Farmer Producer Organizations (FPO) Platform

Building an onboarding journey for smallholder farmers and FPOs on digital platforms

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Introduction

Indian Agriculture sector has progressively become predominantly smallholder driven as ~86% farmers possess less than two hectares of land. These smallholder farmers own ~46% share of arable area in the country. According to the Indian Agricultural Census (2015-16), the average landholding size has declined from 1.41 hectares in 1995-96 to 1.08 hectares in 2015-16. Researchers believe that small landholding is a challenge in eking out a liveable livelihood for an average family size of 4.6 in rural India [1]. Many have identified challenges in access to quality inputs, institutional credit, and other resources, organized markets, modern farming technologies, etc. Economies of scale are not available to most smallholders, which becomes a weakness as overheads on inputs and services purchased are very high. Aggregation models like Farmer Producer Organizations (FPOs) hence are potential institutional interventions that help redress the constraints of small farms, wherein groups of producers jointly manage resources or access credit, inputs, information, and product markets to reduce transaction costs. Successful aggregation models have shown increasing economies of scale, decreased transaction and coordination costs, improved access to markets, and investment in yield-stabilizing technologies like irrigation and improved crop varieties to be the main benefits of organizing farmers [2].

Scholarly work in the broad domain of co-operative organizations in the non-financial sector nevertheless has suffered severely due to a lack of disaggregated data required for examining organizations that operate on the mutuality principle. There is a lot of talk and discussion about Farmer Producer Organizations (FPOs), and the laws allow for FPOs to be incorporated as a co-operative society (and can federate under the same law), as a Mutually Aided Co-operative Society (in States that have passed a liberal co-operative law based on mutuality), and as a Farmer Producer Company (FPC) under the Companies Act. [3]–[5]. However, for several years the State has not disclosed any statistics under any of these categories. The RBI used to provide yearly co-operative data under the series "Statistical Statements Relating to the Co-operative Movement in India" in two categories: credit cooperatives and non-credit cooperatives. After the National Bank for Agriculture and Rural Development (NABARD) was formed from the Reserve Bank of India's Agricultural Refinance branch, NABARD released statistics on non-credit cooperatives for a few years before it was discontinued. There have been several allusions to the need of integrating the returns of cooperatives and non-financial institutions that these individual organizations file with their respective authorities, but data and figures have simply not been available. Thus, a majority of understanding of the FPO financial ecosystem is built on a patchwork of organization consolidation, sectoral studies, case studies of organizations, and practice documentation [3], [6], [7].

In this context, the TCI FPO database is a consolidated resource providing a wealth of comprehensive data on FPOs in India. It allows users to explore the FPO ecosystem in India, with the flexibility to take a wide view of FPOs across states or dig deep into the cropping, legal and financial details of individual FPOs. The database features an array of key performance indicators

and metrics that enable users to analyze the performance and economic viability of FPOs [7].

While the Database is an attempt at aggregating data around different forms of FPOs and presenting a standardized distribution code for future data assimilation, assessment, and interpretation. It lacks crucial functions like information updating through FPO owners and market actors to engage with FPOs. Considering discussions with project owners who plan to include new features in future releases, we have taken up the task to build a responsive user onboarding interface for various stakeholders of the FPO platform.

Research Statement

Continuing the discussion on the technology development challenges for the marginalized population in the agriculture sector, the study aims to improve digital platform accessibility and provide a smooth onboarding experience for small farmers and FPOs. Thus, the project explores avenues in HCI4D and ICT4D research to build a decoupled user onboarding journey for the following target group:

FPO users (includes farmers associated with FPOs or other employees of FPOs engaged in daily operations for the organization)

The specific research question that the study shall answer the following research question:

How to enable smallholder farmers and farmer organizations to improve online visibility through a simplified onboarding journey on the FPO Platform?

Literature Review

Due to the lack of literature on FPOs, related financial platforms, and Agri-tech platforms focusing on the aggregation models in India, the current review shall focus on information consolidation around farm aggregation models and technology interventions in the larger agriculture, Agri-tech and HCI4D/ICT4D domains through peer-reviewed articles, web publications and existing platforms offering similar solutions in other parts of the world. The lack of literature in the FPO economy can be attributed to FPOs being a relatively new formal model in the small farm aggregation economy while cooperatives and self-help groups have existed for several decades, and hence are well studied and documented.

