

PROJECT PROPOSAL

DIVERSE GROW

Smart Agricultural Cooperative Platform

Submitted to

YouthTeamUp Consortium

4th Deep Virtual Exchange (DVE) Cycle

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Aligned with SDG 8 & SDG 9

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ABSTRACT

DIVERSE GROW is a comprehensive digital cooperative platform designed to empower smallholder farmers in Zambia and Tanzania through integrated technology solutions. This project addresses critical challenges faced by agricultural cooperatives, including limited access to digital farm management tools, inefficient cooperative operations, poor market linkages, and knowledge gaps in sustainable farming practices. The proposed platform combines four core modules: a Farm Management System for tracking production and analytics, a Cooperative Management interface for member coordination and governance, a Digital Marketplace connecting farmers directly with buyers, and an Educational Resource Center providing best practices and training materials. Through a 12-week implementation phase supported by YouthTeamUp's 4th Deep Virtual Exchange (DVE) cycle, our team will develop and deploy a Minimum Viable Product (MVP) targeting 20-50 pilot users across 2-3 cooperatives. The project employs a lean budget, leveraging free-tier cloud services and open-source technologies. Expected outcomes include a 15-25% increase in farm productivity, 10-20% increase in farmer income, and significant improvements in cooperative operational efficiency. This initiative directly contributes to SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation and Infrastructure), with potential for regional scalability across East and Southern Africa.

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1. INTRODUCTION

1.1 Project Overview

DIVERSE GROW represents an innovative approach to agricultural development in Sub-Saharan Africa by leveraging digital technology to address systemic challenges faced by smallholder farmers. In Zambia and Tanzania, where agriculture employs over 60% of the population and contributes significantly to GDP, smallholder farmers remain trapped in cycles of low productivity and poverty due to limited access to modern tools, market information, and best practices. This project proposes the development of an integrated digital cooperative platform that will fundamentally transform how farmers manage their operations, access markets, and engage with their cooperatives.

The platform addresses four critical pain points simultaneously: the absence of digital farm management systems leaves farmers unable to track production patterns or make data-driven decisions; manual cooperative operations create inefficiencies and reduce transparency; exploitative middlemen reduce farmer income by 30-50%; and limited access to agricultural extension services prevents the adoption of sustainable practices. By creating an all-in-one solution that tackles these interconnected challenges, DIVERSE GROW will enable farmers to increase productivity, improve incomes, and build stronger, more efficient cooperatives.

1.2 Project Objectives

The primary objective of this project is to develop and deploy a Minimum Viable Product (MVP) of the DIVERSE GROW platform within a 12-week implementation phase, onboarding 20-50 pilot users from 2-3 agricultural cooperatives in Zambia and Tanzania. Specific objectives include:

- Design and develop a user-friendly web platform with mobile-responsive capabilities, featuring registration, farm profiles, cooperative management tools, marketplace functionality, and educational resources
- Create and curate 10-15 high-quality educational articles covering sustainable farming practices, pest management, soil health, and cooperative governance
- Establish partnerships with 2-3 pilot cooperatives and provide comprehensive training and onboarding support to ensure effective adoption

- Collect and analyze user feedback to validate platform usability, identify improvement areas, and inform future development iterations
- Demonstrate measurable impact through key performance indicators including user satisfaction (>70%), platform uptime (>95%), and documented improvements in farmer decision-making processes

1.3 Relevance to YouthTeamUp and SDGs

This project aligns strongly with YouthTeamUp's mission of fostering youth-led innovation and cross-cultural collaboration to address sustainable development challenges. The DIVERSE GROW team brings together expertise from two East African nations, with Ashley Ntiamo providing deep agricultural knowledge from Zambia's cooperative sector and Fatma Abdallah contributing technical skills from Tanzania's growing technology ecosystem. This partnership exemplifies the collaborative spirit of the Deep Virtual Exchange program.

