YOUTH IN JUST FOOD SYSTEMS TRANSITIONS:

SOUTH AFRICA

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KNOWLEDGE PLATFORM ON INCLUSIVE DEVELOPMENT POLICIES

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EXECUTIVE SUMMARY

South Africa's food system is lauded as the most successful on the African continent, as least in terms of achievement of food security. As such, it is widely positioned as a veritable conduit for green job creation. Ironically, this study shows that the on-going transition is not translating into accessible employment opportunities for youth. On the basis of evidence drawn from mixed methods analyses of data and information generated for the Eastern Cape and Gauteng Provinces, comprising surveys (N=612), key informant interviews (N=24), and participatory focus group (N=12) discussions, this study examines how skills, digital access, institutional dynamics, and gender relations shape youth inclusion in the food systems transition. The key empirical findings can be outlined under three central themes that challenge dominant policy assumptions and have far-reaching practical implications:

First, skills matter, but are not sufficient**.** Skills readiness is positively associated with perceived opportunity ($\beta = 1.18$, $p = 0.002$), but its effect remains limited. Youth consistently report that training programmes are not linked to finance, inputs, or market access, preventing skills from translating into employment. This finding aligns with broader evidence from South Africa, where despite one of the highest levels of public investment in education on the continent, youth unemployment, including among graduates, remains persistently high, underscoring a systemic mismatch between skills formation and labour-market absorption.

Second, digital access increases awareness but reduces perceived opportunity. Digital agriculture access has a strong negative association with perceived opportunity ($\beta = -2.57$, $p < 0.001$), despite improving skills. Qualitative evidence shows that digital platforms expose youth to opportunities they cannot access due to capital requirements, certification barriers, and restricted networks, creating an "awareness without access" effect.

Third, gender equity is the decisive factor. Gender equity perceptions are the strongest predictor of perceived opportunity ($\beta = 3.44$, $p < 0.001$). Women face systemic barriers across all value chain segments, including land access, finance, and participation in higher-value activities, indicating that inclusion is fundamentally shaped by power and social norms rather than capability alone. This finding reflects persistent gender inequalities in South Africa's labour market, where young women face systematically lower employment rates and higher structural barriers to asset ownership, mobility, and participation in economic decision-making.

Political Economy Dynamics

A political economy perspective reveals that access to green opportunities in South Africa's food systems transition is shaped less by capabilities than by power, institutions, and structural inequality. The following key lessons can be drawn:

- Power is concentrated within food system value chains, where agribusiness actors and established firms largely determine market access, standards, and financing conditions. These rules favour insiders and limit entry for youth and small-scale producers.

- A fragmented institutional landscape undermines effective inclusion. Weak coordination across government, Technical and Vocational Education and Training (TVET) systems, and youth programmes creates disjointed pathways in which training, finance, and market access operate in silos rather than as integrated systems.
- A skills-market disconnection persists: training systems are poorly aligned with value-chain demand, so skills acquisition does not translate into employment.

- Digitalization produces a “visibility without access” dynamic, where increased connectivity expands awareness of opportunities but leaves underlying barriers such as capital requirements, certification standards, and institutional gatekeeping intact.
- Gendered power relations act as a structural filter, limiting women’s access to land, finance, and decision-making, and thereby constraining their ability to benefit from the transition.
- These constraints are reinforced by spatial inequality, with Gauteng offering more opportunities but higher entry barriers, while provinces such as the Eastern Cape face infrastructure and market deficits.

Taken together, the central challenge is not the absence of opportunities, but the rules and structures that govern access to them. Without addressing these constraints, the transition risks reproducing inequality rather than enabling inclusive green employment for youth.

Policy Implications

The following recommendations translate the research findings into actionable interventions, specifying responsible actors and feasible entry points for implementation.

1. Re-align skills systems with value-chain demand

Key actors including TVET colleges, Sector Education and Training Authority (SETAs), Department of Agriculture, Land Reform and Rural Development (DALRRD), and private agribusinesses should re-orient skills systems toward value-chain demand by embedding structured work-based learning and apprenticeships in agro-processing, logistics, and climate-smart production. This can be operationalised by expanding existing TVET and industry partnerships under the National Skills Development Plan to ensure that training pathways are directly linked to employment opportunities.

2. Target structural barriers to youth enterprise entry

The National Youth Development Agency (NYDA), Land Bank, and provincial development agencies should address structural barriers to youth enterprise entry by providing bundled support that combines finance, inputs, and secured market access for youth-led agribusinesses. A practical entry point is to integrate youth-targeted financing and support windows into existing programmes such as the Comprehensive Agricultural Support Programme (CASP).

3. Move from digital access to market integration

DALRRD, extension services, and digital platform providers should shift from expanding digital access to enabling market integration by linking digital tools to certified value chains, offtake agreements, and advisory systems. This can be achieved by embedding digital platforms within existing extension and market access programmes, ensuring that connectivity translates into participation in formal markets.

4. Implement gender-transformative interventions

DALRRD, the Department of Women, and civil society organisations should implement gender-transformative interventions that prioritise women’s access to land, finance, and leadership roles within food system value chains. This can be advanced through

gender-responsive budgeting and targeting within existing agricultural and youth programmes to ensure equitable participation and outcomes.

5. Strengthen coordination and youth participation in governance

The Presidential Climate Commission (PCC), together with national and provincial governments, should strengthen coordination and institutionalise youth participation in governance by establishing formal youth advisory structures within the food system and just transition platforms. This can be implemented by integrating youth representation into PCC processes and provincial coordination mechanisms, moving from consultation to sustained influence.

Conclusion

This study demonstrates that youth exclusion from green employment in South Africa's food systems is not primarily a skills deficit, but a function of how access to opportunities is structured and governed. Opportunities are mediated by unequal access to assets, institutional gatekeeping, and gendered power relations that determine whether capabilities translate into livelihoods. Without deliberate intervention to address these constraints, the transition risks reproducing existing inequalities. However, with coordinated and targeted reforms that align skills, markets, and governance, food systems can become a viable pathway for inclusive green employment.

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List of Abbreviations and Acronyms

AfCFTA – African Continental Free Trade Area
CSA – Climate-Smart Agriculture
DAAI – Digital Agriculture Access Index
DFFE – Department of Forestry, Fisheries and the Environment
EC – Eastern Cape
FAO – Food and Agriculture Organization of the United Nations
FSJI – Food System Justice Index
FST – Food Systems Transition
GEPI – Gender Equity Perception Index
GHG – Greenhouse Gas
ILO – International Labour Organization
IPCC – Intergovernmental Panel on Climate Change
KII – Key Informant Interview
NEET – Not in Employment, Education or Training
NDP – National Development Plan
NGO – Non-Governmental Organisation
OECD – Organisation for Economic Co-operation and Development
PCC – Presidential Climate Commission
SEM – Structural Equation Modelling
SRI – Skills Readiness Index
Stats SA – Statistics South Africa
TVET – Technical and Vocational Education and Training
UN – United Nations
UNEP – United Nations Environment Programme

1. INTRODUCTION

1.1 Youth Employment, Food Systems, and the Just Transition in South Africa

Climate change mitigation and food security are among the most pressing development challenges confronting South Africa, with particularly acute implications for the country's food system. Highly dependent on climate-sensitive natural resources, food systems are simultaneously vulnerable to climate shocks and central to adaptation and mitigation strategies. Rising temperatures, recurrent droughts and floods and shifting rainfall patterns increasingly threaten agricultural production, food distribution, and livelihood stability (IPCC, 2022; Department of Forestry, Fisheries and the Environment, 2021). Ensuring food and nutrition security while advancing environmental sustainability has therefore become a critical policy priority.