Further evidence through empirical studies in the domain of agri-economics shows that farmer organizations have contributed strongly towards the upliftment of smallholder farmers through increased livelihoods and have provided improved agency to smallholder farmers through services ranging from agricultural extension, advisory, financial support, access to input and output markets etc. [2], [8]. Aggregations models such as cooperatives and producer organizations have been shown to increase the operational efficiency of farmer groups to attain better value for produce and cut through the bureaucratic systems of selling through traditional food and grain markets, especially in the global south. While also providing farmers with a competitive market advantage through the economies of scale being put into practice [4], [9], [10].

Gender and feminism have also been at the forefront of discussion in the FPO ecosystem as they allow women farmers to have their say in the organizational system, with policies in India calling for increased female participation and literature evidence supporting the increased contribution of women leading to better livelihood outcomes for families and organizations together [1], [11], [12]. Several authors have argued feminism to be a natural ally in interaction design, due to its central commitments towards heterogeneous cultural, social, and economic milieus [13], [14]. This becomes especially important while designing for emerging markets, with a focus on compatible designs for hardware and software working in tandem. These articles emphasize not a focus on building minimalist designs, but rather seeing the visual clutter in terms of 'healthy and unhealthy' approaches for the cultural

adoption of products [14]. A similar viewpoint is seen from the global design community articles, where design toolkits focusing on end users are built on principles of inclusiveness and just designed for the next billion users [15]–[17]. All of them consolidate towards addressing challenges such as agency, fulfillment, identity, equity, empowerment, and social justice.

Furthermore, various studies have frequently mentioned the need for digitization of all the FPO datasets, increased monitoring of fund utilizations, and sharing the database with other stakeholders in the ecosystem for facilitating online business transactions through networking and online trade enablement [2], [4], [6], [18], [19]. Well-designed information systems have been found to play an important role in reducing market information disparity and improving the flow of usable information between rural markets and buyers, helping smallholder farmers to stay updated and assess the real-time situations for sales decision-making. Several case studies across Kenya, the Philippines, and Sri Lanka state the role of online platforms enabling interactions among various ecosystem players in the agriculture sector, leading to increased access to information, providing support and allowing market expansions for sale and purchase in both input and output markets [20], [21].

The literature analysis is thus expanded as an assessment based on the distribution of the articles across peer-reviewed, technology frameworks from corporate sources and technology platforms in existence.

The articles reviewed focus on the need for technology interventions and additional research in the area of small-farm aggregation models. The technology frameworks apprise us of the expansive knowledge in user research for marginalized users and build better stakeholder assessment through several resources for designing for digital confidence in emerging markets. The header products/technology platforms cover currently available applications/platforms across the globe that are helping small farmers or farmer organizations enable better market access through online

platforms and technology tools. The articles selected were chosen through snowball sampling via the FPO Database references. Following is the summary list of all articles reviewed for the purpose of this study:

Article type	No. of Articles
Peer reviewed article/case study/reports	14
Technology frameworks	6
Products/technology platforms	11

Table 1: Summary of articles reviewed and classification

Based on the explorative literature study of the 31 articles, and a thematic analysis approach by Braun and Clarke, the following category of codes were classified for the articles:

Code	No. of Articles
Empathy for users	7
Gender neutral design	7
Mobile first approach	8
Building for trust	8
Feedback inclusions	4
Sustainability	10
Local languages	7
Others	20

Table 2: List of codes extracted from literature review of 40 articles utilized for the paper, followed by the number of times the code featured in different papers.

Methodology

Our key research question of how to enable smallholder farmers and farmer organizations to improve online

visibility through a simplified onboarding journey on the FPO Platform, is answered through a focus only on one type of target user i.e. the FPO user goals and their digital journey for onboarding. The goal for this project is to develop a prototype for a platform that enables smallholder farmers to gain access to digital networking tools through the FPO Database.

A total of six different frameworks were extracted from the literature search, including Designing for Digital Confidence, Tarot card of tech, Next Billion Users, and Feminist HCI. Based on the literature review and internal workshops with the team, it was decided to use "Designing for Digital Confidence" as the best fit framework for our research topic and goals. The primary reason for this framework selection was its clear focus on designing for the next wave of internet users with unique needs and contexts. Those users are less tech-savvy and live in emerging markets, increasingly from rural areas, so they are very different from the users that the product team has designed for tech-savvy users. For those users, a lot struggle to read or type, and their first exposure to the digital world is through their phones.

