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Cultiva: Designing an Integrated Digital Platform for Agricultural Leasing, Crop Trading, and Agri-Investment

Komal Kriti[1], Pratardan Shankar Hegde[2], Vignesh Ravichandran[3]

[1,2]Student, Department of Industrial Design, M. S. Ramaiah University of Applied Sciences, Bengaluru, India
[3]Assistant Professor, Department of Industrial Design, M. S. Ramaiah University of Applied Sciences, Bengaluru, India

Abstract
Agriculture is of great importance in the economy, food security and rural livelihoods. Even with the rising use of digital technologies, there are still challenges faced by agricultural stakeholders on land access, market connectivity, investment opportunities, and transparency of transactions. The current digital tools available have been developed for specific services, e.g., crop trading, land leasing, or agricultural investments, which have contributed to multiple user experiences and thus multiple platforms where the stakeholders have to engage with[1, 2]. This dispersion can lead to less efficiency, loss of information and fewer stakeholders in the agricultural chain. The present study introduces the user-centred digital platform, Cultiva, that is designed to incorporate agricultural land leasing, crop trading, tree leasing and agri-investment services in a singular ecosystem. To identify user needs and existing challenges, a mixed-method research approach was used, which included stakeholder interviews, questionnaire-based surveys, competitor analysis, and literature review. The results of the research identified several recurring issues: the farmers, landowners, buyers, and investors were concerned with issues of trust, verification, accessibility, transparency of information, and transaction management.

Keywords: Agricultural Technology; User Experience Design; Digital Marketplace; Land Leasing, Crop Trading; Agri-Investment; Human-Centered Design

1. Introduction and Objective

Agriculture is a key driver of economic development, food security and rural livelihoods [4]. Although digital technologies are becoming increasingly prevalent, some of the challenges to be addressed by stakeholders remain, with regard to land access, market connections, investments opportunities and transparency in transactions. The existing agricultural platforms are largely limited to single services like crop trading, land leasing, or investment management; users need to use multiple platforms and experience a lack of seamless integration [1] [2]. User experience design research underscores the importance of user-friendly, accessible, and efficient integrated digital ecosystems [6, 7, 8]. Trust and transparency are especially critical in agriculture where there are very few ways of verifying what happens and lack of information sharing hinders participation [2] [5]. To overcome these challenges, this study suggests the integrated platform, Cultiva, which integrates agricultural land leasing, crop trading, tree leasing and agri-

investment service into the same platform. The goals of the research are to gather information about the problems faced by stakeholders and the needs of the users, create a solution that increases the transparency and accessibility of the target, and show the use of the user-centered design methodology in the development of agricultural technology. The study result is a high-fidelity prototype that shows how integrated digital ecosystems can contribute to more efficient agricultural interactions.

2. Agricultural Research Gap

Currently, there are platforms emerging for agriculture-related activities, including trading crops, leasing land, and investing in agriculture, due to the digitalization of agriculture [1], [2], [5]. These solutions make access and connect stakeholders easier, but they are mostly standalone systems which only solve certain problems of the farming sector. Digital marketplaces enable farmers to connect with buyers, land-leasing platforms to access land, and investment platforms to provide investment opportunities [1], [5], [9]. However, such services are often disjointed, causing a disjointed user experience, and forcing the user to go from one platform to another to access the services. Moreover, verification, transparency and transaction security are still found issues [2], [5]. Research has already emphasized the advantages of user-centred and integrated digital systems in terms of usability and reducing the complexity of interactions [6], [7] and [8]. Few studies have investigated an integrated platform to support agricultural land leasing, crop trading, tree leasing, and agri-investment services at the same time, however [1, 2, 5]. This study aims to fill that gap by designing Cultiva, a user-centred platform that will make the agricultural ecosystem easier, more transparent, and more engaging for stakeholders.

3. Methodology

The user-centred design methodology was used as a guiding approach throughout the design and development process [6, 7].The methodology was divided into four main stages: Discovery, Analysis, Design and Prototyping.

3.1 Primary Research

Primary research comprised stakeholder interviews, and questionnaires to farmers, landowners, buyers and prospective investors. These activities were used to pinpoint the current problems, expectations, operating needs and views of the users of the agricultural platforms. Qualitative information was gained through interview sessions to gain a further understanding of the experiences of stakeholders and to discuss issues which were recurring. The results of the surveys were also helpful in identifying common trends and confirming the users' concerns across various user groups.

3.2 Secondary Research

In addition to existing platforms, marketplace applications, investment systems and research articles focusing on agricultural technology and user experience design, secondary research was conducted. Competitor analysis was performed to find out the strengths, weakness and functional gaps between the current solutions.

3.3 Data Analysis

Affinity Mapping techniques were used to structure and analyse the research findings and look for any common themes. The key observations were combined into the larger design opportunity areas of trust, verification, accessibility, transparency of transactions, and information management.