Within this context, the concept of a just transition has gained prominence. A just transition emphasises that climate-responsive transformations must be socially equitable and should not exacerbate existing inequalities (Newell & Mulvaney, 2013; Schlosberg, 2007). The International Labour Organization (ILO) and other international bodies caution that without explicit attention to distributional impacts, climate and sustainability policies risk further marginalising groups with limited adaptive capacity, particularly smallholder farmers, youth, and women (ILO, 2015; ILO, 2023). Food systems are therefore not only a technical site of climate intervention but also a political and social arena in which questions of justice, inclusion, and opportunity are negotiated.

South Africa's deeply unequal socio-economic structure heightens the urgency of embedding justice principles within food-system transformation. The legacy of racial exclusion continues to shape access to land, skills, employment, and productive assets across the agri-food economy (Aliber & Hall, 2012; Hall & Kepe, 2017). These structural constraints are most visible among young people. Youth unemployment stood at 46.1% among those aged 15–34 in the first quarter of 2025, while 37.1% of individuals aged 15–24 were classified as Not in Employment, Education or Training (NEET). When extended to the 15–34 age group, NEET rates exceed 40%, with young women consistently more affected than young men (Stats SA, 2025). These figures underscore the scale of labour-market exclusion confronting South African youth.

Beyond unemployment, job quality and formality pose additional challenges. In the first quarter of 2025, South Africa's total employment stood at approximately 16.8 million, of which only 68% were in the formal sector (Table 1.1). Nearly 20% of employed persons worked in the informal (non-agricultural) sector, while a further 5.5% were engaged in agriculture and 6.4% in private households—categories typically characterised by low wages, weak labour protection, and income insecurity (Stats SA, 2025). These vulnerabilities are particularly salient in food-system livelihoods, which absorb labour across informal farming, food trading, processing, and services, especially in rural and peri-urban areas. Job quality constraints are further reflected in time-related underemployment, affecting roughly 781,000 employed persons (4.7% of total employment) who were willing and available to work additional hours, signalling widespread working poverty even among the employed (Stats SA, 2025).

Table 1.1: Employment structure in food-system livelihoods (South Africa, Q1 2025)

Geography (Q1 2025)	Total employed	Formal sector	Informal sector (non-agric)	Agriculture	Private households
South Africa	16,787,000	11,434,000 (68.1%)	3,345,000 (19.9%)	930,000 (5.5%)	1,078,000 (6.4%)
Eastern Cape	1,144,000	768,000 (67.1%)	271,000 (23.7%)	78,000 (6.8%)	27,000 (2.4%)
Gauteng	3,084,000	2,166,000 (70.2%)	829,000 (26.9%)	17,000 (0.6%)	72,000 (2.3%)

Source: Stats SA, 2025

The consequences of youth unemployment and precarious employment are severe, including lost productivity, heightened social and political instability, intergenerational poverty, and persistent gendered vulnerability (National Planning Commission, 2012; World Bank, 2022). These outcomes are closely linked to long-standing deficits in education and skills development, rooted in apartheid-era policies such as the Bantu Education Act of 1953, whose effects continue to constrain labour-market participation (Spaull, 2013). In this context, agriculture and the broader food system, particularly in rural and peri-urban areas, remain critical livelihood domains for economically excluded youth, even as opportunities within these systems are often informal, insecure, and poorly remunerated (Aliber & Hart, 2019).

Food systems occupy a central position at the intersection of climate change, employment, and development. Encompassing agricultural production, processing, storage, transport, retail, consumption, and waste management, they are both significant contributors to greenhouse gas emissions and major sources of employment (FAO, 2023). In South Africa, the agri-food sector continues to absorb labour across a wide range of skill levels and plays a crucial role in rural livelihoods and national food security (Department of Agriculture, Land Reform and Rural Development [DALRRD], 2021). Climate-induced disruptions to food systems not only threaten food availability and affordability but also undermine income stability for households dependent on food-system activities (Presidential Climate Commission [PCC], 2022).

The transition toward sustainable and climate-resilient food systems is therefore increasingly framed as an opportunity to address youth unemployment through the creation of green jobs. In food systems, green jobs are commonly understood as employment opportunities that support environmentally sustainable production and distribution while promoting social equity and decent work (ILO, 2018; UNEP, 2019). Potential areas include climate-smart agriculture, agro-processing, renewable energy use in farming, sustainable logistics, digital agriculture services, waste reduction, and ecosystem restoration linked to food production (FAO, 2021). These opportunities are often seen as particularly relevant for young people, who may be more adaptable to technological change and innovation.

However, evidence suggests that green employment does not automatically translate into inclusive outcomes. Access to green jobs is shaped by structural constraints such as limited access to land and finance, weak alignment between skills development and labour-market

demand, informality, gender norms, and uneven integration into higher-value segments of food value chains (Agarwal, 2021; Newell, 2021). Moreover, there remains limited consensus on what constitutes a green job in practice or how access to such opportunities should be distributed within a just transition framework (OECD, 2022).

Taken together, these dynamics underscore the importance of examining how food-system transitions are governed, how labour-market structures shape inclusion, and who ultimately benefits. Understanding the drivers and barriers shaping youth participation in green employment within food systems is essential for designing transition pathways that link climate action, food security, and employment in equitable ways. This integrated framing provides the foundation for the problem statement that follows, which interrogates justice dimensions, institutional dynamics, and youth inclusion in South Africa's food-system transition.

1.2 Problem Statement: Inequalities, Youth Employment, and Food Insecurity

Post-apartheid South Africa has been shaped by a strong policy emphasis on transformation, redress, and social justice. Early reform efforts focused heavily on correcting historical inequities in access to land for agriculture, which had systematically marginalised the black population under apartheid (Obi, 2006; Hall & Kepe, 2017). However, land reform outcomes have been uneven, and in some cases have generated new socio-economic pressures that continue to threaten social cohesion and political stability. Rising inequality, persistent poverty, and unmet expectations of redistribution have contributed to recurrent public protests, some of which have escalated into violent confrontations between citizens and law enforcement, resulting in injuries, destruction of property, and fatalities (Bonga, 2021; Ragolane, 2024).

Well before climate change emerged as a dominant development challenge, the imperative to address historical injustice had already preoccupied South Africa's development discourse. Climate change has since intensified these pressures, particularly in sectors that are both socially sensitive and environmentally exposed, such as agriculture and food systems (IPCC, 2022; DFFE, 2021). In response, the Presidential Climate Commission (PCC, 2022) published *A Framework for a Just Transition in South Africa* outlining a national vision, guiding principles, and governance arrangements for an equitable transition to a low-carbon and climate-resilient economy (PCC, 2022). While this framework represents an important policy milestone, it engages food systems only tangentially, addressing agriculture in broad terms without systematically examining food-system dynamics, employment pathways, or equity outcomes.

This limited treatment of food systems reflects a broader pattern in climate and development policy. Existing frameworks, including climate-smart agriculture strategies and the National Development Plan (NDP) 2030, acknowledge the significance of climate risks, economic inequality, and sustainability transitions, yet offer insufficient analysis of how these forces interact within food systems as sites of livelihood, employment, and social reproduction (National Planning Commission, 2012; Clapp et al., 2018). As noted in the literature, proposed solutions are frequently technocratic, privileging productivity, efficiency, and innovation while

underplaying social relations, political economy, and differentiated impacts across gender, age, and class (Newell & Mulvaney, 2013; Schlosberg, 2007).

More critically, existing policy frameworks reveal several interrelated gaps that undermine the pursuit of a just food systems transition in South Africa. National strategies, including the PCC Just Transition Framework, the NDP 2030, and sectoral instruments such as the Agricultural and Agro-processing Master Plan, provide limited empirical evidence on the depth and lived experience of the food-system crisis, particularly in relation to employment quality, informality, and livelihood resilience (DALRRD, 2021; PCC, 2022). These frameworks also rely heavily on aggregate indicators, offering insufficient disaggregated data on key stakeholder groups, such as smallholder farmers, food-system workers, agribusiness actors, and youth, whose differentiated experiences ultimately shape transition outcomes (FAO, 2023).