A design sprint workshop was conducted to structure the design process. Key components of the Design sprint workshop include Sprint Canvas, Sprint Focus Cards, User Context Cards (surmising user needs to be supported with literature evidence), and Design Principle Cards.

First, Sprint Canvas is used to help structure our sprint. Through analyzing our focus users, setting principles & inspirations, and coming up with initial user flows, we used Sprint Canvas as the first step in guiding our design process and adding coming up with high-level user flows.

Second, Spring Focus Cards are used to provide clarity on challenges we should focus on. A deck with 10 challenge cards is used here to help us think through each common challenge when developing for emerging markets and if they apply to our research topic. It's one of the first things that we should do to decide which aspect of the problem we'll concentrate on. When they interact with digital tools for the first time, first-time internet users face a unique set of challenges, similar to the specific needs and circumstances they have.

User Context Cards are utilized to analyze the ways our users' contexts are different from or similar to our own. We chose user context cards next because the next generation of internet users has specific requirements and expectations, and these users may have a very different context than the users that your product team has traditionally designed for. One example is someone who lives in a rural area that does not have a supermarket, the image of a shopping cart that you click on to complete a purchase might not be something they are familiar with.

Design Principle Cards are used to decide the principles that will guide our decisions. We use design principles as the guiding light for our solution. They are a tool that can be put into action to direct the design decisions made by your team. A more accessible and inclusive product can be created by adhering to design principles that prioritize consumers with less digital confidence, such as giving different modes of engagement, prompt instruction, and frequently recognized wins. In this step, we hope to discover practical methods to direct our work and influence design decisions by using the design principles cards.

Analysis

Based on our chosen framework, we were able to

1. Identify the main challenges to focus on;

2. Systematically summarize our user context;

3. Discern practical design principles to address both our main challenges and user context.

After browsing over 10+ metrics, we consolidate our discussion into three main challenges:

- Onboarding
- Discovery
- User Context

As solutions to counter these challenges, we adopt design principles including celebrating wins early and often, letting users look before they leap, and embracing local aesthetics, and adapting based on our user context, respectively.

Before the workshop, we outlined the sketch of user flow in Wireframes. The extracted design principles as the outcome of our workshop provide a skeleton for us to develop our design rationale, which guides us in implementing the final design.

Primary Challenges

Problem: Onboarding could be long and frustrating

Solution: Celebrate wins early and often

If the signup process becomes too difficult, users will abandon it. Installing new apps and creating accounts is a common point of frustration for many users. Our onboarding flow involves multiple steps including verification which could take days. If the purpose and benefits of using the platform are not clear to users from the beginning, they might abandon the app early on. Taking the time consumed to complete onboarding and the clarity of the onboarding process into consideration, the design principle we adopt to counter this challenge was to celebrate wins early and often. According to this principle, we should section tasks into manageable chunks, then celebrate their completion along the way in order to prepare users for more complex interactions later in their journey. More concretely, we could include Progress Bar which indicates what step(s) the user is on and has completed, how much time it would take to complete the current step as well as the remaining steps, and provides clear, actionable error states to keep users on track.

Problem: Users lack the confidence to discover features

Solution: Let users look before they leap

Users lack the confidence to experiment on their own within an app. Many users are afraid of doing something "wrong," which prevents them from discovering new features in an app.

For the case of our app, we include functionalities that assist users to complete the onboarding processes, such as switching between languages. Users also need to provide a full user profile to fully access data, easy discovery would build their confidence and boost their willingness to contribute data. To counter the low confidence problem, we adopt a design principle—let users look before they leap. One improvement we have is allowing users to preview experiences, and even try them out before further commitment. This includes indicating the "cost" of completing an action (e.g., data use, time allocation, storage space), and opening access to part of the services for free. In our case, we make a small part of a preview of the data available to the users before they even need to sign in and answer any questions. In doing so, we hope it can help them build a mental model around how our platform works, and boost their confidence in committing more to access the full data.

