographically, India is home to 17% of the world's population reaching 1.33 billion in 2017 (World Bank, 2018a). Despite the agricultural sector as one of the major contributors to the nation's economy, its contribution to the Indian GDP has shown a declining trend. According to the Central Statistical Organization, the farm and agricultural sector has contributed to 13.9% during 2013-14 of the India's GDP in comparison to 14.6% during 2010-11. This is consistent in line with the increase in service sector's share in GDP. Also, there has been a sharp decline in overall workforce (11% points) in the agricultural and allied sectors (FICCI 2015). Despite the decline, more than 60% of the rural households depend on agriculture and more than 40% of the total labor force in India still works in agriculture sector.

Farm mechanization has been claimed for over a longtime to help in improving the productivity of Indian agricultural and farm sector. This is consistent with the findings from Ministry of Agriculture in Government of India who showed direct correlation between increased yield and farm mechanization (FICCI, 2015). **Figure 1** presents the different nodes in an agricultural value chain along with the supporting equipment. The agricultural sector in India has seen a considerable fall in favour of human labor. The trend has shifted towards a wide range of agricultural tools. Although the level of mechanization in India is low as compared to that of the developed nations, farm mechanization as an industry is on the rise. The government is promoting farm mechanization by subsidizing equipment purchase and

bulk purchase from external agencies. India is witnessing labor scarcity in the agricultural sector and the increased initiatives in the form of government's subsidy programs, farm mechanization as a market is bound to increase.

<Insert Figure 1>

The benefits of farm mechanization can be broadly classified into three categories, namely savings in input, efficiency improvement and social benefits. Farm mechanism leads to improvements in seeds and fertilizer input by approximately 15-20% and enhancement of cropping intensity by 5-20% (FICCI, 2015). In terms of efficiency improvement, farm mechanization decreases time by 20%, and improves harvest and post-harvest agricultural process, leading to overall quality enhancement of cultivation. Further, it provides a set of social benefits by transforming uncultivable land to cultivable one, by reducing burden on women through increased labour efficiency, by providing a safe and tested farming practices and by encouraging youths to join agriculture.

With rising population in India coupled with sluggish growth of total cultivable land and followed by swift migration of agricultural workforce to urban areas, the agricultural sector in India is facing a number of other key challenges which constrains Indian farmers from implementing farm mechanization. First, average farm size per farmer in India is less than two hectares, which is far lower than that of developed regions. Large equipment is difficult to operate in such holding and is often considered unsuitable. Furthermore, mechanizing small group of farms is against economies of scale. The second challenge is that the farm equipment is capital intensive and thereby introduces high ownership risk. As a result, it turns out to be an unaffordable investment for financially constrained farmers. The third challenge is the quality of after sales service due to the absence of adequate maintenance facilities in remote regions in India. The fourth and the biggest challenge is the

unwillingness of banks to finance farm equipment to marginalized farmers (Ferroni and Zhou, 2012; Glendenning et al., 2010; Sidhu and Gill, 2006).

Therefore, in this paper, we address the research question ‘how financially constrained farmers can overcome the above-listed challenges in Indian agricultural sector to access a farm equipment’. We adopted an inductive single case study approach (Sigglekow, 2007) to answer the research question. Following the established guidelines of theoretical sampling (Glaser & Strauss, 2017) we selected Gold Farm, a firm which relied on digitization and access-based business (ABB) model to develop and implement India’s first farm equipment booking app. ABB model offers access to goods/services to consumers in return for a usage fee payment, which is much lesser than the ownership price (Carroll & Buchholtz, 2012; Matzler et al., 2015). This enables financially constrained people to consume livelihood-improving products without ownership of the product.

Gold Farm’s farm equipment booking app is an online digital platform, where equipment owners (can also be farmers) sign up their equipment with specifications and farmers access equipment needed for their requirements. The remainder of the paper as follows: Section 2 summarizes the literature on inefficiencies in Indian agriculture, access based business model and digitization in agriculture. Section 3 presents the methodology of our study. Section 4 analyzes the Gold Farm Booking App and its utility in overcoming the hurdles in agricultural supply chain. Section 5 concludes our study with discussions on research implications and managerial relevance.