Although youth and gender feature prominently in policy rhetoric, including in the National Youth Policy 2020–2030, intersectional roles of gender, age, and socio-economic status in structuring access to opportunities and exposure to risk within food systems remain weakly operationalised (NYDA, 2020; Agarwal, 2021). Young women face compounded constraints related to unpaid care work, limited access to productive assets and exclusion from decision-making spaces, yet these dynamics are insufficiently addressed in existing policy instruments (Doss et al., 2018; FAO, 2020). Furthermore, political dimensions of food systems transformation, including power relations, institutional coordination failures, and contestation over land, finance and market access, are largely absent from dominant policy analyses, which tend to privilege technical fixes over governance and justice considerations (Hall & Kepe, 2017; Satgar, 2019).

This study responds directly to these gaps by generating evidence on the drivers and barriers shaping a just transition in South Africa's food systems. It examines how food systems transformation can generate green jobs for youth under conditions of high unemployment, informality and skills mismatch. By foregrounding youth inclusion, gender equity, and distributional outcomes, the study advances an equity-oriented understanding of how food systems can simultaneously support climate resilience and address labour-market exclusion. In doing so, it contributes policy-relevant evidence to inform just transition strategies that translate climate ambition into decent work, inclusive livelihoods and socio-economic inclusion.

1.3 Objectives and research questions of the case study

This case study aims to examine the drivers and systemic barriers shaping a just transition of South Africa's food system, with a specific focus on youth employment and green jobs. Building on the conceptual framing of just food systems and the identified policy and evidence gaps, the study adopts a political economy perspective to analyse how institutional arrangements, governance processes, and power relations influence the distribution of opportunities and outcomes within food-system transformation. The study explores pathways through which food systems transformation can generate decent and inclusive green employment for young people, particularly in areas such as climate-smart agriculture, sustainable and circular value chains, agro-processing, digital agriculture, and other green innovations relevant to South Africa's

socio-economic and ecological contexts. In doing so, it situates youth employment within national development priorities and global sustainability commitments, including climate resilience, food and nutrition security, and inclusive economic growth.

1.3.1 Research question

What are the key drivers and systemic barriers shaping youth employment and green job creation within a just food systems transition in South Africa?

1. How can a just food systems transition contribute to the creation of green jobs for youth?
2. How do national and international institutional and regulatory frameworks shape opportunities for young people in food systems transformation?
3. To what extent are different dimensions of justice; social, economic, gender, and intergenerational, reflected in national efforts to transform South Africa's food system?
4. How can food systems transition strategies leverage digital technologies and innovation to expand economic opportunities and safeguard the livelihoods of young people?
5. How do gender dynamics and inequalities influence youth access to green employment opportunities within food systems?

2. METHODOLOGY

2.1 Overall Research Design and Mixed-Methods Approach

This study employed a mixed-methods research design to analyse the drivers and barriers shaping youth employment and green job creation within a just food systems transition in South Africa. Mixed-methods approaches are particularly suited to complex socio-economic systems such as food systems, which operate across multiple scales—households, value chains, institutions, and governance structures—and require both quantitative measurement and qualitative interpretation (Creswell & Plano Clark, 2018; FAO, 2023). Qualitative methods, including participatory stakeholder workshops, key informant interviews, and focus group discussions, were used to examine institutional dynamics, justice dimensions, and lived experiences of youth and other food-system actors. In parallel, structured household and youth surveys generated comparable quantitative data on skills readiness, digital agriculture access, gender equity perceptions, and perceived access to green employment opportunities, enabling systematic analysis of patterns and disparities (OECD, 2008).

2.2 Participatory Research and Analytical Strategy

A participatory research approach was embedded throughout the study, with youth engaged not only as respondents but as co-researchers involved in instrument validation, pre-testing, and reflection on emerging findings. Participatory engagement strengthens procedural and recognition justice within research processes and enhances the credibility and policy relevance of findings, particularly in studies concerned with inclusion and equity (Chambers, 2017; Cornwall, 2008). Quantitative analysis, including descriptive statistics, regression analysis, and structural equation modelling, was used to identify associations and causal pathways shaping youth inclusion in green food-system opportunities (Hair et al., 2019). Systematic triangulation with qualitative evidence ensured that statistical results were interpreted considering institutional contexts and social realities, thereby strengthening validity and supporting integrated analysis of justice, youth employment, and food systems transformation (Denzin, 2012).

An important component of this study was the broad stakeholder engagement which covered youth, households, food-system actors, government institutions, civil society organisations, and academic partners. Engagement methods included structured surveys, focus group discussions, key informant interviews, and participatory workshops.

To operationalise principles of procedural and recognition justice, the study embedded youth as co-researchers across key research stages rather than treating them solely as respondents. This approach aligns with emerging guidance on meaningful youth engagement in food-systems research, which emphasises intentional, inclusive, intersectional, and impactful participation throughout the research cycle (Kithinji, 2025).

Youth co-researchers were purposively selected from local youth organisations, universities, agrifood networks, and community initiatives in the study sites, with attention to gender balance,

geographic diversity, and socio-economic background. They contributed to: (i) refining research questions during design workshops; (ii) contextual validation of survey and qualitative instruments; (iii) piloting and pre-testing with structured feedback; and (iv) stakeholder workshops where emerging findings informed final analytical framing.

Co-researchers received short training on research ethics, basic methods, and facilitation, and were compensated through stipends and non-financial support in line with ethical engagement standards. This approach strengthened data quality, contextual relevance, and ethical practice by ensuring that youth perspectives informed both evidence generation and interpretation. While the model is resource-intensive and cannot fully eliminate power asymmetries, these were mitigated through clear role definition, feedback loops, and mentorship, and are acknowledged in interpreting the study's process and outcomes.

The methodological approach included diverse stakeholders, as detailed in Annexes 8 and 9 and summarised in Table 2.1. This ensured that perspectives were included across policy, practice, and community levels. Key informants were drawn from community leaders, youth groups, farmers, government departments, academic institutions, research networks, and independent experts, who provided critical insights into governance, climate risks, agricultural systems, and youth participation. Complementing this, focus group participants included agricultural advisers, smallholder farmers, NEET youth, women and rural youth farmers, cooperative groups, informal traders, extension officers, youth employment organisations, and local entrepreneurs, contributing lived experiences and localised knowledge.

The Quantitative analysis of household and youth survey data constructs four composite indices: 1). Skills Readiness, 2). Food System Justice, 3). Digital Agriculture Access, and 4). Gender Equity Perceptions and employs descriptive statistics, bivariate correlations, ordered logistic regression, robustness checks, and structural equation modelling to assess direct and indirect pathways to perceived green employment opportunities. Qualitative evidence from interviews, focus groups, stakeholder workshops, and document review is triangulated with quantitative findings to ensure that statistical results are interpreted within their institutional and lived contexts.

2.3 Case Selection: Rationale and Description

The selection of case study sites was guided by the objective of capturing the diverse socio-economic, spatial, and institutional contexts shaping youth employment and green job opportunities within South Africa's food system. Given the uneven geography of food-system transformation and the differentiated impacts of climate change, inequality, and labour-market exclusion, a multi-site approach was adopted to enable comparative analysis across contrasting settings while remaining coherent within a single national policy environment. To enhance contextual relevance and analytical validity, the study worked closely with provincial departments, youth development agencies, agripreneurs hubs, and community leadership structures, with data collection and facilitation approaches adapted to local institutional and socio-cultural conditions. Together, these case selections and institutional linkages enabled comparative analysis across urban and rural food economies, formal and informal employment

settings, and varying levels of institutional support, strengthening insights into how a just food systems transition can be operationalised to support inclusive youth employment in practice.