Problem: Our user context could be largely diverse

Solution: Adapt based on textual and numerical literacy, cultural context, gender norms, and usage environment, and embrace local aesthetics.

Our users not only come from largely diverse cultural backgrounds but also accept different levels of education. We extracted the most important features of our users and summarized them into the following four aspects: textual and numerical literacy, cultural context, gender norms, and usage environment.

- *Textual and numerical literacy* Our users are literate but are only familiar with a regional language. They do have numerical literacy, but only local currency. Content that requires textual or numerical literacy can create barriers to entry.
- *Cultural context* Our users are potentially spread across India. They are highly diverse in their cultural context. They speak diverse languages, identify with different cultural backgrounds, and live in different climates.
- *Gender norms* Female participation in FPOs has always been an important topic, and policies in India are calling for increased female participation over these years.
- *Usage environment* Our users are farmers. Most of their usage environment is presumably rural.

Based on the analysis of user contexts above, we adopt the design principle—embrace local aesthetics. According to this principle, the model of minimalist UI doesn't resonate in many parts of the world, where people expect more vibrant colors, patterns, and designs. More concretely, we ensure imagery and visuals are culturally sensitive and relevant; use imagery and visuals that celebrate local culture, and collect common UI elements in popular local Indian apps.

Designing for the FPO Users

Our target group represents a unique opportunity for businesses, governments, and technologists to innovate, as these users often have different needs and preferences than those who have been early adopters of technology. Designing an app [Fig 1] such as the FPO Platform to serve this market is a complex task, requiring a deep understanding of user needs in order to create a successful product. This section will explore the key considerations we considered while designing the FPO Platform that is able to meet the needs of the *'Next Billion Users',* with a particular focus on farmers.

Onboarding

The onboarding process is one of the most important aspects when designing an app for *'Next Billion Users.'*

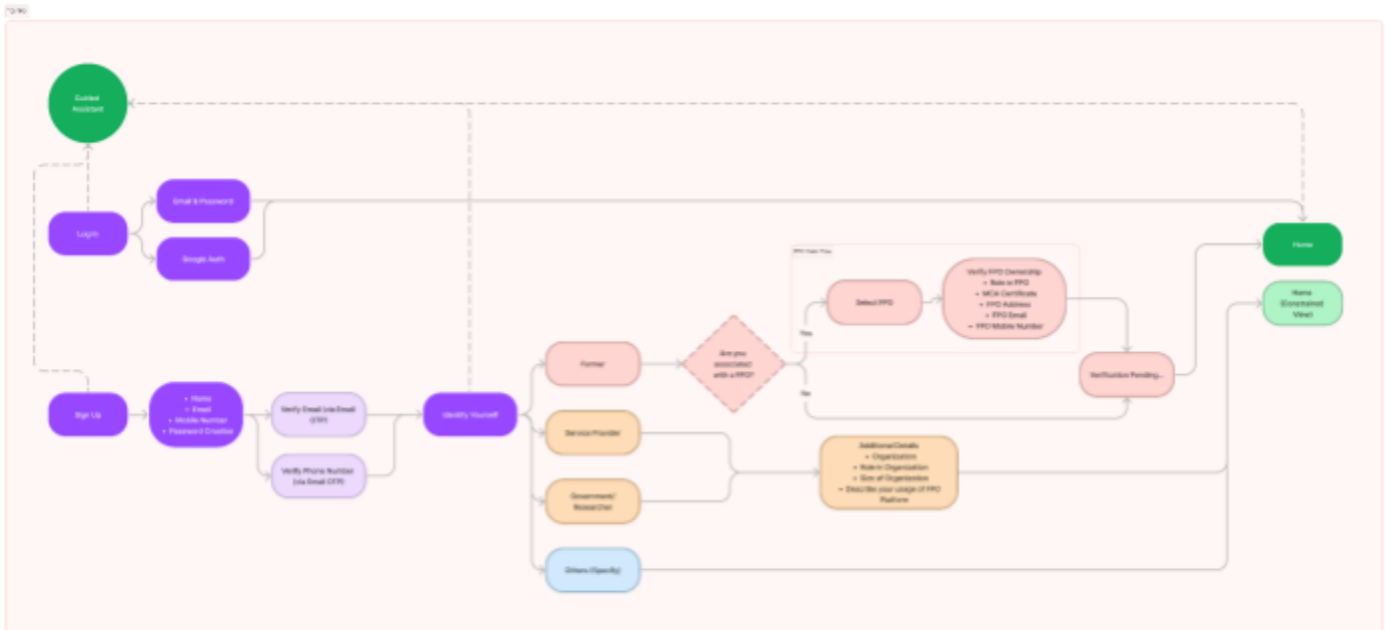We asked ourselves two key questions:

Fig 1: User Flow Diagram for FPO Onboarding (Check Annexure for high resolution flows)

1. How can we guide users in a way that doesn't feel overwhelming? and
2. How can we help them gradually become more familiar with the advanced features of the app as they progress?