2.0 Literature Review

We first discuss the relevant literature on constraints in Indian Agriculture. This is followed by a brief literature on access based business model. Finally, we present the literature on digitization in agriculture.

2.1 Constraints in Indian Agriculture

Multiple issues affect agricultural sector resulting in the loss of yield. Weed growth (Mani et al., 1968), pests (Savary et al., 1997) and excessive usage of genetically modified crops (Qaim and Zilberman, 2003) are the widely prevalent issues in Indian agricultural sector. Along with these issues, existing process driven inefficiencies (traditional farming versus organic farming) (Kirchmann, 2018) and resource driven inefficiencies (manual farming tools versus mechanized farming methods) (Rada and Fuglie, 2018; Kislev and Peterson, 1981; Culpin, 1968) makes farm productivity a critical issue in developing nations.

Process driven inefficiencies can be mitigated by adopting better agricultural practices which typically falls under the capacity of farmers. In other words, they are endogenous factors within the farmer's control and choice. However, resource driven inefficiencies are exogenous factors beyond the control of farmers as such factors may have evolved over time due to existing social, economic and institutional constraints in the local region to which it operates.

A direct consequence of such inefficiencies is that farming becomes not profitable in rural India. This has resulted in the migration of agricultural labor force from rural to urban regions. Such migrations are also fueled by wage gap, lack of education, ethnic conflict, and lack of employment opportunities (Munshi and Rosenzweig, 2016; Bhagat, 2016; Østby, 2016; Weiner, 2015). This issue of migration can be addressed by improving farm productivity using mechanization.

The average farm size in India is considerably small in comparison to European Union (14 hectares) and United States (170 hectares) (Mehta et al., 2014). As a result, there will be little mechanization unless equipments are appropriate and available for small holdings. Even if they are made available, the cost of equipment is too high for marginalized

farmers to afford them. Mechanizing small farms is against “economies of scale” especially for operations such as land preparation and harvesting. With this decreasing trend in land holding pattern, individual ownership of equipment will become uneconomical for majority of farmers. As a consequence, only a small fraction of farmers having large land holdings can avail the benefits of mechanization.

It is already a known fact that majority of farmers in India belong to the BoP segment. This has aggravated the issues and challenges of farm mechanization in India. For instance, farmers are either constrained by the inability to match equipment for tractors and prime movers for their requirements. Also, due to improper guidance, farmers make inappropriate selection of farm equipments leading to high cost of production due to severe fuel wastage. This further deteriorates the economic conditions of the farmers (Mehta et al., 2014). Almost 90% of the tractors are sold in India with the assistance of lending institutions such as banks, cooperatives etc. The sale of such equipment is driven by financial track record of farmers which ultimately leads to non-issuance of equipment to majority of farmers. As equipment fail to reach farmlands, productivity comes down and farmers economic conditions fails to improve. The high cost of equipment always remains out of reach for majority of Indian farmers due to shortage of capital (Mehta et al., 2014).

Farm mechanization is a known solution for improving crop yield in Indian agricultural system (Kumar et al., 2017). However, due to the affordability, accessibility, and small land holding constraints, farm mechanization is beyond the reach for majority of Indian farmers (Raina et al., 2018). As a result, innovative solutions have to be deployed to make farm mechanization equipment easily accessible and affordable to farmers in the country.

2.2 Access Based Business Model

During the last decade, it is being seen that markets have moved from the traditional modes of acquisition and consumption such as ownership to alternative modes of consumption (Bardhi and Eckhardt 2012). There is a surge in such alternative modes of consumption models, where access is enabled through either sharing or pooling of resources (Gansky 2010).