The project directly contributes to two Sustainable Development Goals. Under SDG 8 (Decent Work and Economic Growth), DIVERSE GROW will increase farmer income through improved market access and productivity, while creating opportunities for youth engagement in agriculture through technology. Under SDG 9 (Industry, Innovation and Infrastructure), the platform provides digital infrastructure to underserved rural communities and demonstrates how innovative technology solutions can bridge development gaps. By empowering smallholder farmers with digital tools, this initiative promotes inclusive and sustainable economic growth while fostering innovation in agriculture.

2. BACKGROUND AND LITERATURE REVIEW

2.1 Current State of Smallholder Farming in East Africa

Smallholder farmers in Zambia and Tanzania face multidimensional challenges that limit agricultural productivity and income generation. In Zambia, approximately 1.2 million smallholder farmers cultivate 2-10 hectare farms, contributing 80% of national food production but earning minimal income due to inefficient farming practices and exploitative market structures. Similarly, Tanzania's 8 million smallholder farmers struggle with low yields, limited access to inputs, and weak market linkages. Research by the Food and Agriculture Organization (FAO) indicates that smallholder farmers in Sub-Saharan Africa produce 80% of the food supply but remain disproportionately affected by poverty, with productivity levels significantly below global averages.

Agricultural cooperatives have historically served as vehicles for collective action and resource pooling among smallholder farmers. However, many cooperatives in East Africa operate with outdated manual systems that hinder efficiency and transparency. Poor record-keeping, limited communication channels, and weak governance structures undermine trust and member participation. The International Fund for Agricultural Development (IFAD) reports that strengthening cooperative management systems and providing digital tools can significantly improve farmer outcomes, yet fewer than 10% of cooperatives in Zambia and Tanzania have adopted digital solutions.

2.2 Digital Agriculture and Technology Adoption

The global digital agriculture revolution has demonstrated significant potential for transforming smallholder farming systems. Precision agriculture technologies, farm management software, and mobile-based information systems have enabled farmers in developed countries to optimize inputs, reduce costs, and increase yields. However, the adoption of such technologies in Sub-Saharan Africa remains limited due to factors including high costs, inadequate digital infrastructure, low digital literacy, and lack of context-appropriate solutions.

Recent initiatives have shown promising results. Platforms like WeFarm (peer-to-peer knowledge sharing), Twiga Foods (market linkages), and M-Farm (price information) have demonstrated that

mobile and web-based solutions can effectively serve smallholder farmers when designed with their specific needs and constraints in mind. A 2023 World Bank report on digital agriculture in Africa highlights that mobile phone penetration exceeding 70% in most countries creates opportunities for digital service delivery, provided that solutions are affordable, user-friendly, and relevant to farmers' daily challenges.

2.3 Gap Analysis and Project Justification

While various digital agriculture solutions exist, few platforms offer integrated approaches that address farm management, cooperative operations, market access, and knowledge sharing simultaneously. Most existing solutions focus on single pain points—price information, input supply, or extension services, but fail to provide holistic support for farmer livelihoods and cooperative strengthening. Additionally, many platforms are designed for individual farmers rather than cooperative structures, missing opportunities for collective action and economies of scale.

DIVERSE GROW addresses this gap by creating an integrated platform specifically designed for agricultural cooperatives. By combining farm management tools, cooperative governance features, marketplace functionality, and educational resources in a single, user-friendly interface, the platform provides comprehensive support that reflects the interconnected nature of smallholder farming challenges. This approach builds on lessons learned from successful agri-tech initiatives while innovating in areas where gaps remain, particularly in cooperative management and member engagement.

3. METHODOLOGY AND IMPLEMENTATION PLAN

3.1 Overall Approach

The DIVERSE GROW project will follow an agile development methodology implemented over 12 weeks (March 17 - June 6, 2026), divided into five distinct phases: Planning and Design, Development, Testing and Quality Assurance, Deployment, and Pilot Launch with Iteration. This approach allows for rapid prototyping, continuous user feedback integration, and flexible adaptation to emerging challenges. Weekly sprints with clear deliverables will ensure consistent progress, while regular check-ins with YouthTeamUp mentors and pilot cooperatives will validate assumptions and guide development decisions.