3.4 Design and Prototyping

Analysis insights were used to create user personas, information architecture, user flows, wireframes and

visual design systems. Scrimmage sessions were used to review and refine concepts, and to confirm they met stakeholder needs. The final solution was created in Figma as a high-fidelity interactive prototype.

4. Research Findings

4.1 Participant Overview

Stakeholder interviews and questionnaire-based surveys were conducted to gather primary data from the farmer, land owner, buyers, and agri-investors. To receive a broad range of viewpoints on leasing, trading and investment activities, participants from various roles within the agricultural ecosystem were included in the study. The demographics of the participants overall are summarized in Table 1.

Table 1. Participant Overview

User Type	Number of Participants	Description
Farmers	**3**	**Engaged in crop selling/tree leasing**
Landowners	**2**	**Interested in leasing unused land**
Buyers	**2**	**Purchase produce directly from farmers**
Agri-Investors	**3**	**Explore tree/land rental returns**

The participants discussed their experiences, challenges and expectations around the services and platforms currently available in agriculture. Their responses took them back to the trust, transparency, accessibility, transaction management and investment opportunity aspects of the issues. Based on these findings, the subsequent data analysis and design development of the Cultiva platform was based on.

4.2 Data Analysis

Affinity mapping and thematic categorisation techniques were used to analyse data gathered from stakeholder interviews and questionnaire-based surveys. The analysis aimed to surface common issues, expectations and opportunities to intervene in the digital space for farmers, landowners, buyers, and agri investors. The results showed that trust, transparency and accessibility were the most important factors affecting involvement in agricultural transactions. Importance of verified profile, reliable listings, transparency and secure transactions processes were highlighted by participants. Ease of use was also found to be an important requirement, especially for those who have low digital literacy. Further, multilingual access, security of transactions and access to agricultural services from a single point were identified as critical requirements. From the analysis, the following five major themes emerged: trust and verification, pricing transparency, ease of use and accessibility, legal assurance and transaction security, and centralized agricultural service management. Themes guided the design specifications and had a direct impact on the information architecture, user flow, dashboard features, and verification process of Cultiva. These themes guided the design requirements and were the basis for the development of Cultiva. The learnings from the data analysis directly impacted the information architecture, user flows, verification formats, dashboard functionality and overall user experience design of the platform.

4.3 Key Research Findings

During the research stage, it was found that several problems were faced by the stakeholders in agricultural transactions. Farmers, landowners, buyers, and investors indicated that access to reliable information, identification of trusted parties, and transactions conducted via the digital channels were problematic. The

platforms available in most of the cases only dealt with single agricultural activities and the users were supposed to go through several platforms to do whatever they needed to do for such activities.

4.3.1 Obstacles of Farmers

Some of the issues that farmers mentioned were related to accessing agricultural resources and involvement in online markets. The issues that were raised most often were the inability to find land to grow crops, poor market information and lack of trust in buyers/sellers and service providers. Participants also highlighted the importance of digital solutions that are simple to use, offer clarity on costs, have secure payment methods, and have multiple languages available, to cater for different levels of digital literacy.

4.3.2 Obstacles of Landowners

Landowners identified poor-quality tenants and challenges to effective agricultural lease operations. A number of the participants highlighted issues of transparency, contract management and post-leasing land use. Lack of centralised verification and communication systems sometimes led to uncertainties when leasing, raising the demand for secure and transparent digital solutions.

4.3.3 Offers Challenges faced by buyers.

Purchasers reported issues with finding confirmed agricultural products and getting reliable information on the quality, availability, and price of agricultural products. The participants also noted challenges in communicating with the sellers in the existing platforms. The absence of a uniform information and comparison system sometimes made it difficult for visitors to make their purchase, highlighting the importance of a clear and reliable feature of the marketplace.

4.3.4 Agri-Investors' challenges

The agri-investors wanted to be part of agricultural projects, but were hampered in the availability of reliable investment opportunities. The participants expressed a lack of confidence on project trustworthiness, risk analysis abilities and investment performance monitoring. Fewer information sources and clear tracking methods contributed to the lack of trust in the current investment choices, thus emphasizing the need for easy dashboards, project visibility, and monitoring of performance. One consistent observation in the interviews and survey answers was that there was a lack of transparency of the agricultural transactions. Participants noted issues with fraudulent listings, confusing information about who owns the listing and lack of clarity on deal status. Participants sometimes found these fears to be a blocker to involvement in online agricultural markets. Accessibility was another major factor of concern. Simple interfaces, having local language support, and easy navigation structures were highlighted by many stakeholders. Participants who were less digitally literate preferred systems which were simple and clear in terms of level of complexity and guidance throughout transaction processes. Growing interest in agricultural investment opportunities was also identified in the study. The current processes linking investors to agricultural projects were however, poorly integrated and not easily accessible. The participants expressed that a platform with a common approach to support investment opportunities in addition to agricultural services could enhance the participation and accessibility of resources. The major design aspects emerged from these findings were the need to implement user & asset verification, clear transaction workflow, centralized access to agricultural services and easy & intuitive navigation structures. Other common attributes of the top-rated platforms included features for monitoring and management, accessibility design features and multi-stakeholder support. These requirements defined the next steps in the design process and development of the platform.