Access based consumption is therefore defined as a form of transaction that is market mediated where there is no transfer of ownership (Bardhi and Eckhardt 2012). This implies that the consumer is acquiring a consumption time at the cost of price premium paid for use of that object which is being accessed (Benoit et al 2017; Belk 2014). As a result, consumers are able to access objects or services that they chose not to own due to some inherent constraints such as financial constraints, burdens of ownership¹, etc. They accrue benefits by using the products and/or services on the basis of rental payments (Lovelock and Gummesson 2004). Mobility sharing (car or bike) and online borrowing programs for DVD, are some of the examples of access based models (Becker et al 2017). Literature suggests that there is a strong need to understand why ABB model is more beneficial to a certain population in comparison to the traditional ownership driven paradigm (Lovelock and Gummesson 2004). Although researchers have addressed consumer behavior related studies (Bardhi and Eckhardt 2012; Durgee and O'Connor 1995), several questions still remain unanswered with regard to the link between the characteristics of the ABB model (e.g. burdens of ownership; Schäfers et al., 2018; Schaefers et al 2016; Moeller and Wittkowski 2010) and its preference by financially constrained market segment (Karnani, 2007).

2.3 Digitization in Agriculture

¹ Burdens of ownership - In the case of ownership, it is the responsibility of the owner to ensure that the service or product is functioning properly and all costs related to repair and maintenance are borne by the owner. In access based services, the service provider bears responsibility for performance issues and consumers only pay a fee for usage only (Schaefers et al 2016; Moeller and Wittkowski 2010).

Digitization in agriculture has gained momentum in the last few decades across the globe. Before we understand how digitization unfolded in agriculture, it is important to acknowledge the general challenges in agricultural sector and argue the need for introducing digitization in the agricultural sector. First, several years of intensive farming coupled with the use of fertilizers have declined soil fertility which in turn led to higher use of fertilizers (Pham and Stack, 2018). Also over fertilization has caused serious environmental problems. Second, water availability is a growing concern in almost all parts of the globe and therefore the need to figure out ways to better utilize limited water (Sfiligoj, 2016). Third, world population is expected to rise to 9 billion people by 2050 which means that agricultural output needs to increase in similar proportions (Giplin, 2015).

To address these challenges, precision agriculture was adopted by collecting relevant data and implementing technologies for smart farming (Bosilj et al., 2018; Pham and Stack, 2018). Among the common technologies, Geographic Positioning Systems (GPS) is widely adopted for recording coordinates of farm fields and use sensors mounted on tractors for navigation guidance. In addition, sensors mounted on farm equipment are used to capture data on soil moisture, soil temperature, wind direction, leaf wetness, etc. to help monitor performance and run diagnostics on the farm field (Pham and Stack, 2018; John Deere, n.d.). Similar efforts have been observed specific to certain developed nations. For instance, Bernhardt et al. (2018) emphasizes the aspect of improving and integrating digitization in agricultural logistics in Germany. The study stress on the need for cooperation among supply chain partners in the agricultural sector for stronger integration of digitization platforms among players. Bilali and Allahyari (2018) documented the positive impact of digitization in agricultural supply chain in European Union. The study established that digitization can bring positive benefits from the perspective of “triple bottom line” objective in the entire supply chain. However, the study also mentions that many barriers, prevalent in the Global South,

should be removed in order to increase the use of digitization in the agricultural sector. Dudin et al. (2018) found that digitization in Russian agricultural sector has led to improved business productivity, reduction in losses due to automation in the production processes and better resource utilization in the farm sector.

Many other similar efforts have been introduced in bits and pieces at a very small scale in India's agricultural sector (Devalkar et al., 2018). For instance, ICRISAT has introduced a data driven climate simulation and crop growth model which advises peanut farmers in Andhra Pradesh, a state in India. The advice includes when to prepare the land for sowing based on the current rainfall, which variety of seed to sow given the soil and weather conditions to a specific farmer (ICRISAT, 2017). Agri business firms such as ITC has introduced procurement software (e-Choupal) where the farmers can directly sell their produce to the farms based on the market price of their produce in the wholesale market. Similarly, government is trying to provide public information through portals (Agmarket Portal) and app (AgriMarket App) in order to ensure that farmers can access relevant data from such portals (Ministry of Agriculture and Farmers Welfare, 2017). The portal has provided information such as daily prices of goods both commodity and variety wise enabling farmers to have adequate market information. The current efforts only cater to the access of information to the agricultural market players without focusing on the current challenges in the sector in an organized way. Many questions remain unanswered as to how digitization can actually remove barriers (Bilali and Allahyari, 2018) by addressing the challenges in the agricultural supply chain with focus on emerging market context.