We decided that the onboarding process should be broken down into multiple progressive steps, indicating what step(s) the user is on and has completed. [Fig 2]

Fig 2: Progressive steps during Onboarding

Additionally, we wanted to make sure that users were not presented with too many options at once but instead allowed to explore different parts of the app at their own pace. To achieve this, we designed an intuitive user flow that had clear step-by-step instructions and cues to help users understand what actions they need to take next. [Fig 2]

It is important to keep in mind that confidence is built over time. Breaking up tasks into small chunks will help prepare users for more complex interactions by allowing them to feel a sense of accomplishment after completing each task. This approach will create a positive experience and set the tone for future interactions with the app. Celebrating completion along the way helps build trust between the user and the app, which ensures they are comfortable using more advanced features as their journey continues.

We included helpful tips and hints throughout the onboarding process so that even novice users would be able to easily navigate through it. Finally, we also took into account farmers' specific needs when developing our advanced features - ensuring that they could access all functionalities relevant to their workflows quickly and efficiently.

In order to make the onboarding process more intuitive and user-friendly, we decided to provide a preview experience for users before asking for any input or proceeding with the next step. [Fig 3] Through this preview experience, users will be able to explore new possibilities offered by our app that they may not have been aware of previously. It will also help ease any fear of making mistakes during onboarding as well as allow them to evaluate data storage and battery usage associated with each task they complete while using the app.

Fig 3: 'Preview Tooltips' appears before any critical action

Content

In order to ensure our FPO platform is accessible to all users, we implemented strategies such as localizing content in terms of UI, tone, and language. This allowed us to better meet the needs of users from different states and cultures within India. We also recognized that some of our users may have lower literacy levels, so we

simplified text as much as possible and provided visual cues wherever appropriate. By taking these steps, we sought to make sure every user could understand what the platform was asking them to do and respond accordingly. [Fig 4]
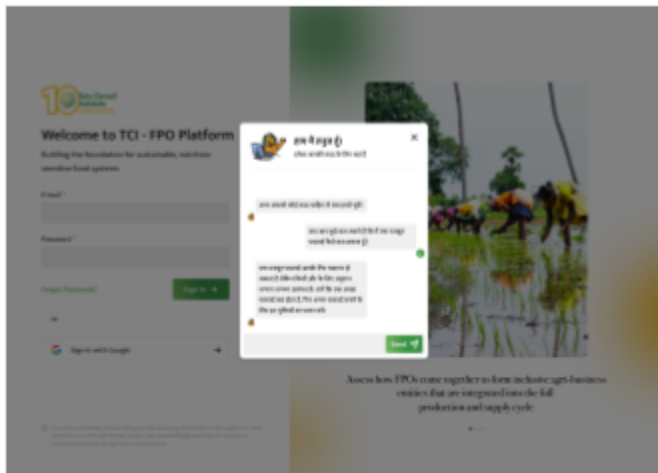

Fig 4: Guided Assistant that chats with user in their locale

Privacy

It is essential to create a sense of security for data. This includes providing them with clear information about how their data will be collected and used, as well as giving them control over who can access that data. [Fig 5] We wanted to ensure that the user experience for accessing and managing this sensitive information is simple and intuitive, allowing farmers to feel secure in knowing that their privacy is respected.