5. Design Process and Artifacts

The user-centered design process was followed and the research was converted into functional interface solutions. Several design artifacts were created to guarantee that the platform functions as the stakeholders needed it to.

5.1 User Personas

During research, the main stakeholder groups are identified and personas for them were created. The personas were used as reference models throughout the design process, and were used to validate choices made in functionality, navigation, and information presentation. The main personas were, Farmers, where in Leasing opportunities, agricultural services, crop marketplaces, and investment support are needed. Trust, affordability and ease of use are their main concerns. A user persona was created using insights gained in primary research to better understand the goals, motivations, challenges and behavioural patterns of farmers. The case study respondents form a typical cross-section of farmer stakeholders identified in the research process, with User Persona 1 being a representative of such a stakeholder. He uses agriculture as a major livelihood and is looking for effective avenues to access land leasing opportunities, market crops and access agriculture support services. The issues he is concerned about are: finding reliable transaction partners; getting clear pricing data; and using digital platforms that are easy and convenient to use. The persona emphasizes the importance of having verified products, easy-to-use interfaces, and streamlined processes on Cultiva. Landowners want to find efficient ways to list and lease their farmland and ensure transparency and legal certainty throughout the process. Buyer needs to have access to verified crop listing, pricing and direct communication with producers. Investor look for opportunities to invest in agricultural projects, while also being provided with clear information about investment risks, potential returns, and project developments. An agri-investor persona was developed from these expectations, concerns and investment needs that were identified during the stakeholder interviews. During research, User Persona 2 emerged as a potential agri-investor. A business-oriented professional who is interested in agricultural investment opportunities, he is looking for reliable and transparent ways to assess agricultural investments and measure investment performance. The main things he is looking for are verified listings, accurate pricing, secure agreements and real time updates that enable him with informed decision making. But fluctuating price levels, uncertain land conditions, a lack of trust in unfamiliar listings, and insufficient information on projects are challenges that can decrease investment confidence.

5.2 Information Architecture

To structure its various services into a cohesive and easy to navigate platform, information architecture has been developed. Design of the architecture was aimed to reduce the cognitive load and also remain accessible to all the stakeholder groups. The core navigation was made up of Home, Crop Trading, Land Leasing, Tree Leasing, Agri-Investment, User Dashboard, and Profile & Verification Services. The sections were structured to offer easy and clear access to the most important features of the platform, while simultaneously allowing the user to have direct access to the platform's features. The building was conceived to accommodate a number of stakeholder groups and allow for simple flow of people between agricultural services, transaction management and account related functions. This hierarchical structure enabled users to access services efficiently while maintaining consistency throughout the platform. The overall information architecture of Cultiva was structured to organize platform features and navigation pathways across different stakeholder groups, as illustrated in Figure 3.

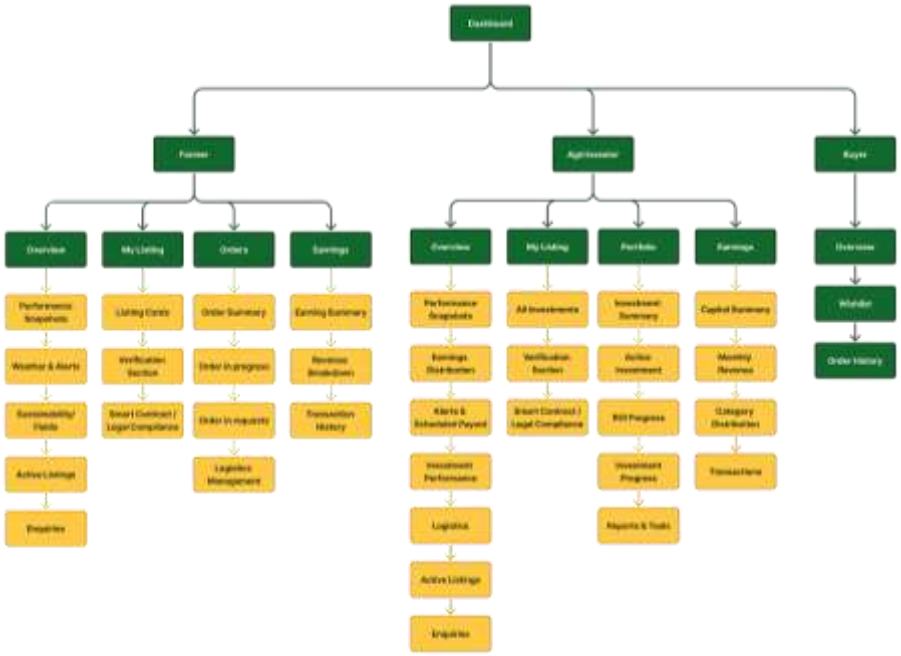

Figure 3. Stake Holders Group

A dedicated dashboard sitemap was developed to define the hierarchy and organization of role-specific dashboard functionalities within the platform.