2.3.1 Rationale for Provincial Selection

The study focused on Eastern Cape and Gauteng provinces (Figure 2.1 below) due to their complementary roles within South Africa's food system and development landscape. Gauteng represents the country's economic and industrial hub, characterised by dense urban and peri-urban food systems, advanced value chains, and proximity to policy and market institutions. In contrast, the Eastern Cape is predominantly rural, with high levels of poverty, youth unemployment, and reliance on small-scale agriculture and informal food economies. Together, these provinces provide a robust analytical contrast for examining how structural conditions, governance arrangements, and market access shape pathways to a just food systems transition and influence youth participation in green employment.

2.3.2 Site Typology, Sampling Framework, and Analytical Contribution

Within each province, sites were purposely selected to represent urban, peri-urban, and rural settings, ensuring attention to inclusivity and intersectionality. Selection criteria included the presence of active food-system activities, relevance to emerging green or climate-responsive practices, concentration of youth seeking livelihoods in food systems, institutional presence, and feasibility of stakeholder engagement. A structured sampling framework ensured coverage of key stakeholder groups, including youth, smallholder farmers, agribusiness actors, policymakers, and civil society organisations, with particular emphasis on young women and rural youth. This case selection strategy enables nuanced analysis of drivers and barriers across formal and informal food economies and supports practical insights into how a just food systems transition can be operationalised in diverse contexts.

Table 2.1: Summary Table of Stakeholder Groups and Participation

Stakeholder Group	Description / Role in Study	Engagement Method	No. of Participants
Youth (18–35)	Central focus of the study; engaged as survey respondents, FGD participants, and co-researchers involved in tool validation, pre-testing, and feedback sessions	Surveys, FGDs, workshops	170
Households	Provided household-level evidence on livelihoods, food security, and climate exposure	Household surveys	120

Smallholder farmers & food workers	Shared production, labour, and climate-risk experiences within food systems	FGDs, KIIs	55
Agribusiness & value-chain actors	Provided insights on market access, skills demand, and barriers to youth entry	KIIs	25
Government & public institutions	Contributed policy, regulatory, and programme perspectives on agriculture, youth, and just transition	KIIs, workshops	20
Civil society & academia	Supported validation of findings, justice framing, and policy dialogue	Workshops, KIIs	25

Source: Green Jobs for Youth Field Study, 2025

Note: Totals reflect de-duplicated counts across methods and sites (Eastern Cape and Gauteng).

2.3.3 Composite Indices

Four composite indices were constructed to summarise multi-dimensional aspects of youth readiness, justice, and inclusion in the just food systems transition, following established practices in composite index construction and social indicator analysis (OECD, 2008; Nardo et al., 2005); Skills Readiness Index (SRI), Digital Agriculture Access Index (DAAI), Food System Justice Index (FSJI) and Gender Equity Perception Index (GEPI. The SRI was created as the simple average of six items capturing access to and participation in relevant training; The FSJI combined five Likert-type items measuring perceived fairness of youth targeting, rural inclusion, policy design, future opportunities, and neglect of marginalised groups; The DAAI combined fifteen items on ownership and use of digital tools, access to connectivity and electricity, affordability, identification and language barriers, training, fear of misuse, and other self-reported obstacles, while GEPI combines eleven items capturing attitudes toward gender roles, diversity and equality, representation and access, as well as reported instances of being denied access or credit, excluded from training and leadership, and being paid less. For the DAAI and GEPI, each component was first standardised into a z-score before averaging across all items and normalising to the [0,1] interval. These indices measure youth access to skills and training, perceptions of fairness and inclusion in food systems, levels of digital inclusion and barriers to digital agriculture, and experiences and attitudes related to gender equity.

3. CONTEXTUAL BACKGROUND

This section situates the study within the broader policy, socio-economic, and environmental context shaping food systems transformation in South Africa, with specific attention to the Eastern Cape and Gauteng provinces. It provides the structural and institutional backdrop against which youth employment, gender inclusion, and green job creation are analysed, and highlights how national and provincial policies, socio-economic conditions, and climate risks interact to shape opportunities and constraints within food systems. By integrating policy analysis, demographic and livelihood profiles, and climate-related challenges, the section establishes the rationale for the study's analytical framework and composite indices, which are subsequently used to examine justice, inclusion, and transition outcomes in a systematic and empirically grounded manner.

3.1 Policy context: agriculture, employment, and just transition

South Africa's policy framework for agriculture, employment, and climate action recognises youth and women as priority constituencies yet remains weakly grounded in demographic realities. As shown in Table 3.1, young people aged 15–34 constitute over half of the working-age population, but experience unemployment rates exceeding 46%, with young women facing higher NEET rates than young men (Stats SA, 2025). Within food systems, youth participation is highest in food trade and services, moderate in agro-processing, and lowest in primary agriculture, while women are over-represented in informal and lower-paid segments across value chains.

Table 3.1: Demographic Profile of Youth and Gender in Food-System Employment

Indicator	Agriculture (Primary)	Agro-processing	Food Trade & Services	Source
Share of total employment (%)	6–7	4	12–14	Stats SA, QLFS 2024/25
Youth share of employment (15–34, %)	35–40	45	50+	Stats SA, QLFS
Female share of employment (%)	38	43	55	Stats SA, QLFS
Youth unemployment rate (%)	>45	>40	>35	Stats SA, QLFS 2025
Informality rate among youth (%)	High (>60)	Moderate	High (>55)	Stats SA, Labour Market Dynamics
Dominant youth roles	Small-scale farming, labour	Processing, packaging	Retail, vending, logistics	FAO (2022); Stats SA
Asset/decision control by youth	Very low	Low–moderate	Low	Aliber & Hart (2019)

***Notes**:*

- *Food trade & services include retail, street vending, logistics, and food services.*
- *Percentages rounded from QLFS trends; used for profiling, not causal inference.*
- *Youth defined as ages 15–34.*

Provincial and sectoral patterns reinforce disparities. In the Eastern Cape, youth participation is concentrated in small-scale and informal agriculture, where unemployment exceeds 50% and access to land and finance remains highly unequal. In Gauteng, youth participation is higher in food retail, processing, and logistics, yet stable and higher-value segments remain dominated by older and male actors.Together, these data demonstrate that youth and women are central to South Africa's food economies in proportional terms but remain disadvantaged in quality, security, and influence. This strengthens the study's justice-focused analysis and underscores why a just food systems transition requires policies that explicitly address who participates, where, and under what conditions, rather than relying on aggregate employment targets.

3.2 Socio-economic profile of youth and women in food economies

Youth and women play central roles in the food economies of both Eastern Cape and Gauteng, but their participation occurs under markedly unequal conditions that have direct implications for a just food systems transition. Nationally, youth unemployment stood at 46.1% among those aged 15–34 in the first quarter of 2025, while 37.1% of youth aged 15–24 were classified as Not in Employment, Education or Training (NEET). When extended to the 15–34 age group, NEET rates exceed 40%, with young women consistently recording higher rates than young men (Stats SA, 2025). These indicators point to deep structural exclusion of youth from South Africa's labour market, including within agriculture and food-system activities.

The Eastern Cape consistently records some of the most severe manifestations of this exclusion. Youth unemployment and NEET rates in the province remain among the highest nationally, reflecting the province's rural character, weak industrial base, and heavy reliance on informal and subsistence-oriented livelihoods (Stats SA, 2025). Employment in the provincial food economy is dominated by small-scale agriculture, livestock rearing, informal food trading, and seasonal farm labour, activities characterised by low productivity, income volatility, and limited upward mobility. Young women are over-represented in the most precarious segments of these activities, including unpaid family labour and low-return food trading, reflecting persistent gender gaps in access to land, credit, extension services, and training (Aliber & Hart, 2019; FAO, 2022). From a just transition perspective, these patterns indicate that food systems in the Eastern Cape function more as social safety nets than as pathways to decent employment**,** limiting the transformative potential of climate-smart or green interventions.