2.4. Research gaps

Although there have been extensive studies on digitization in agricultural sector in general (Yanuka and Elrick, 1985; Yanwei et al., 2006; Zhang, 2011; Bilali and Allahyari, 2018), very few studies to the best of our knowledge introduces digitization in agricultural

supply chain in India (Meenakshi, 2017; Mudda et al., 2017). Most of these digitization solutions have been focusing on providing access to information and supporting large landholding farmers rather than solving problems faced by financially constrained farmers, especially those in possession of small land holdings (Karanasios and Slavova, 2018).

As far as the sharing economy (Roos and Hahn, 2017; Belk, 2014) literature is concerned, no study has seen digitization from the angle of reducing the lack of access to equipment for financially constrained farmers. Most of the studies have documented digitization from the angle of gaining access to mobility (e.g. Uber, Ola, etc.), food delivery (Geissinger et al., 2018; Wallsten, 2015; Cannon and Summers, 2014), etc. Recently, Schaefers et al. (2018) pitched the idea of access-based business model for providing access to livelihood improving goods (e.g. air cooler) to the BoP. Our study extends it by combining access-based business model with digitization to address the issues faced by financially constrained Indian farmers, where most of them satisfy the filters of BoP.

From the methodological perspective, none of the existing studies have captured the experience of a real case study which has implemented digitized access-based solution for solving the issues of financially constrained population. It approves the feasibility of the proposed idea by addressing the practical difficulties and answering the procedural doubts relevant to emerging market contexts.

In summary, this study is a unique attempt to discuss the difficulties faced by agricultural sector in emerging economy and demonstrate how digitization can act as a solution for those difficulties. This paper is also one of the first attempts to introduce digitized ABB model as a solution to inefficiencies in the Indian agricultural sector by contextualizing it to emerging economy's characteristics.

3.0 Methodology

The methodology section is broadly divided into two parts. First, we provide a brief description of the case organization from which data is collected. Then, we describe the process of data collection and the rationale behind the approach adopted.

3.1 About Gold Farm

Gold Farm² was started in March 2016 keeping in mind the growing need for a solution in the farm mechanization business. By end of April, 2016, more than fifty thousand members joined the online community (WhatsApp and Facebook) in support of the initiative. In May 2016, Gold Farm launched “Honey Bee”, a first ever known platform for farmers aspiring to take advantage of this initiative. By September 2016, “Honey Bee” signed MOU’s with leading OEM’s in farm equipment. Gold Farm celebrated 10000 hours of farm equipment booking in December 2016.

As a firm, it aims to connect government, banks, and manufacturers/owners to ensure that farm mechanization is affordable to marginalized farmers in India. Gold Farm’s business model entails partnering with a local entrepreneur who can invest in farming equipment (e.g. tractors) or some large landholding farmers who already own the equipment. These owners sign up their equipment in the Gold Farm mobile app by registering their location with the details of the equipment. After the registration, these equipments are assigned to a nearest centre. Gold Farm help the owner of the equipment with demand generation around their location through the app, call centre and booking agents in different villages. Using the Gold Farm app or by dialling to the call centre, farmers in the vicinity of up to 30 km to the equipment will be able to book it using the mobile app. Gold Farm is leveraging internet of things and mobile technology to generate demand, track location of the equipment in operation, compute the consumption of fuel, assess the condition of the vehicle and generate

² More details about the firm can be accessed from their homepage ‘<http://www.goldfarm.in/home/>’

the final payment receipt for the farmer who accessed the equipment. Gold Farm gets a percentage of the revenues generated by the local centre.