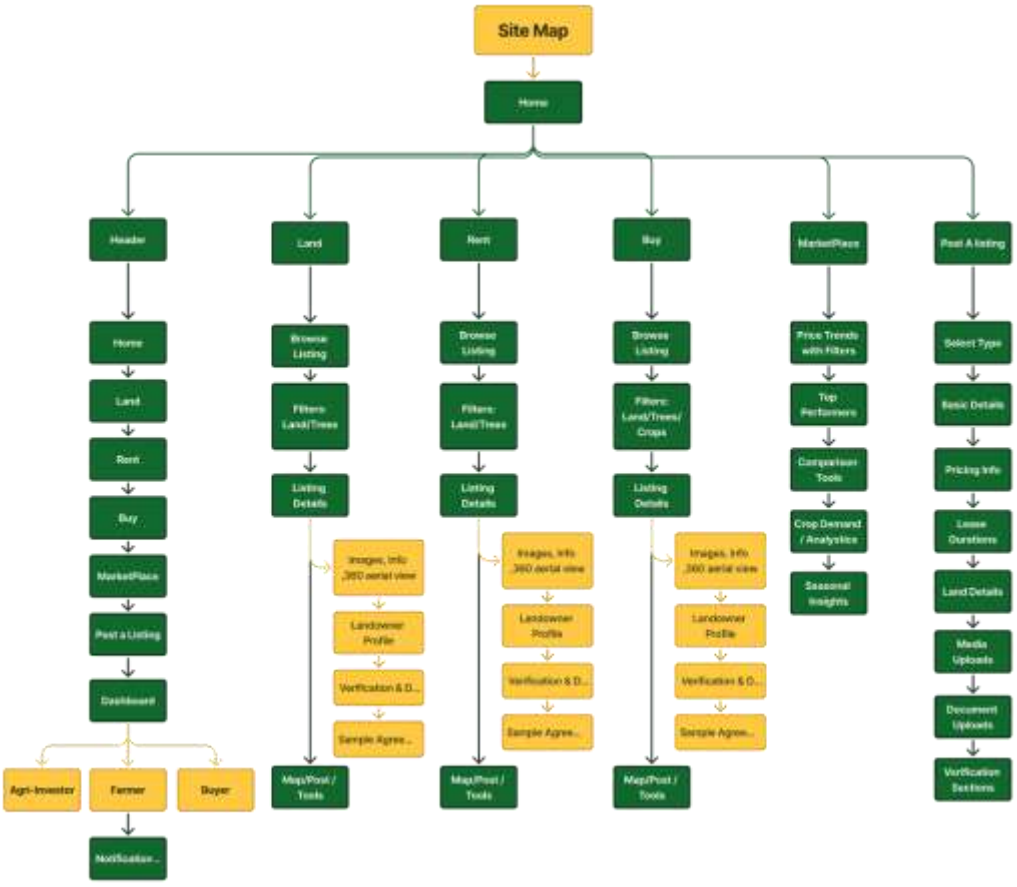

Figure 4. Dashboard Sitemap

5.3 User Flows

User flows were created to represent interactions within the important platform activities. With these flows, critical tasks were achieved with little complexity and low navigation barriers. The key activities of the site users were identified, with the creation of major user journeys to support them. These trips included listing agricultural land for lease, searching and leasing farmland, purchasing and selling crops, engaging in agricultural investment opportunities and completing user verification procedures. The user flows have been developed to be as simple as possible, to increase the efficiency of the tasks and to give a clear indication of the transaction process to the users, to improve the experience of the users of the various types of users. The resulting flows highlighted transparency and gave users visibility on the transaction's progress. The overall user flow was created to show the main interactions and navigation path in the Cultiva ecosystem. The resulting flows emphasized transparency and provided users with clear visibility into transaction progress. The overall user flow was designed to visualize the primary interactions and navigation pathways available across the Cultiva ecosystem.