In Gauteng, youth participation in food systems is more urban and peri-urban in nature, with greater involvement in food retail, agro-processing, logistics, street vending, and digitally mediated food services. While overall employment levels and infrastructure are stronger than in the Eastern Cape, youth participation remains highly segmented. A significant share of young people operate in the informal economy, particularly in township and informal settlement contexts, where regulatory barriers, high competition, and insecure market access constrain earnings and business growth (Crush & Battersby, 2016). Gender disparities persist: young women are more likely to be concentrated in lower-paid retail and service roles, face greater care burdens, and report weaker access to finance and business networks compared to young men (Stats SA, 2024; FAO, 2022).

Taken together, these data suggest that existing food-system employment structures reproduce inequality rather than advance a just transition. High youth unemployment, pervasive informality, and pronounced gender disparities indicate that green job creation in food systems will not be inclusive by default. A just food systems transformation therefore requires targeted interventions that address job quality, access to productive resources, and gendered barriers, rather than relying solely on skills development or technological upgrading to absorb excluded youth into emerging green opportunities.

4. RESULTS: YOUTH INCLUSION AND GREEN OPPORTUNITIES IN THE FOOD SYSTEMS TRANSITION

This section presents the empirical findings from the quantitative and qualitative analyses, focusing on what the data reveal about youth inclusion, skills, justice, and access to green employment opportunities within South Africa's food systems**.** The results are structured to first report observed patterns and statistical relationships and then situate these findings within broader justice and transition debates. Tables are used to present detailed estimates, while the accompanying text highlights the key empirical takeaways most relevant for policy and practice**.**

4.1 Descriptive Profile of Youth, Skills, Justice, and Opportunity Perceptions

The descriptive analysis reveals substantial variation in youth skills readiness, digital access, justice perceptions, and perceived access to green opportunities across the study sites**.** The results are presented in Table 4.1. Overall, youth report moderate levels of skills exposure uneven access to digital tools and infrastructure, and relatively low perceptions of fairness and inclusion within food-system governance**.** Perceived access to green opportunities remains limited for a large share of respondents, particularly among young women and youth in rural and informal food economies.

Table 4.1. Descriptive Statistics of Composite Indices (N = 612)

Index	Mean	SD	Min	Max
Skills Readiness Index (SRI)	0.504	0.211	0	1
Digital Agriculture Access Index (DAAI)	0.686	0.131	0	1
Food System Justice Index (FSJI)	0.423	0.217	0	1
Gender Equity Perception Index (GEPI)	0.491	0.089	0	1

Source: Field Data processed in STATA, 2025

The mean values of the four indices provide an overview of how youth in the sample experience skills readiness, digital access, justice in the food system, and gender equity. The SRI (0.504), indicates that youth possess moderate but uneven access to training and skills development, suggesting partial readiness for decent or green employment but with substantial room for improved readiness. In contrast, the DAAI (0.686), shows that youth report comparatively stronger access to digital tools, connectivity, and technology-enabled opportunities, although variability (SD = 0.131) suggests this access is not uniformly distributed. The FSJI (0.423), reflects ambivalent perceptions of fairness, inclusion, and equitable opportunities within the food system, consistent with systemic challenges in rural targeting, policy responsiveness, and support for marginalised groups. Lastly, the GEPI (0.491), signals low perceptions of gender equity, with many respondents still reporting stereotypes, exclusion from opportunities, or unequal treatment. Together, these results suggest that while digital access appears comparatively strong, skills readiness, justice perceptions, and gender equity remain weak to moderate, highlighting structural barriers that limit youth participation in a just food systems transition.

The descriptive patterns observed in Table 4.1 are consistent with a growing body of evidence showing that youth exposure to green transition discourse, training programmes, and digital tools has outpaced the creation of credible and accessible employment pathways within agrifood systems. Studies across Sub-Saharan Africa and South Africa specifically document that while young people increasingly acquire skills and awareness related to climate-smart agriculture and green innovation, these gains often coexist with high uncertainty, informality and weak labour absorption in food-system value chains (FAO, 2023; ILO, 2023). Research on youth aspirations and employment perceptions further shows that exposure to policy narratives and training initiatives can raise expectations without resolving underlying structural constraints, resulting in low confidence in realised opportunity rather than optimism (Sumberg et al., 2017; Brooks et al., 2019).

Empirical work on just transitions and green labour markets also highlights that perceived fairness, inclusion, and institutional credibility strongly condition how youth interpret their prospects, even before employment outcomes materialise. Where governance arrangements are seen as opaque or exclusionary, young people tend to discount the feasibility of green opportunities despite nominal skills readiness or digital access (Newell & Mulvaney, 2013; Schlosberg et al., 2017). In South Africa, recent evidence indicates that youth—particularly young women—often experience the green transition as discursively inclusive but practically inaccessible, reinforcing scepticism toward food-system–based employment pathways (PCC, 2022; Stats SA, 2025). Taken together, this literature supports the descriptive finding that exposure alone is insufficient to generate confidence in green employment**,** underscoring the importance of justice, recognition, and institutional access in shaping youth opportunity perceptions.

The foregoing pattern as revealed by the quantitative analysis is strongly corroborated by qualitative evidence from stakeholder engagements. Youth participants in both Eastern Cape and Gauteng repeatedly emphasised that while training and digital tools improved their awareness of opportunities, they did not translate into actual access. In Gauteng, it was highlighted that digital platforms exposed them to procurement opportunities and market

standards, yet without certification, capital, or networks, they remained unable to participate. Similar indications emerged in the Eastern Cape Province where young farmers reported that access to climate-smart training did not overcome constraints related to land access and extension support. The next sections where inferential analysis is applied to the data, we will show to what extent the foregoing are either random or systematic observations and their implications for policy.

4.2 Bivariate associations between Skills, Digital Access, Justice, and Opportunity

Bivariate correlation analysis measures the strength and direction of the relationship between the two variables, showing whether they move together, move in opposite directions, or are unrelated. The bivariate correlation analysis identifies clear and statistically significant relationships among the composite indices**,** while also indicating that these dimensions capture distinct aspects of inclusion and justice**.** The results displayed in Table 4.2 show that Skills Readiness is positively associated with perceived access to green opportunities, indicating that training and skills exposure align with higher opportunity perceptions. Gender Equity Perceptions exhibit the strongest positive association with perceived opportunity, highlighting the central role of recognition and inclusion. In contrast, Digital Agriculture Access is negatively associated with perceived opportunity, despite being positively correlated with skills readiness, pointing to a disconnect between digital exposure and perceived inclusion. Food System Justice shows weak or non-significant direct correlations with opportunity but is strongly associated with both skills readiness and gender equity.

Table 4.2: Bivariate Correlation Results (Pearson)

	(1) Green Opportunity	(2) SRI	(3) DAAI	(4) FSJI	(5) GEPI
(1) Green Opportunity	1.000				
(2) SRI	0.127***	1.000			
(3) DAAI	-0.106***	0.240***	1.000		
(4) FSJI	0.049	0.322***	0.035	1.000	
(5) GEPI	0.144***	0.198***	0.103**	0.253***	1.000

Significance codes: *** p < 0.01, ** p < 0.05, * p < 0.10
Source: Field data processed in STATA, 2025

The bivariate correlation patterns reported in Table 4.2 are consistent with existing empirical literature showing that key dimensions of youth inclusion in green transitions—skills, digital access, justice perceptions, and gender equity—are interrelated but not interchangeable. Prior studies emphasise that skills acquisition and digital exposure tend to move together, reflecting the growing role of digital platforms, online learning, and information access in shaping youth capabilities within agrifood systems (World Bank, 2021; FAO, 2022). However, the observed negative association between digital access and perceived green opportunity aligns with

emerging evidence on the "digital paradox," whereby increased exposure to information heightens awareness of structural barriers, competition, and exclusion rather than improving perceived prospects (Friederici et al., 2020; Graham et al., 2019). This pattern reinforces the interpretation that digital exposure increases awareness of opportunities faster than it expands actual access to them.