Fig 5: Usage of 'Trust Markers' to establish the idea of a safe and secure platform

Visual Confirmation

When users complete actions within the app, they should be provided with visual aids in order to reduce any guesswork about what happens when an action/activity is triggered. This helps create a sense of confidence that the action was successful and encourages further engagement with the app. [Fig 6]

Fig 6: Alert Messages provide a feedback mechanism to user's action

Global Guided Assistant

The global guided assistant we designed was tailored specifically to the needs of low-literate users. To make sure they felt comfortable asking for help, we created a face and persona for this assistant. [Fig 7 i] We hoped that by doing this, users would feel less embarrassed or ashamed when they needed assistance with something like using their own smartphone. The goal of our persistent support system is to give these users access to on-demand support and guidance so that they can use the platform confidently even if unsure about what tasks need completing. In time, we believe that this Guided Assistant could be used in more advanced ways; helping users discover new functions and capabilities of the app which can enable them to get the most out of it. [Fig 7 ii]
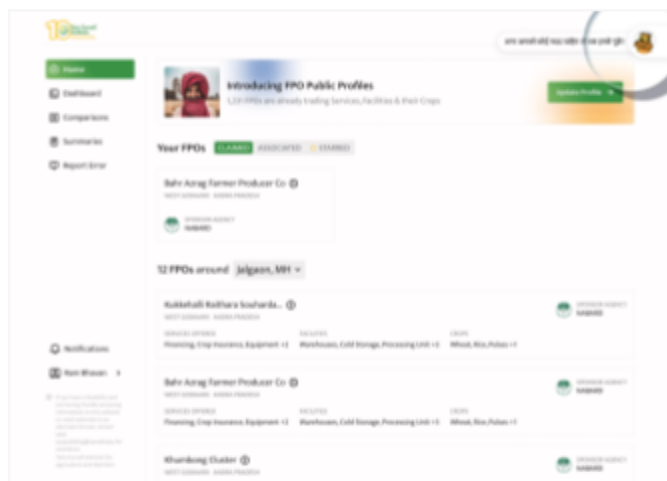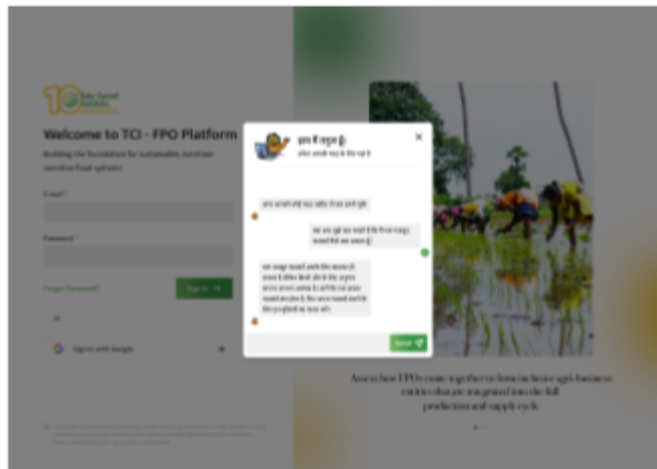

Fig 7 i: Personified Accessibility Assistant

Fig 7 ii: Personified Accessibility Assistant

Local Sensorial Visuals

It is important to take into consideration the local sensorial visuals of emerging markets. These environments are often bustling and full of life, with a wide range of sensory engagement (sight, sound, smell, touch). Traditional Western aesthetics such as minimalism - featuring little color or text - may not be effective in these contexts. It is essential to create visuals that make sense for each specific context and capture the vibrancy and uniqueness of its environment.

Our goal was to create the right amount of "healthy clutter" and maintain a balance between clear user interfaces and local needs, we took into consideration sensory visuals that were specific to the target users. We made sure not to overwhelm them with too much information, but rather provide enough visual cues for support. We also looked into cultural factors such as language, symbols, graphics, motion animation, and other visual elements to ensure our design was tailored specifically for the target audience. This way we could create a platform that both provided clear actionable steps while also providing a look and feel rooted in local culture. [Fig 8]

Fig 8: Usage of native cultural identity in the FPO Platform's Visual Language
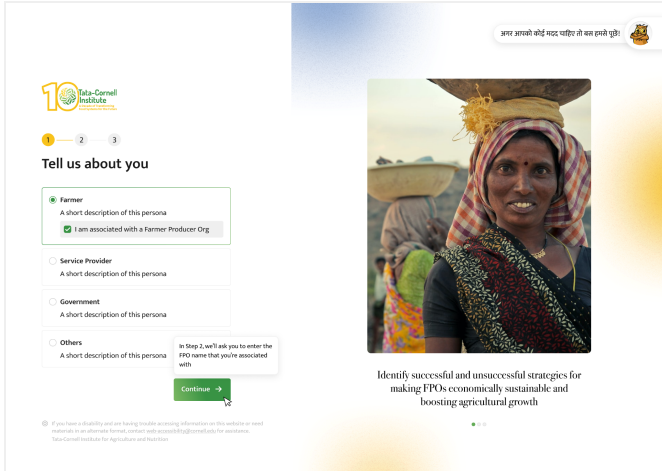
Social-Proofing