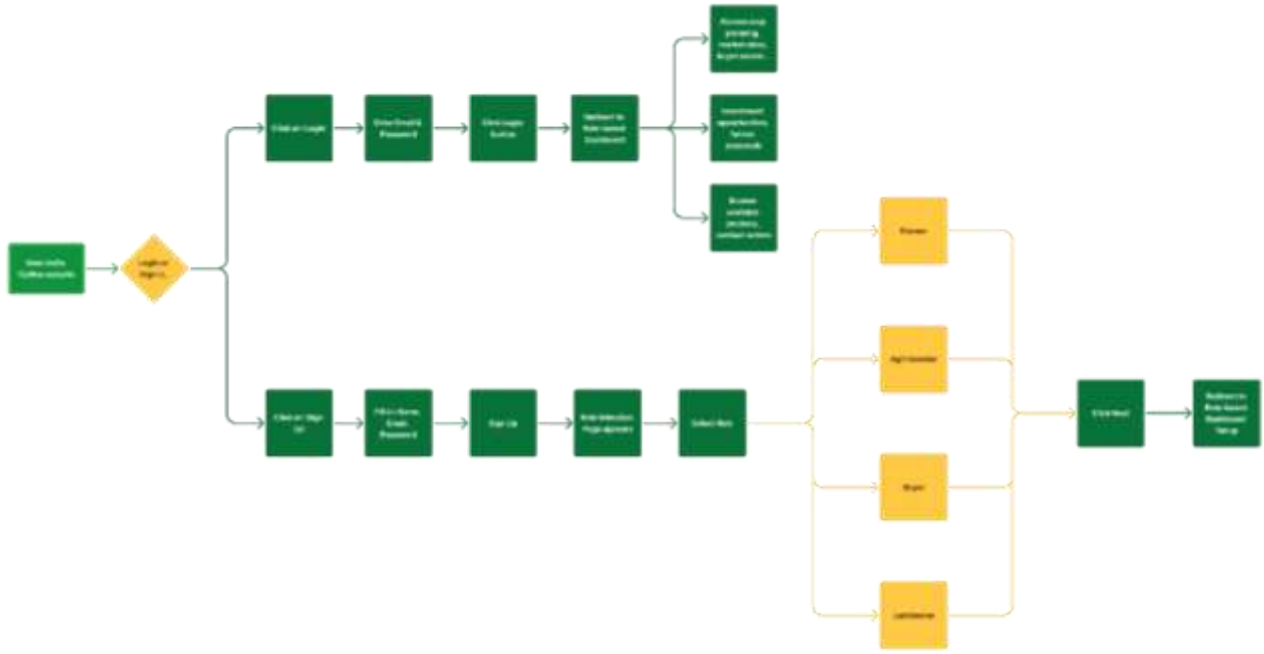

Figure 5. Overall User Flow

The farmer dashboard workflow features how farmers can interact with listings, transactions and platform activities in a streamlined way.

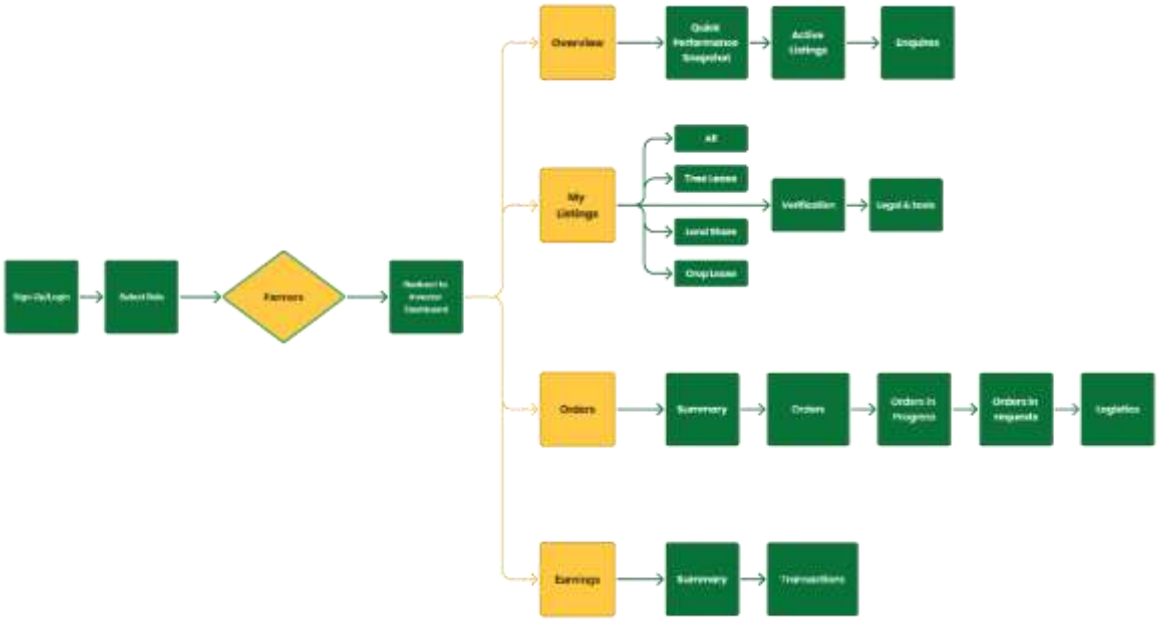

Figure 6. Farmer's Dashboard User Flow

The agri-investor workflow demonstrates the process of discovering opportunities, monitoring investments, and accessing performance-related information within the platform.