The relatively stronger association between gender equity perceptions and perceived opportunity corroborates just transition scholarship that highlights recognition justice as a central determinant of perceived inclusion, particularly for young women (Schlosberg, 2007; Fraser, 2009). Meanwhile, the weaker direct correlation between food system justice and opportunity reflects findings that procedural fairness often operates indirectly, shaping trust, legitimacy, and recognition rather than immediate opportunity assessments (Hall & Kepe, 2017; Newell & Mulvaney, 2013). Overall, the correlation results align with the literature in suggesting that youth opportunity perceptions emerge from interlocking but distinct justice and capability dimensions, providing a sound basis for multivariate modelling.

The qualitative evidence generated through focus group discussions, key informant interviews, and participatory engagements provides strong triangulation for the bivariate results presented in Tables 4.1–4.6, while also deepening the interpretation of the opportunity domains identified in Table 4.7. The composite indices introduced in Table 4.1—Skills Readiness Index (SRI), Digital Agriculture Access Index (DAAI), Gender Equity Perception Index (GEPI), and Food System Justice Index (FSJI)—are not only analytically robust constructs but are also clearly reflected in the lived experiences of respondents. Qualitative accounts confirm that these indices capture real and interacting dimensions of youth engagement in the food system. However, they also reveal that these dimensions do not operate in isolation; rather, they are experienced simultaneously, often reinforcing or constraining one another in practice.

Results on the Skills Readiness and Opportunity Pathways are shown in Tables 4.2–4.3 and Table 4.7. The positive but moderate associations between SRI and perceived opportunity observed in the bivariate analysis (Tables 4.2–4.3) are strongly supported by qualitative findings.

Across both provinces, youth consistently identified skills acquisition, particularly in climate-smart agriculture, agro-processing, and digital marketing, as a key enabler of entry into the opportunity domains outlined in Table 4.7 (e.g., sustainable production, value addition, agri-services, and green logistics). However, qualitative evidence clarifies why these relationships remain weak to moderate in magnitude. Many respondents emphasised that training programmes are often not aligned with specific value-chain opportunities, and skills are rarely accompanied by access to finance, inputs, or market linkages. As one participant noted: *"We have the training, but after the training there is no support to start."* This helps explain why SRI shows a positive but limited effect in the quantitative results on skills readiness, but do not guarantee absorption into the opportunity domains identified in Table 4.7.

The results in respect of Digital Access and the "Opportunity Awareness Gap" are strongly corroborated by qualitative findings. For instance, participants reported that digital tools expand awareness of opportunities across the domains in Table 4.7, including agritech services,

e-commerce, and climate-smart innovations, but simultaneously expose structural barriers to entry, such as capital requirements, certification standards, and restricted market access. This creates what can be described as an “opportunity awareness gap”, where youth can identify opportunities in theory but cannot access them in practice. A respondent captured this dynamic succinctly: *“Online, you see many opportunities, but they are not for people like us.”* This directly explains the negative or weak coefficients observed in the bivariate analysis: digital access increases awareness faster than it increases actual access.

The strong influence of GEPI in the bivariate analysis (Tables 4.3–4.5) is consistently reinforced across all qualitative data. Importantly, qualitative findings show that gender disparities cut across all opportunity domains in Table 4.7, rather than being confined to specific sectors. Young women reported constraints in accessing land for production (limiting entry into sustainable agriculture), securing finance for agro-processing and value addition, participating in higher-value nodes such as logistics, aggregation, and agri-services. In addition, unpaid care responsibilities and social norms restrict mobility and time allocation, further limiting participation.

Regarding Food System Justice and Indirect Pathways shown in Tables 4.4–4.6, the qualitative findings provide critical insight into this pattern. In that regard, respondents frequently pointed to limited youth representation in decision-making processes, lack of transparency in programme targeting and resource allocation, and weak institutional accountability.

These factors affect recognition and procedural justice, shaping whether youth feel included in, or excluded from, the food system. Rather than directly determining access to specific opportunity domains (Table 4.7), FSJI influences: confidence in institutions, willingness to engage, and perceptions of fairness. This explains why its statistical effect appears weaker and indirect in Tables 4.4–4.6 as it operates through mediating variables, particularly gender equity and perceived inclusion.

The stakeholder engagements in the two provinces revealed interesting differences in youth perceptions about challenges and opportunities. Across Tables 4.2–4.7, the qualitative data help reintroduce and deepen the comparative dimension implicit in the quantitative results. In Gauteng, respondents reported greater exposure to diversified opportunity domains (Table 4.7), particularly in agro-processing, logistics, and digital services. However, competition and high entry barriers limit actual participation, reinforcing the moderate strength of quantitative relationships. In the Eastern Cape, opportunities are more concentrated in primary production and natural resource-based activities, but are constrained by infrastructure deficits, weak market access, and limited institutional support. This results in lower overall perceived opportunity despite the presence of potential. These contextual differences help explain variations in the direction and strength of bivariate relationships across the datasets.

Overall, the qualitative findings strongly validate the direction of relationships observed in the bivariate analysis while providing crucial insight into their limited strength. For instance, they demonstrate that:

- SRI enhances readiness but is constrained by structural bottlenecks;
- DAAI increases awareness faster than access, creating an opportunity gap;

- GEPI is the most decisive and cross-cutting determinant;
- FSJI operates indirectly through recognition and procedural pathways.

By linking these dynamics directly to the opportunity domains in Table 4.7, the analysis shows that youth exclusion is not due to the absence of opportunities, but rather to unequal access across all domains of the emerging green food economy. The convergence of quantitative and qualitative evidence therefore strengthens the central conclusion of the study: that a just food systems transition requires not only capability development, but also structural and institutional transformation to ensure that opportunities become genuinely accessible to youth.

4.3 Direct Determinants of Perceived Green Opportunity

4.3.1 Ordered Logit Estimates

The ordered logit model is a means to show how different factors (such as skills, digital access, and gender equality) influence the likelihood of young people experiencing low, medium, or high levels of opportunity in the food system. It helps us understand what moves youth up or down the opportunity ladder in the transition to green jobs. These ordered logit results provide clear evidence on which factors directly shape youth perceptions of access to green opportunities. The model is statistically significant and shows three dominant empirical findings.

First, Skills Readiness has a strong and positive association with perceived green opportunity, indicating that youth with greater exposure to digital, technical, business, and practical training are significantly more likely to report higher opportunity categories. However, this effect remains conditional and does not guarantee inclusion, as many youth lack access to the complementary resources required to translate skills into employment, including finance, productive assets, and market entry points. This finding is consistent with broader national evidence from South Africa, where high levels of investment in education have not translated into commensurate employment outcomes, resulting in persistently high youth unemployment, even among graduates (World Bank, 2022; Stats SA, 2025; OECD, 2020).

Second, Digital Agriculture Access has a large and statistically significant negative association with perceived opportunity, indicating that increased digital exposure does not translate into optimism about employment prospects. Rather, digital access appears to heighten awareness of structural barriers—such as capital requirements, certification standards, and restricted market access, thereby reinforcing perceptions of exclusion. This finding is consistent with broader evidence from South Africa and other developing contexts, where rapid expansion in digital connectivity has outpaced the creation of accessible economic opportunities, resulting in a gap between informational access and labour-market inclusion (World Bank, 2021; Friederici et al., 2020; Graham et al., 2019).

Third, Gender Equity Perception emerges as the strongest positive predictor of perceived opportunity, indicating that perceptions of fairness, inclusion, and equal opportunity play a decisive role in shaping how youth evaluate their prospects. Importantly, this result suggests that gender operates not merely as an independent determinant, but as a mediating gateway condition through which other factors, such as skills readiness and digital access, are translated into perceived opportunity. In contexts where gender inequalities persist, the returns to skills and

digital capabilities are systematically constrained, particularly for young women. This finding is consistent with broader evidence from South Africa, where gender disparities in access to land, finance, and labour-market opportunities continue to limit women's economic participation (Stats SA, 2025; UN Women, 2022; Agarwal, 2021). This indicates that improving skills or expanding digital access alone is insufficient unless accompanied by gender-transformative interventions that address underlying structural inequalities.