3.2 Phase 1: Planning and Design (Weeks 1-2)

The project commences with the YouthTeamUp kick-off meeting on March 17, 2026, where the team will present the project concept and establish connections with mentors from Copperbelt University, University of Dar es Salaam, and business advisors from DTBi and BongoHive. Following the kick-off, the team will conduct comprehensive user research through interviews with 5-10 smallholder farmers and 2-3 cooperative leaders to validate requirements and identify priority features. This qualitative research will inform the development of detailed user personas and use cases.

3.2.1 Platform Selection: Web Application vs Mobile Application

After careful analysis of user context, budget constraints, and project timeline, the team has determined that a mobile-first responsive web application represents the optimal platform choice for DIVERSE GROW's initial implementation phase.

Rationale for Web Application:

User Context and Accessibility: In rural Zambia and Tanzania, smartphone penetration ranges from 40-50%, with feature phones still widely used. Many farmers access the internet through shared devices, internet cafés, or borrowed smartphones. A web application ensures universal accessibility across all device types, smartphones, feature phones with basic browsers, tablets, and

desktop computers without requiring app store accounts, device storage space, or installation procedures that create barriers to adoption.

Budget and Timeline Efficiency: The budget and 12-week implementation timeline make native mobile application development impractical. Native apps require separate development for Android and iOS (doubling development effort), incur app store fees (\$25 Google Play + \$99/year Apple Developer), demand extensive cross-device testing, and necessitate longer development cycles. A single web codebase deployed once serves all platforms, maximizing resource efficiency.

Development and Maintenance Advantages: Web applications enable rapid iteration and bug fixing through immediate server-side updates without requiring users to download and install updates. This is particularly valuable during the pilot phase when user feedback will drive frequent improvements. Fatma's existing web development expertise in React.js and Node.js directly transfers to this approach, eliminating the learning curve associated with native mobile development frameworks.

Distribution and Adoption: Web applications eliminate installation friction farmers can access DIVERSE GROW immediately by visiting the URL or scanning a QR code, without navigating app stores, managing permissions, or consuming device storage. This "zero-friction" access model is critical for pilot phase adoption, where ease of trial use determines initial engagement rates.

Mobile-First Responsive Design Approach: The web application will be designed using mobile-first principles, meaning the user interface is optimized for small smartphone screens first, then progressively enhanced for larger devices. This ensures excellent mobile user experience while maintaining compatibility with desktop usage at cooperative offices. Technical implementation will utilize Tailwind CSS responsive utilities, touch-friendly interface elements (minimum 44px touch targets), optimized images for low-bandwidth environments, and simplified navigation suitable for one-handed smartphone use.

Progressive Web App (PWA) Enhancement: Following successful deployment and pilot validation, the platform will be enhanced with Progressive Web App capabilities in Phase 2. PWA

features will enable users to "install" the web application to their smartphone home screens (creating an app-like experience), utilize service workers for offline functionality allowing farmers to access cached data without internet connectivity, and implement push notifications for important updates. This upgrade path provides native app benefits without the development overhead of building separate mobile applications.

Future Native App Development: Should user demand and available resources warrant it, native mobile applications for Android and iOS can be developed in Year 2 using React Native, which enables cross-platform development from a single codebase. This phased approach allows validation of core functionality and user adoption before committing resources to native app development.

3.3 Phase 2: Development (Weeks 3-7)

Development will progress through iterative weekly sprints, each focused on delivering functional features optimized for mobile-responsive web access. Week 3 will establish core infrastructure: user registration and authentication systems with mobile-friendly form inputs, a landing page optimized for smartphone viewing with compressed images and minimal load times, and basic database schema. The frontend will implement responsive breakpoints ensuring proper display on devices from 320px (small smartphones) to 1920px (desktop monitors), with particular attention to touch interactions, scrollable content areas, and readable typography on small screens.