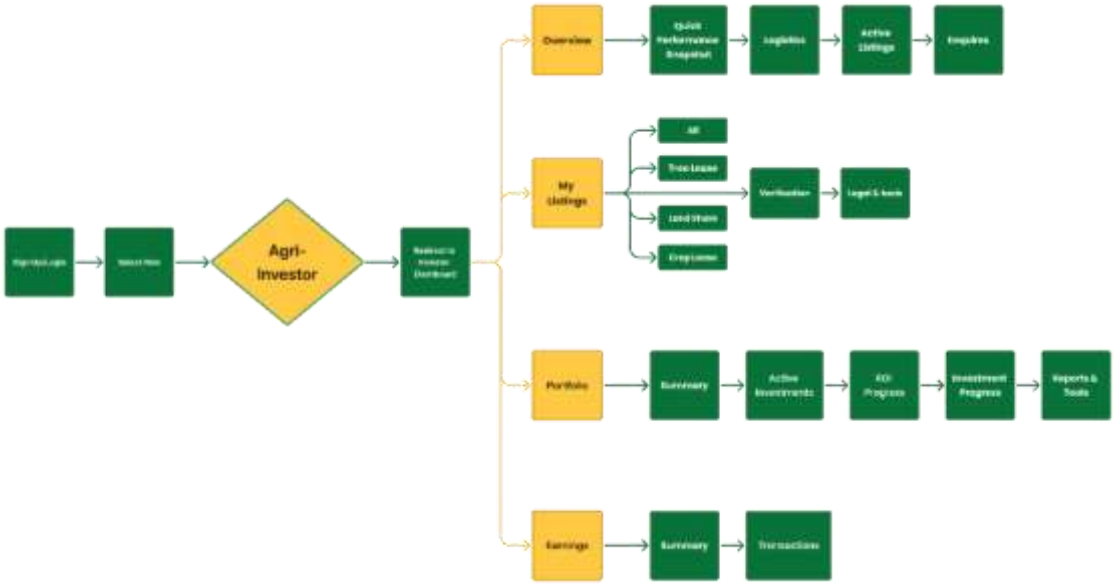

Figure 7. Agri-Investor's Dashboard User Flow

5.4 Wire Framing

To understand the layout structures, navigation patterns and content hierarchy, low fidelity wireframes were created prior to visual design implementation. Wireframing helped to quickly evaluate the various design solutions and to ensure they matched research findings. Specific focus was on navigation structures as well as limiting information overload, positioning call to actions, designing website friendly layouts

and making the dashboard accessible. The wireframes were then refined through an iterative process to create a layout that satisfied the needs of the stakeholders, the usability and functionality.

5.5 Design System

A consistent design system was created to ensure the consistency of the platform's design. The system consisted of standardised components, typography styles, Colour palettes, Iconography, and Interaction patterns. The design language was designed to be simple, trustworthy, readable, accessible and consistent, with the aim of ensuring a user-friendly and reliable experience. A clean and minimal interface was chosen to minimise the cognitive load and make interactions easy. Trustworthiness was supported by good visual hierarchy, patterns, and information transparency. Appropriate typography, spacing and contrast has been used to ensure that content is easily understood and readability has been prioritised. Accessibility principles were included to allow different users and access for different interactions. Web layout, components, colors, and interaction patterns were consistent to some extent, which ensured a cohesive atmosphere for the user and facilitated an efficient, confident use of the system. Incorporation of visual elements that were green and earth toned to reinforce the agriculture aspect while keeping a professional look. A detailed brand system was created to achieve consistency and strengthen the platform's identity on all platforms. The design system also supported scalability by enabling reusable interface components across multiple modules.

Figure 8. Cultiva's Branding Kit

6. Design Implementation

The result of this study was a high-fidelity prototype called Cultiva. The prototype is created to bring together agricultural leasing, trading of crops, tree leasing, and agri-investment under one roof in digital format. The platform design was created using Figma and will include the design decisions that were identified from stakeholder research and iterative development of the design.

6.1 Verified Listings

Users have access to accurate listings of land property, crops and investment. The use of verification indi-

cators boosts trust and diminishes uncertainty in transactions.

6.2 Agricultural Land Leasing

The leasing module allows landowners to post their agricultural properties, and allows farmers to look for leasing opportunities, assess them and enter into a leasing arrangement via structured workflows**.**

6.3 Crop Trading Marketplace

The crop trading area enables direct communication between the buyers and sellers. Product information, pricing and channels of communication are communicated in an open marketplace environment.

6.4 Tree Leasing

The platform offers the option of leasing trees, enabling users to engage in long-term ownership and management of trees.

6.5 Agri-Investment Module

Investors can explore agricultural projects, view project details, and get involved in investment opportunities all in one place.

6.6 User Dashboard

A dashboard feature helps users to view their transactions, listings, investment activities and account management.