Word-of-mouth and trust in peers are important when it comes to taking up new technology. While revamping the FPO Platform we considered how to create social proofing [Fig 9] that makes users look good and adopt new functionality progressively — through status symbols, rewards or achievements — so they are more likely to share and engage with the FPO data and its services with other users in and outside the TCI FPO ecosystem.
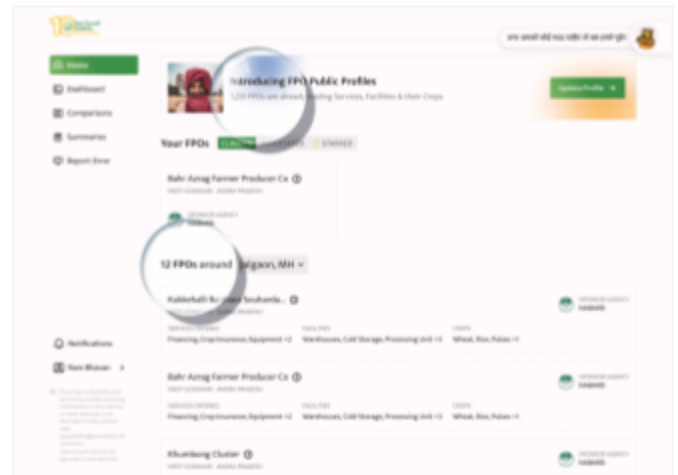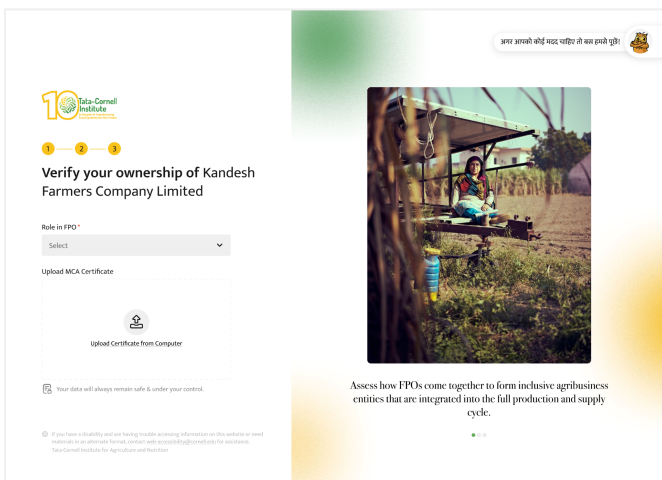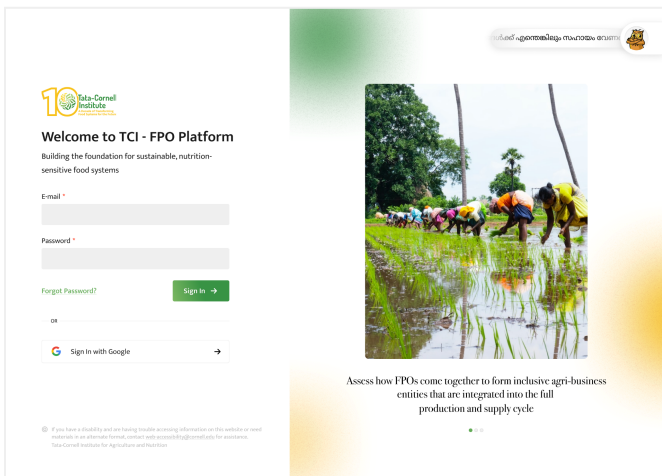

Fig 9: Usage of Social-Proofing constructs across the platform

Literacy Support

To provide literacy support [Fig 11] to the low-literate users of our app, we decided to incorporate several features that would allow them to easily understand specific terminologies and technical words. We added an audio option so that users could listen to the pronunciation of the word in their local language. Additionally, we provided a glossary with definitions for each term and also included detailed walk-throughs which explain how certain functions work in more detail. By giving users these additional resources, they are able to better engage with the content available on the FPO platform.