3.4 Phase 3: Testing and Quality Assurance (Weeks 8-9)

Week 8 will be dedicated to internal testing, with both team members systematically verifying all features using a comprehensive testing checklist. This includes functionality testing (ensuring all forms submit correctly, data persists accurately, and navigation works intuitively), usability testing (verifying mobile responsiveness, load times, and error handling), and security testing (checking password encryption, data validation, and access controls). Identified bugs will be documented in GitHub Issues, prioritized by severity, and resolved before proceeding to user testing.

Week 9 will involve User Acceptance Testing (UAT) with recruited participants representing the target user base. The team will facilitate structured testing sessions where farmers and cooperative

leaders complete realistic tasks while team members observe and collect feedback. Participants will be asked to register accounts, create farm profiles, post marketplace listings, access educational resources, and perform cooperative management tasks. Post-session interviews and feedback forms will capture detailed impressions, usability issues, and feature requests. This feedback will be analyzed to identify critical improvements that must be addressed before deployment and nice-to-have enhancements that can be deferred to post-launch iterations.

3.5 Phase 4: Deployment (Week 10)

The project will utilize Hostinger Premium Web Hosting (\$36/year), which provides an integrated solution including domain registration, web hosting with unlimited bandwidth, MySQL database, SSL certificate, and professional email accounts. This all-in-one approach simplifies deployment, reduces technical complexity, and ensures reliable service with African data centers optimized for East African user access. Hostinger's cPanel interface enables straightforward deployment and management without requiring advanced DevOps knowledge, while supporting both the React.js frontend and Node.js backend on a single platform.

But as an alternative deployment will utilize a cost-effective cloud infrastructure strategy leveraging free-tier services. The frontend will be deployed on Vercel, which offers free hosting for static sites and serverless functions with automatic HTTPS, global CDN distribution, and seamless GitHub integration enabling continuous deployment. The backend API will be hosted on Railway's free tier, providing \$5 monthly credit sufficient for the pilot phase. MongoDB Atlas free tier will serve as the production database, offering 512MB storage and automatic backups.

A custom domain will be registered through Namecheap (approximately \$10-15 annually), providing a professional web address (e.g., diversegrow.com). DNS configuration will point the domain to Vercel's servers, with SSL certificates automatically provisioned for secure HTTPS connections. Prior to deployment, the team will conduct final security checks, implement monitoring tools (Google Analytics for usage tracking, Sentry for error monitoring), and prepare backup and disaster recovery procedures. Post-deployment, the team will conduct smoke testing to verify all production features function correctly and monitor system performance for the first 48 hours to catch any deployment-specific issues.

3.6 Phase 5: Pilot Launch and Iteration (Weeks 11-12)

The pilot phase will begin with onboarding sessions for 2-3 partner cooperatives. Ashley will lead in-person or virtual training workshops, guiding cooperative leaders and members through platform features, demonstrating key workflows, and providing printed quick-reference guides. A dedicated WhatsApp support group will facilitate ongoing communication, allowing users to ask questions, report issues, and share experiences. The team will actively monitor platform usage through analytics, tracking metrics including daily active users, feature utilization rates, marketplace listings created, educational resources viewed, and user session duration.

Throughout weeks 11-12, the team will collect structured feedback through follow-up surveys, phone interviews with key users, and analysis of user behavior patterns. This feedback will inform rapid iterations, with Fatma implementing high-priority improvements and bug fixes on a rolling basis. The team will document success stories, challenges encountered, and lessons learned, preparing comprehensive project documentation and presentation materials for the final YouthTeamUp presentation in June. This documentation will serve both as a project completion requirement and as a foundation for future development phases.

4. PROJECT TIMELINE

The following table presents a detailed breakdown of project activities, responsibilities, and deliverables across the 12-week implementation period. Key milestones include the March 17 kick-off meeting, completion of MVP development by Week 7, deployment in Week 10, and final presentation in mid-June.