6.7 Accessibility Considerations

The accessibility features were designed to ensure that the platform is accessible and user-friendly for all types of users. Navigation structures were established to ensure that information could be easily accessed by the user and the flow of the navigation to the site was efficient. Cross-screen consistency of interaction where needed, to minimise confusion and aid learnability. Content comprehension was aided by readable typography, which included the use of appropriate font sizes, spacing, and contrast. The visual hierarchy was optimized to make sure that important information is highlighted and user attention is directed properly. Furthermore, the multilingual support factor was considered to make sure that the system will be capable of supporting customers with diverse language preferences, making it more accessible and user-friendly. Collectively, these features demonstrate how a single digital ecosystem can support multiple agricultural stakeholders while maintaining usability and operational clarity. High-fidelity interface designs were developed to translate research insights and wireframe concepts into visually refined user experiences. The login interface is presented in Figure 9.

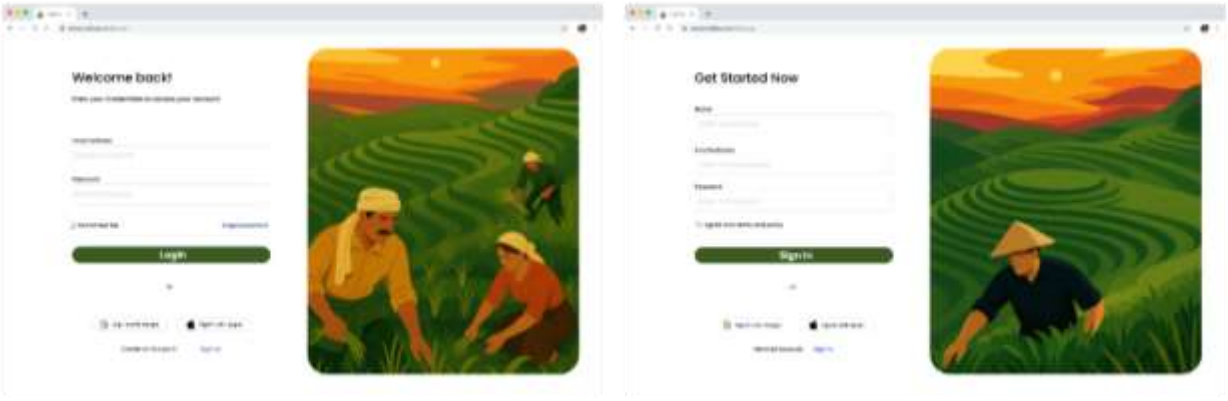

Figure 9. Cultiva High Fidelity Key Screen : Login

Key platform interfaces were designed to support agricultural leasing, trading, and investment activities while maintaining usability and accessibility.