Fig 10: Example of Literary Tooltips which help users understand key terminology in their locale
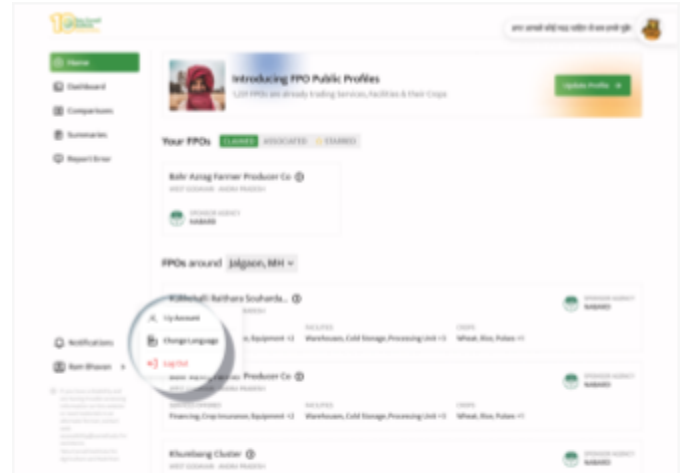

Fig 11: 'Change Language' setting which is accessible from the My Account menu

Language support widgets [Fig 10] within the FPO Platform can help bridge language barriers, allowing users to select their preferred language or switch between languages quickly and easily. Providing text-to-speech functionality is an excellent way to ensure that even those who are not literate can access all content in your app. Text-to-speech technology will be able to read out any written material to the user, making it accessible to everyone regardless of literacy level. This approach truly allowed us to create a truly inclusive platform that caters to all types of users regardless of their educational backgrounds or skill level.

Discussion & Limitations

The success of technology products with small farmers in India is hindered by several challenges. Many small farmers in India may not have access to technology due to a lack of infrastructure and resources, which can make it difficult for them to use technology products effectively. Additionally, some small farmers may not be aware of the benefits of technology products and may be hesitant to adopt them. This can make it difficult for technology companies to reach and educate these farmers about the advantages of their products. Affordability is also an issue, as technology products can be expensive, and small farmers in India may not have the financial resources to purchase and use them. This can limit the adoption of these products among small farmers. Furthermore, many small farmers in India may not have access to technical support if they encounter problems with technology products, which can make it difficult for them to use these products effectively and can lead to low levels of adoption. Finally, technology products designed for small farmers may not be able to easily scale up to meet the needs of larger farms, which can make it difficult for technology companies to expand their customer base and reach more farmers.

Our analysis and design based on the "Design for Digital Confidence" framework yields   referenceable design

principles for our final high-level user flows. After our initial analysis of the main challenges, we were able to rule out design principles that did not fit well for our users, or deprioritize some design principles that are not effective for better user experiences. For example, we identified Data Usage as a minor challenge for our users, indicated by our literature analysis. As a result, we decided that we need not prioritize the good functionality of our app on slow, limited Wi-Fi connections. In this way, we feel safe including extra functionalities that better fit the diverse user contexts. Though we must acknowledge that the design is based highly on assumptions that originate from the literature.

Within these contexts, it becomes highly imperative to undertake large field studies to better understand the users and then start the design from scratch without any prejudices. Though, adhering to the time boundaries for the course and the special context of an already existing platform, the prototype shall serve as a test bed for field usability testing with FPOs already utilizing technology products and platforms. Through field usability testing of the project in the coming months, the prototype shall be refined further to meet the needs of true users. This shall be accompanied by the expansion of the project with more market players entering the FPO economy and hopefully leading to a large network marketplace for reliable buyers and sellers to find each other.

Contributions

TC devised the project, the main conceptual ideas and proof outline. HX and SX conducted the workshop and prepared the extensive outcomes document for EK to develop the prototypes. Everyone contributed to the literature review and final content.

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Annexure

Thematic analysis:

Literature review coding schema.xlsx

Workshop documentation:

Workshop Documentation

User flows and Prototype:

Prototype Link