Together, these results show that skills matter, gender equity matters more, and digital access alone may heighten perceptions of exclusion rather than opportunity**.**

Table 4.3. Ordered Logit Estimates of Perceived Green Opportunity (Robust SEs)

Predictor	β	SE	p-value
Skills Readiness Index (SRI)	1.18	0.38	0.002
Digital Agriculture Access Index (DAAI)	−2.57	0.71	<0.001
Food System Justice Index (FSJI)	−0.26	0.39	0.511
Gender Equity Perception Index (GEPI)	3.44	0.86	<0.001
Age	—	—	0.350
Female (vs male)	—	—	0.062

Source: Field Data processed in STATA, 2025

4.3.2 Robustness Checks and Interaction Models

The OLS model is a standard linear regression that estimates how different factors affect a continuous outcome. The interaction model tests whether the effect of one variable depends on the level of another, showing how two factors combine to influence an outcome rather than acting independently. The robust OLS and interaction models confirm the direction and consistency of the core findings. Digital access remains negatively associated with perceived opportunity, while gender equity continues to exert a strong positive effect. In these linear specifications, Food System Justice becomes statistically significant and negative, indicating that procedural unfairness erodes opportunity perceptions in a continuous sense, even when it does not shift ordered outcome thresholds.

The interaction between Skills Readiness and Digital Access is not statistically significant, indicating that skills do not yield higher perceived returns under greater digital exposure**.** These findings challenge assumptions that combining training with digital connectivity automatically improves employment outcomes.

\Table 4.4. Robust OLS Estimates of Perceived Green Opportunity

Predictor	Coefficient	SE	p-value
Skills Readiness Index (SRI)	0.495	0.306	0.106
Digital Agriculture Access Index (DAAI)	−1.31	0.52	0.011
Food System Justice Index (FSJI)	−0.67	0.30	0.026
Gender Equity Perception Index (GEPI)	2.69	0.49	<0.001
Female (vs male)	−0.26	0.12	0.027

Source: Field Data processed in STATA, 2025

Table 4.5. Interaction Model (SRI × DAAI)

Predictor	Coefficient	SE	p-value
Skills Readiness Index (centred)	0.515	0.305	0.090
Digital Agriculture Access Index (centred)	−1.293	0.515	0.012
SRI × DAAI	−2.207	2.419	0.357
Food System Justice Index (FSJI)	−0.643	0.298	0.032
Gender Equity Perception Index (GEPI)	2.693	0.487	<0.001
Female (vs male)	−0.258	0.116	0.027

Source: Field Data processed in STATA, 2025

The regression results presented in Tables 4.3–4.5 are consistent with empirical studies demonstrating that skills readiness is a necessary but insufficient condition for youth inclusion in green labour markets. Positive associations between skills and perceived opportunity reflect human-capital and capability-based perspectives, which emphasise training as a foundational requirement for employability in climate-responsive sectors (ILO, 2023). However, the large and robust negative effect of digital access on perceived opportunity echoes growing critiques of technology-led transition strategies that overlook structural constraints such as land access, finance, procurement systems, and market power (Graham et al., 2019; World Bank, 2022).

The dominance of gender equity perceptions as a predictor of opportunity strongly corroborates feminist political economy and just transition literature, which shows that labour-market inclusion is shaped as much by norms, representation, and recognition as by skills or infrastructure (Kabeer, 1999; Agarwal, 2021). Evidence from South Africa similarly indicates that women's perceived exclusion persists even where policy frameworks formally promote inclusion, reflecting deep-seated institutional and cultural barriers (Stats SA, 2024; UN Women, 2022). The absence of a significant interaction between skills and digital access further aligns with studies demonstrating that "skills-plus-connectivity" approaches do not automatically generate employment where structural demand and institutional access remain weak (Tee et al., 2024; Brooks et al., 2019).

Across interviews and focus groups, respondents described a context in which multiple constraints operate simultaneously. Youth repeatedly emphasised that no single factor, whether skills, digital access, or institutional support – is sufficient on its own to unlock opportunity. Instead, access to green employment depends on a combination of interdependent conditions, including assets, networks, and institutional access. According to one participant: *"You need everything to come together, skills, money, connections, if one is missing, it doesn't work"*. This helps explain why the OLS coefficients, although significant, remain below strong effects thresholds: each variable captures only part of a broader constrained opportunity system.

Overall, the qualitative findings strongly corroborate the OLS results in Table 4.4, particularly in terms of the positive but limited effect of skills (SRI), the ambiguous role of digital access (DAAI), the dominant influence of gender equity (GEPI), and the indirect role of food system justice (FSJI).

More importantly, qualitative evidence explains why these relationships are statistically modest but substantively meaningful. It demonstrates that perceived opportunity is shaped by a complex system of interacting constraints rather than by any single factor in isolation, consistent with an employment ecosystem perspective and broader systems-based approaches to labour market outcomes (Karanikolas & Qian-Khoo, 2025; ILO, 2015; Ostrom, 2007).

This triangulation strengthens the robustness of the findings and reinforces the study's central conclusion: that expanding youth access to green employment opportunities requires integrated interventions that simultaneously address skills, gender inequality, institutional inclusion, and structural barriers to entry, consistent with evidence showing that youth employment outcomes are shaped by multiple interacting constraints and are most effectively addressed through coordinated, multi-dimensional policy approaches (World Bank, 2019; Apunyo et al., 2022; ILO, 2013; Khan, 2020).

Qualitative insights also help interpret how the OLS relationships play out differently across Gauteng and Eastern Cape. In Gauteng, better infrastructure and market access strengthen the positive effects of SRI, but high competition limits overall opportunity realisation. In Eastern Cape, structural deficits (infrastructure, markets, and institutional support) dampen the effects of all variables, particularly SRI and DAAI. These contextual differences help explain variability in the OLS estimates and reinforce the importance of place-based policy responses.

4.4 Structural Equation Modelling: How Justice Operates Through Pathways

While the regression models establish which factors are associated with perceived access to green opportunities, the structural equation model (SEM) specifies how justice and inclusion operate through interconnected pathways. In other words, the SEM identifies the mechanisms through which skills, digital access, and justice perceptions are translated into perceived opportunity or blocked from doing so.

The SEM results (Tables 4.6 and Annex Tables 4.7 – 4.10) show three core patterns: First, digital agriculture access plays a clear distributive role by significantly increasing skills readiness (DAAI → SRI: $\beta = 0.389$, $p < 0.001$). Youth with greater digital access report higher exposure to training, information, and learning opportunities. However, digital access simultaneously exerts

a strong negative direct effect on perceived green opportunity ($\beta = -1.557$, $p < 0.001$). As a result, despite its positive indirect contribution through skills, the total effect of digital access on perceived opportunity is negative (Annex Table 4.8). This indicates that digitalisation increases capability but also heightens awareness of exclusion, competition, and institutional barriers. This dual effect underscores the structural nature of the digital paradox observed in the regression results.

Second, food system justice does not directly affect perceived opportunity. Instead, it operates entirely through recognition, captured by gender equity perceptions. The path from Food System Justice to Gender Equity Perceptions is positive and significant (FSJI → GEPI: $\beta = 0.105$, $p < 0.001$), while Gender Equity Perceptions exert the strongest positive effect on perceived opportunity in the model (GEPI → Opportunity: $\beta = 2.148$, $p < 0.001$). The indirect pathway from FSJI to opportunity via GEPI is statistically significant, whereas all direct paths from FSJI to opportunity are not (Tables 4.6 and Annex Table 4.7). This shows that procedural fairness matters only when it translates into lived recognition and equitable social relations.