3.2 Data Collection Procedure

A case study design for a research study should be considered when the focus is to answer the “how” and “why” questions and also, when one cannot control the behavior of actors and players in the study (Yin, 2003). The purpose of this study is to answer the “how” question by documenting the current situation in the field without controlling or influencing any of the stakeholders. Therefore, we conduct a single case study approach with Gold Farm to understand how digitized access based solution can help in overcoming the financial constraints experienced by the farmers in accessing expensive farm equipment and thereby reduce the inefficiencies in agricultural value chain.

The rationale for using a single case study approach is to understand and explain an environment which is unique (Siggelkow, 2007). In our case, Gold Farm’s mobile App is one of the first Apps which tackle the issue of farm mechanization in India. We believe that our case study methodology is both explanatory and descriptive (Baxter and Jack, 2008). This is because, on one hand, we are trying to explain the presumed causal links in a real life intervention (i.e. Gold Farm’s App with farm mechanization process) that are too complex for survey or experimental design (Yin, 2003). On the other hand, we are simultaneously describing an intervention (i.e. functioning of the Gold Farm App) and the real life context (agricultural inefficiencies) in which it is implemented (Yin, 2003). The data collection involved discussion with the founders of Gold farm, evaluating their presentations, review of their reports and documents, and understanding the functioning of Gold Farm’s mobile App.

4.0 Gold Farm's Sharing App for Farm Equipment

In this section, we summarize and report our findings based on the experience of Gold Farm. In particular, we would document the rationale of Gold Farm being present in this market, followed by the functioning of the app and how important stakeholders are getting benefitted in addition to removing inefficiencies in the agricultural supply chain.

4.1. Motivation for Gold Farm

Our interaction with Gold Farm to understand their motivation for starting this firm suggests that between 2004 and 2012, agricultural labor reduced by 30.57 million with rising costs of agricultural produce. In addition, they mentioned that total arable land in India is 400 million acres; out of which, only 40% are already ploughed by farming equipment such as tractor. The cost of plough through tractors is estimated to be INR 1000 per hour and it takes approximately 1.5 hours to plough an acre of land. The total untapped market turns out to be INR 24000 crores (35 million USD approximately).

4.2. Building App Ecosystem for Gold Farm

The next step of Gold Farm was to create a credible ecosystem (Ceccagnoli et al., 2012; Bloom and Dees, 2008) by linking different stakeholders. The first challenge was to select trusted individuals who can act as a representative for farmers to assist them with the usage of booking app and also the farming equipment. These individuals were recruited offline through Vodafone m-pesa, Airtel money agents, post offices and fair price shops under the designation of “farmer advisors”. The farmer advisors contact individual farmers through WhatsApp/SMS to help them avail and use Gold Farm Services. As these farmer advisors were from within the community of farmers, it was easy to establish trust and credibility for Gold Farm. The farmer advisors are needed in this supply chain to tackle the resistance of farmers to adopt these new digital platforms and also to overcome poor internet connectivity issues in rural areas where majority of farmers are located. The presence of

farmer advisors ensured that farmers received the information irrespective of internet connectivity issues.

The next initiative in ecosystem building for Gold Farm was to connect and bring tractor owners onboard. This was operationalized through systematic tie-ups with OEMs (Original Equipment Manufacturers), different dealers, distributors and owners of the equipment. The final step in the process was to automate the business model in the digital platform. We provide the app screenshot in **Figure 2** and process flow diagram in **Figure 3** for a pictorial overview.

<Insert Figure 2>

<Insert Figure 3>

4.3. Gold Farm's Solution

Gold Farm has initiated a large scale transformation at the grass root level in the agricultural sector by ensuring that farm equipment are made available through the sharing economy model (Acquier et al., 2017; Heylighen, 2017; Munoz and Cohen, 2017). This is achieved through a mobile based digital booking platform. Gold Farm experienced primarily two functional challenges in the built App ecosystem. First, there is poor demand density in terms of farms and farmers willing to register for Gold Farm App. Second, to improve customer experience, Gold Farm has to ensure sufficient availability of brand specific farm equipment to match supply-demand at the field level. To eliminate these challenges, Gold Farm relied on satellite driven demand projection, which worked in a focused geography ensuring high throughput on farm equipment assets. This ensured positive results to unit economics.