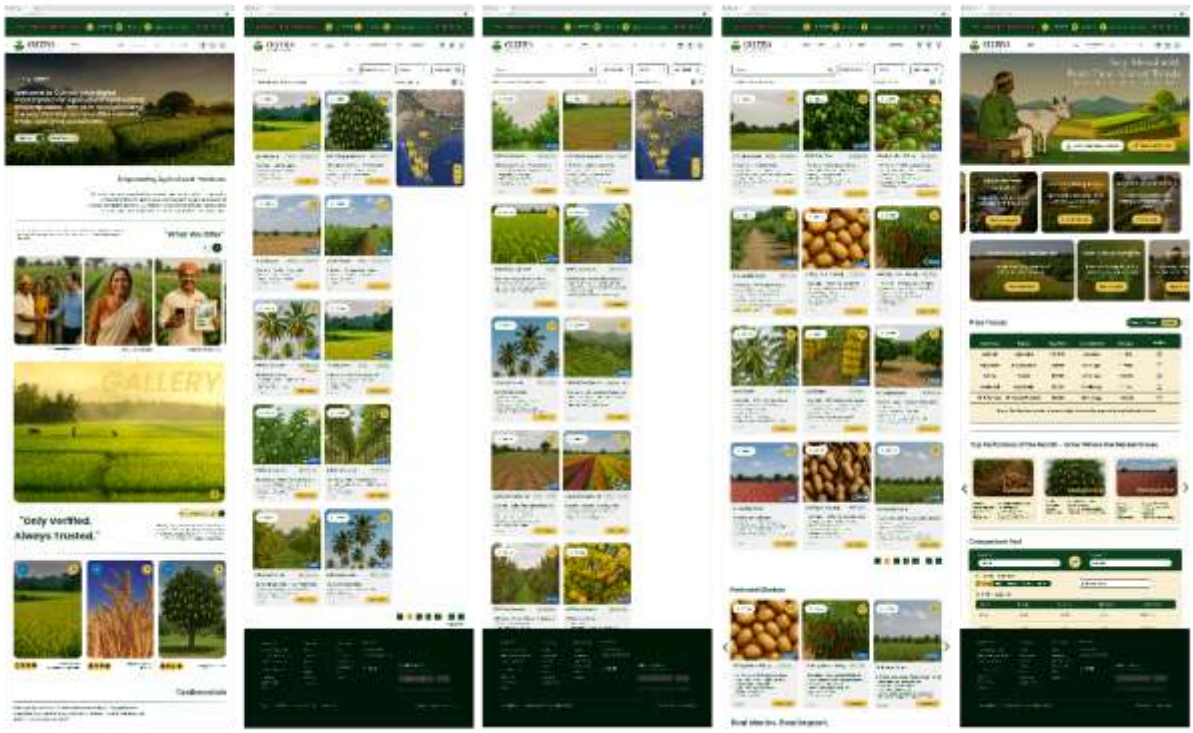

Figure 10. Cultiva High-Fidelity Screens: Landing Page, Leasing, and Marketplace

Additional high-fidelity screens demonstrate the implementation of core platform functionalities and stakeholder-specific interaction.

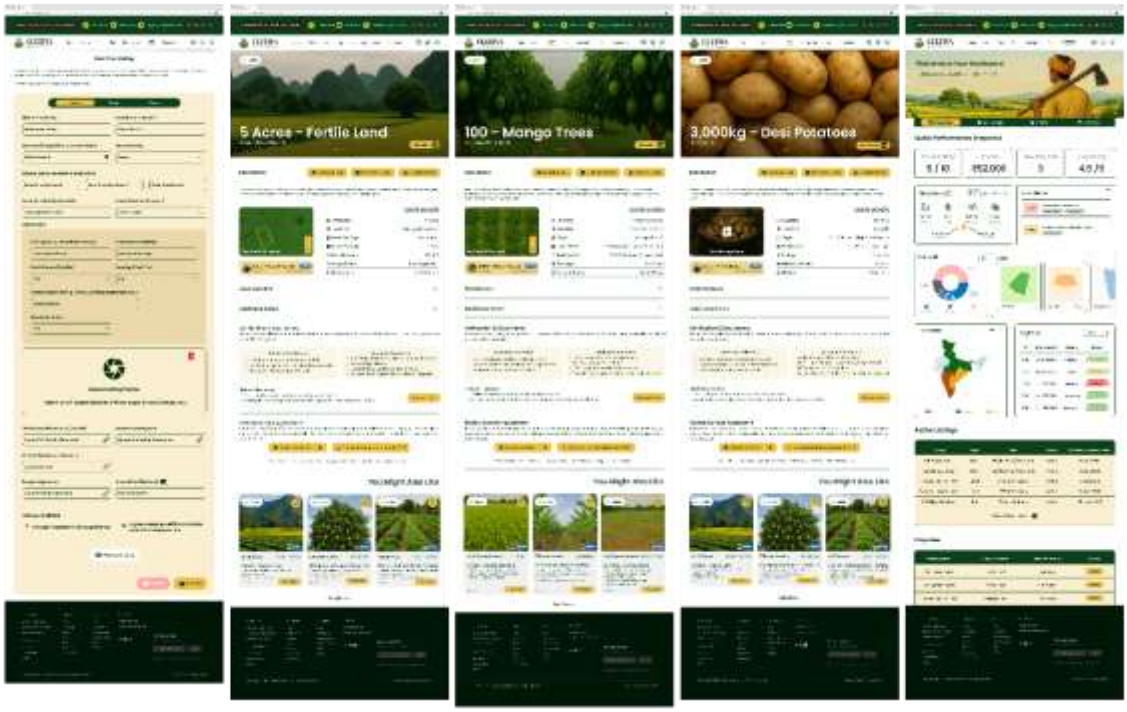

Figure 11. Cultiva High-Fidelity Screens: Dashboard and Investment Interfaces

7. Discussion and Conclusion

This study aimed to design an integrated digital platform that could solve the issues related to agricultural leasing, crop trading and agri-investment. The results of the research pointed that trust, transparency, access and central service delivery are important in agricultural ecosystems. The result is the prototype 'Cultiva', which shows the possibilities of linking several agricultural services in a single digital environment. The platform's leasing, trading and investment capabilities help to eliminate fragmentation and make the platform easier to use for a variety of stakeholders. Finally, the study presents the importance of user-focused design approaches in agricultural technology development. The information architecture, interaction flows and user interface of the platform were shaped by insights gained from stakeholders, with solutions tailored to user expectations and operational needs. The study has its limitations, however. The number of participants in the research were relatively small and the proposed solution was tested as a prototype. Real world usability and adoption behaviour, and operational effectiveness are not yet explored, however. Future work includes the development of a usable implementation of the platform and large-scale usability evaluations. Further improvements, including AI-powered recommendations, predictive agricultural analytics, and multilingual voice systems, coupled with blockchain verification, could further bolster platform capabilities. Overall, the study shows the transformative power of digital ecosystems to optimize agricultural transactions, boost transparency, increase access to information, and foster collaboration among stakeholders. Cultiva is a design-led solution to tackle current inefficiencies and to enable agricultural sector digitalization.

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