Week	Phase & Activities	Lead	Deliverables
1-2	Planning & Design: Kick-off meeting, user research, requirements gathering, wireframing, technical architecture design	Both	Requirements doc, wireframes
3	Development: Core infrastructure, user authentication, landing page	Fatma	Working prototype
4-5	Development: Cooperative management module with member directory, announcements, document sharing	Fatma	Cooperative features
6	Development: Farm management system with production tracking and analytics dashboard	Both	Farm features
7	Development: Digital marketplace, educational resources library (10-15 articles)	Both	Complete MVP
8	Testing: Internal testing, bug fixing, performance optimization	Both	Bug reports
9	Testing: User acceptance testing with farmers and cooperatives, feedback collection	Ashley	UAT report
10	Deployment: Domain setup, production deployment, monitoring configuration	Fatma	Live platform
11-12	Pilot & Iteration: Cooperative onboarding, pilot phase analysis	Both	Final report, lessons learned document

	user training, feedback collection, platform improvements, final documentation		presentation
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5. TEAM COMPOSITION AND ROLES

5.1 Team Members

Ashley Ntaimo – Agricultural Lead

Ashley brings extensive knowledge of Zambian agricultural systems and cooperative structures, having worked closely with smallholder farming communities. Her responsibilities encompass content development, user research, testing coordination, and stakeholder engagement. Ashley will conduct farmer interviews to gather requirements, create and curate educational content on sustainable farming practices, organize and facilitate user acceptance testing sessions, and serve as the primary liaison with pilot cooperatives. Her deep understanding of farmer challenges and communication styles will ensure the platform addresses real needs with culturally appropriate solutions.

Fatma Abdallah – IT Lead

Fatma is a third-year Computer Science student at the University of Dar es Salaam with strong skills in web development, database management, and software engineering. She will lead all technical aspects of the project, including system architecture design, frontend and backend development, database configuration, quality assurance, and deployment. Fatma will make critical technology stack decisions, write and test code, implement security measures, configure hosting infrastructure, and maintain technical documentation. Her technical expertise will ensure the platform is built using industry best practices and modern development methodologies.

5.2 Collaboration and Support Structure

The team will benefit from YouthTeamUp's comprehensive support ecosystem. Technical mentorship will be provided by faculty from Copperbelt University (Zambia) and University of Dar es Salaam (Tanzania), offering guidance on software development challenges and agricultural technology integration. Business mentorship from DTBi and BongoHive will support project management, user engagement strategies, and sustainability planning. The team will also collaborate with students from Constructor University Bremen (Germany) through virtual exchanges, facilitating knowledge sharing and cross-cultural learning.

Regular communication will be maintained through weekly Tuesday and Thursday training sessions (2pm EAT) via the WaziUp platform, daily WhatsApp coordination between team members, biweekly mentor check-ins, and monthly progress reports to the YouthTeamUp consortium. This multi-layered support structure ensures the team has access to expertise across technical, agricultural, and business domains while fostering accountability and consistent progress.

6. BUDGET AND RESOURCE REQUIREMENTS

The DIVERSE GROW project adopts a lean startup approach, minimizing costs while maximizing impact through strategic use of free-tier cloud services, open-source technologies, and student discounts.

Item	Cost (USD)	Justification
Domain Registration (1 year)	\$8-15	Professional web address
Web Hosting & Database (Free Tiers: Vercel, Railway, MongoDB Atlas) or Hostinger(Recommended)	\$0-38	Sufficient for pilot phase
Internet & Mobile Data	\$50-80	Development & testing
Optional Design Tools & Plugins	\$0-20	UI enhancement if needed
Transport & Field Visits	\$20-30	Cooperative visits, training
Training Materials (Printing, Handouts)	\$20	User guides, quick reference
Miscellaneous & Contingency	\$30-40	Unexpected expenses
TOTAL ESTIMATED COST	\$200-250	

All development tools, collaboration platforms, and learning resources will be obtained at no cost. These include Git and GitHub for version control, Visual Studio Code as the primary code editor, Figma for design and wireframing, Postman for API testing, Google Analytics for usage

monitoring, and access to extensive online documentation and tutorial resources. The team's existing laptops will serve as development machines, eliminating hardware costs.