All the information was stored in a cloud server which operated as an umbrella to the booking app. First, the details of all farm equipment owners who registered in the app were stored along with their location details and specifications in the cloud server. On the other hand, 7x7 segments were charted on the localized geography to pursue surgical demand predictions with the help of remote sensing equipment and information collected from secondary sources. Following it, farmers from different selected geographies were registered in the app by farmer advisors. The app recorded the basic information such as the type of equipment, brand of equipment, number of equipment required and the dates for which they were required.

By combining different types of information listed above, the cloud server through the app facilitates the transaction in which a farmer's request is matched with available equipment's specification. The farmer advisors, while booking tractors on farmer's behalf, would collect advance payment for the usage requested (i.e. pay per use) by representing Gold Farm. In this way, the equipment and financial transaction are realized between the farmer and equipment owner and thereby helps in increasing the farm yield and reducing the overall cost of produce.

4.4. Benefits of Adopting Gold Farm's Solution

Digitization with access-based business model ensured that farmers could connect with equipment owners benefiting all the involved parties in the supply chain. With improved equipment utilization for the owner, accessing equipment at affordable price for the farmer and financial incentive for the farmer advisor, all stakeholders experience a win-win situation and thereby are motivated to remain a part of the network and minimize the inefficiency in the agricultural value chain.

Our interactions with Gold Farm suggest that there were certain key aspects which contribute to their success. First, Gold Farm led to better utilization of tractors. Earlier tractor owners were dissatisfied as transactions were done on a credit basis. Also, tractors were hardly engaged for 4-5 months period in a year. In addition, farmers couldn't avail good quality tractors in a timely manner. Currently, tractors are utilized for 11 months in a year. Tractor owners doubled their income annually post implementation of the model. As a result, these owners were willing to invest more in new equipment for leasing. This eventually ensured that more job opportunities were created by hiring more operators.

Second, access based business model ensured that wide variety of equipment were made available to those marginalized farmers at affordable rates. This resulted in 15% reduction in farmer's cost of produce. Eventually, with higher yield and affordable price to access equipment, more farmers are served. Farmer advisors started earning additional source of monthly income. Stakeholders, observing the benefits, have started using smart phones and bank accounts, which were earlier absent in such subsistence markets. Point of Sale (POS) device³ and mCurrency⁴ are being used by farmer advisors for making payment and also to recharge the wallet. Such value creation across supply chain for different stakeholders enhanced the viability of the business model.

5.0 Conclusion

In this paper, we show how digitization and sharing economy can play a role in mitigating inefficiencies in the agricultural supply chain. We observed the unique features in Indian agricultural sector and documented the need for digitization driven innovation to answer our research questions. Gold Farm, by creating India's first farm mechanization platform, ensured that marginalized farmers can reap considerable social benefits in addition

³ It is a place where a retail transaction is carried out through a device.

⁴ It is medium through which a person can surrender talk time in return for cash.

to aiding farm productivity and yield across the supply chain. To ensure that the digital platform works in the field, Gold Farm offered a sharing model approach by connecting OEM's in the agricultural sector with marginalized farmers thereby satisfying the needs of both the players in the supply chain. This study is one of first few attempts which explain how digitized ABB model can incentivize different players in the agricultural supply chain without compromising on social responsibility within the business model.

5.1. Research implications

Our paper makes several key theoretical contributions in the interface of digitization, sharing economy and agricultural value chain. First, our paper is unique to show how digitization can mitigate inefficiencies in the agricultural value chain. Past literature documented the need for farm mechanization in order to improve farm productivity (Muazu et al. 2015; Owombo et al., 2012). However, our paper has found empirical evidence to substantiate how farm mechanization can be implemented, especially for marginalized farmers, by utilizing ABB model innovation. Specifically, we show how the feature of ABB model is capable of tackling inefficiencies in the existing institutions like the agricultural sector in India.