7. EXPECTED OUTCOMES AND IMPACT

7.1 Immediate Outcomes (End of Implementation Phase)

By June 2026, the project will deliver a fully functional DIVERSE GROW platform accessible via custom domain with SSL encryption, serving 20-50 registered users from 2-3 agricultural cooperatives. The platform will feature complete user authentication, farm profile management, cooperative coordination tools, marketplace functionality with 50+ product listings, and a comprehensive library of 10-15 educational articles. Technical performance will meet industry standards with >95% uptime, <3 second page load times, and full mobile responsiveness.

User satisfaction metrics will demonstrate platform value, with >70% of pilot users reporting positive experiences and >50% actively utilizing core features. The team will have collected detailed feedback through surveys, interviews, and usage analytics, identifying specific strengths and areas for improvement. Comprehensive project documentation will be completed, including technical documentation, user manuals, and a final report synthesizing lessons learned and recommendations for future phases.

7.2 Short-Term Impact (6-12 Months Post-Launch)

Farmers using DIVERSE GROW will begin experiencing tangible improvements in their agricultural operations. The farm management system will enable better production planning and resource allocation, with early adopters reporting 15-25% increases in productivity through data-driven decision-making. Direct market access via the marketplace will reduce dependence on exploitative middlemen, increasing farmer income by 10-20%. Educational resources will support adoption of sustainable farming practices, improving soil health and reducing input costs by 30-40%.

Cooperatives will benefit from streamlined operations, with administrative time reduced by 50-70% through digital record-keeping and communication tools. Enhanced transparency will strengthen member trust and participation, while improved coordination will enable cooperatives to negotiate better prices for inputs and outputs. Youth engagement in agriculture will increase as technology makes farming more appealing and provides clear pathways for innovation and entrepreneurship.

7.3 Long-Term Vision (2-5 Years)

DIVERSE GROW aims to scale across East and Southern Africa, serving 50,000-100,000 smallholder farmers and 1,000+ cooperatives. Enhanced features will include mobile applications, SMS integration for feature phone users, IoT sensors for farm monitoring, AI-powered recommendations, weather forecasting integration, and financial services (microloans, crop insurance). The platform will establish partnerships with governments, NGOs, agribusinesses, and development organizations, creating a sustainable ecosystem that supports smallholder farmer prosperity.

The project will contribute meaningfully to poverty reduction, food security, and sustainable development in Sub-Saharan Africa. By empowering farmers with tools, knowledge, and market access, DIVERSE GROW will help break cycles of poverty and create opportunities for inclusive economic growth. The open-source nature of the platform (where appropriate) will enable adaptation and replication in other contexts, multiplying impact beyond the initial implementation.

8. CONCLUSION

DIVERSE GROW represents a timely and impactful response to critical challenges facing smallholder farmers in Zambia and Tanzania. By integrating farm management, cooperative coordination, market access, and education into a single digital platform, the project addresses interconnected barriers to agricultural productivity and farmer prosperity. The lean budget, agile methodology, and strong support from YouthTeamUp mentors position the project for successful implementation within the 12-week timeframe.

The complementary skills of the team, Ashley's agricultural expertise and community connections combined with Fatma's technical proficiency, create a strong foundation for delivering a user-centered, technically robust solution. The project's alignment with SDG 8 and SDG 9, emphasis on youth-led innovation, and potential for regional scaling make it a valuable contribution to YouthTeamUp's mission of fostering sustainable development through cross-cultural collaboration.

We are committed to delivering an MVP that demonstrates tangible value to farmers and cooperatives while laying groundwork for long-term impact. Through iterative development, continuous user engagement, and data-driven improvements, DIVERSE GROW will empower smallholder farmers to build more productive, profitable, and sustainable livelihoods. We look forward to presenting our progress at the kick-off meeting on March 17 and to collaborating with the YouthTeamUp community throughout this transformative journey.

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