Second, we believe our paper has made strong contribution in understanding the growing literature of entrepreneurship and strategy in informal institutional setups (Webb et al. 2014). It is often being understood that entrepreneurs and business managers often deviate from their existing practices to offer new and innovative product offerings or sometimes new market development (Chiasson and Saunders 2005) with the objective of creating a value in the society (Webb et al. 2014). Our paper show how the case organization developed new and innovative process such as the digitization driven access based services to create a positive impact in India. The case organization identified the need of marginalized farmers and utilized the concept of digitization and sharing economy to create a new product offering.

This solution, by bridging the requirements of farmers and OEM's, not only created a new market in the domain of agricultural supply chain but also created a value in society.

Third, our study directly contributes to the growing concern of social responsibility in different functional fields through descriptive research (Sodhi 2015). Following Sodhi (2015), we learn that there is a dearth of well researched case studies in understanding how different stakeholders become better off from the operations of the business. Since, in our case, stakeholders include farmers from subsistence market, owners of underutilized farm equipment and Gold Farm, our study has addressed multiple facets of under-researched domain of social responsibility. Our paper provides a meaningful discussion on the literature that firms initiate social responsibility by responding to stakeholders interests (Bergström and Diedrich, 2011).

5.2. Managerial implications

We believe that managers can learn and benefit from our study in several ways. First, our study provides a directive for doing business with financially constrained population. Second, managers can learn how firms can convert existing inefficiencies into business opportunities by evoking digitization and business model innovation into a market product. Third, our paper is one of the first few studies explaining how farm equipment utilization can be improved through digitization. Fourth, due to the inherent characteristic of the market being untapped, our paper contributes to the managerial implications by documenting the business model phenomenon and providing data driven insights to managers.

5.3. Social implications

We believe that social planners can extract key information from our study. First, this study establishes the fact that digitization can improve livelihoods of marginalized farmers in the agricultural supply chain. This is in agreement with recent studies regarding the importance of digital transformation applied in social problems (Riaz and Qureshi, 2017;

Reinecke and Ansari, 2016). Second, it is important to note that digitization alone would not have been successful in ensuring farmers welfare. Hence, entrepreneurs and policy makers have to come up with innovative business models (e.g. access based consumption or access based business model innovation) and use digitization to accelerate the reach of the business model. Leveraging ICT's for designing innovative solutions for pressing issues are bound to increase in developing nations such as India (Faik and Walsham, 2013) thus creating new opportunities in subsistence agricultural market (Kistruck et al., 2013). This case study is a demonstration for utilization of access based digitization in other related social problems, where all players need to be incentivized under the overall umbrella of social responsibility. Third, our study is one of the first of its kind to show how farm mechanization can be operationalized at the field level by bringing in OEM's and marginalized farmers through a digital platform. Finally, our study show Gold Farm is effective in creating entrepreneurs within their business model. We observe how OEM's and high income farmers in possession of farm machinery can be part of the business model by renting machinery which is idle. Also, farmer advisors get their share of incentive by involving themselves within the community of marginalized farmers and helping them overcome the inertia and infrastructural inefficiencies in BoP market, thus creating opportunities and environment for social entrepreneurship (Bhatt et al., 2017; Qureshi et al., 2016).

5.4. Limitations & future research

Our study has certain limitations. First, this study is based on a single case organization. Therefore, it has to be seen how competitors of Gold Farm operate on a similar business model. Since it is the first App in India operating using this business model, the authors couldn't compare the results with any of their competitor in the agricultural sector. Second, Gold Farm has operated in specific regions in India (e.g. Karnataka and Tamil Nadu) by identifying problems in the local region. The team had expertise in connecting OEM's and

farmers due to their proximity and closeness in terms of language and culture to the target region. It will be an interesting future research to observe the scaling of the business model to other regions in India and evaluate the transformation underwent by Gold Farm in the process. Impact of region specific cultural and institutional voids on Gold Farm will be worth studying. Future research could also include understanding “how” and “why” digitization based innovation models succeed or fail in the BoP market. This would provide additional information to the body of knowledge from the viewpoint of entrepreneurial behavior in such markets. Understanding and predicting stakeholder incentives and behavior under the umbrella of digitized business model innovation will provide further clarity at the BoP level.

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Figure 1: Agricultural value chain with different type of equipment

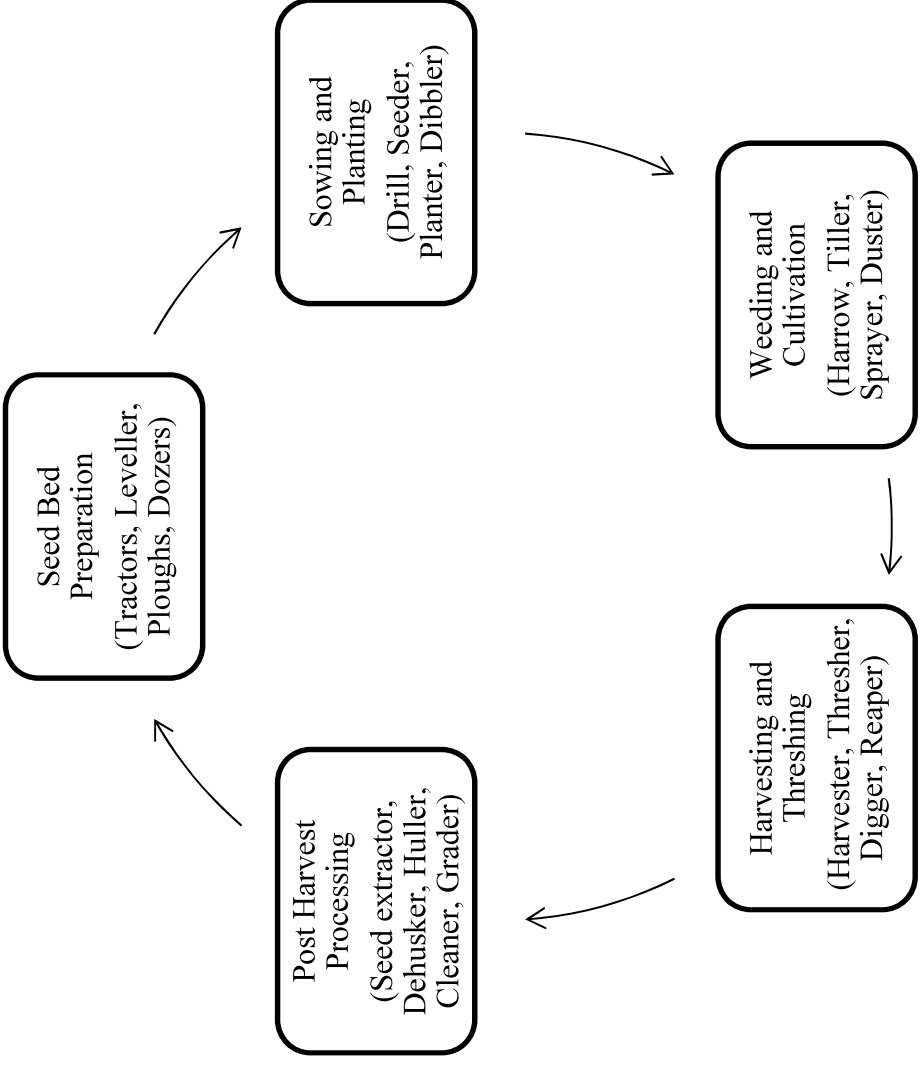


Figure 2: Screenshots of Gold Farm App (Consumer/Farmer's App)



Figure 2a: Sign-in of Farmer App with Name and Mobile Number



Figure 2b: Digital Platform of App asking farmers to choose a equipment based on options provided.



Figure 2c: The farmer is then asked to provide the date of delivery, duration of use and preferred time slot.



Figure 2d: The booking concludes. A Booking ID is generated. Gold Farm Agent will contact the farmer for further details

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