Third, recognition justice emerges as the dominant gateway through which other dimensions of justice and capability become meaningful. Skills readiness positively affects perceived opportunity ($\beta = 0.863$, $p = 0.001$), but its effect is substantially smaller than that of gender equity. Women also report significantly lower perceived opportunities than men, even after controlling for skills and digital access. Together, these results show that capabilities enable participation, but recognition determines whether participation is perceived as a viable opportunity.

Overall, the SEM clarifies that youth exclusion from green opportunities is not primarily a skills deficit. Instead, it reflects a structural configuration in which digitalisation expands exposure without power, procedural justice lacks traction without recognition, and gendered inequalities determine whether the transition is experienced as open or exclusionary. The just food systems transition, as currently configured, therefore produces digitally informed and increasingly skilled youth who nevertheless remain structurally constrained in converting these capabilities into perceived opportunity.

Table 4.6. Structural Equation Model: Direct Effects

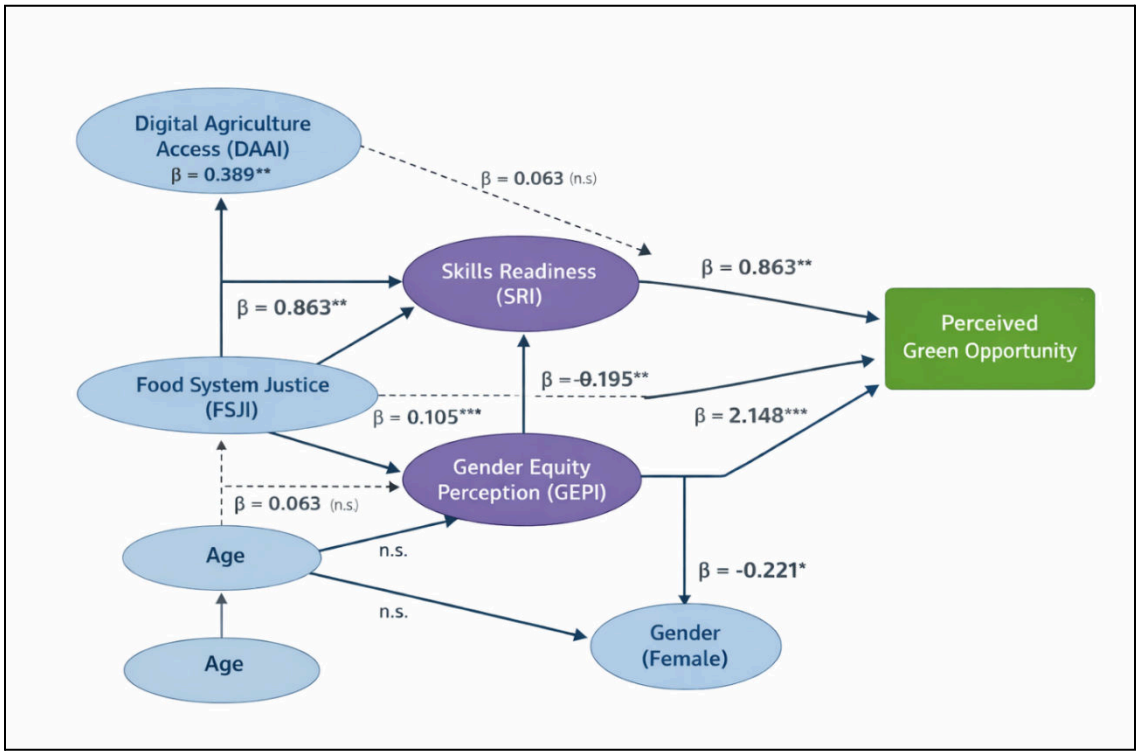
Structural Path	Coefficient (β)	Std. Error	p-value
Digital Agriculture Access (DAAI) → Skills Readiness (SRI)	0.389	0.062	<0.001
Digital Agriculture Access (DAAI) → Food System Justice (FSJI)	0.063	0.068	0.350
Age → Skills Readiness (SRI)	0.012	0.009	0.187
Female (vs male) → Skills Readiness (SRI)	−0.018	0.031	0.565
Age → Food System Justice (FSJI)	0.003	0.002	0.138
Female (vs male) → Food System Justice (FSJI)	0.002	0.015	0.890
Food System Justice (FSJI) → Gender Equity Perception (GEPI)	0.105	0.021	<0.001
Skills Readiness (SRI) → Perceived Green Opportunity	0.863	0.262	0.001
Gender Equity Perception (GEPI) → Perceived Green Opportunity	2.148	0.401	<0.001
Digital Agriculture Access (DAAI) → Perceived Green Opportunity	−1.557	0.472	<0.001
Female (vs male) → Perceived Green Opportunity	−0.221	0.100	0.027
Age → Perceived Green Opportunity	0.014	0.012	0.246

Notes:

- *Coefficients are unstandardised structural parameters.*
- *Reference category for gender is male.*
- *Bolded paths are statistically significant at p < 0.01.*

Source: Field Data processed in STATA, 2025

Figure 4.1: SEM: Path Diagram: Justice Pathways to Perceived Green Opportunity



The path diagram (Figure 4.1 above) confirms that digital agriculture access plays a dual role in the just food systems transition. While digital access significantly strengthens skills readiness, it simultaneously exerts a strong negative direct effect on perceived green opportunity. This indicates that digitalisation enhances capabilities but also exposes young people to structural barriers, such as competition, compliance requirements, and limited institutional access, resulting in a net reduction in perceived opportunity once these constraints are taken into account.

Crucially, Figure 4.1 shows that food system justice does not operate directly, but instead shapes opportunity through recognition, captured by gender equity perceptions. Gender equity emerges as the strongest pathway to perceived opportunity, mediating justice effects and outweighing both skills and digital access. The SEM results further confirm that gender equity functions as a mediating mechanism, shaping how institutional fairness and capability variables translate into perceived opportunity. Together, these pathways demonstrate that skills and digitalisation are necessary but insufficient: recognition-based justice, particularly gender equity, is the central mechanism through which youth perceive green opportunities as attainable, reinforcing the argument that just transitions are ultimately governed by power and inclusion rather than capacity alone.

The SEM findings align closely with emerging scholarship on just transitions, digitalisation, and political economy in agrifood and labour systems. The positive pathway from digital agriculture access to skills readiness corroborates a substantial body of evidence showing that connectivity,

digital tools, and platform exposure enhance learning opportunities, information flows, and capability formation among young people (van Dijk, 2020; World Bank, 2022; ILO, 2023). In agrifood systems specifically, digital tools have been shown to improve access to training materials, extension services, and market information, particularly for youth and small-scale producers (FAO, 2022).

However, the strong negative direct effect of digital access on perceived opportunity is consistent with critical digital labour and development literature, which documents how digitalisation can intensify awareness of exclusion rather than alleviate it. Studies of platform-mediated and digitally intermediated labour markets show that increased exposure often reveals compliance costs, certification barriers, capital thresholds, and competitive pressures that disproportionately disadvantage youth and small producers (Graham et al., 2019; Friederici et al., 2020). Rather than functioning as a straightforward inclusion mechanism, digitalisation may therefore act as a "transparency without access" process, expanding information while leaving underlying power relations unchanged.

The finding that food system justice affects perceived opportunity only through gender equity provides strong empirical support for recognition-centred theories of justice. Fraser (2009) and Schlosberg (2007, 2013) argue that distributive and procedural reforms are insufficient unless they translate into lived recognition, dignity, and equal social standing. The SEM pathway (FSJI → GEPI → Opportunity) operationalises this argument empirically, showing that institutional fairness matters only when it reshapes gendered norms, representation, and access. Similar patterns have been observed in South African agrarian and labour systems, where policy commitments to fairness and participation have limited impact unless gendered power relations are explicitly addressed (Hall & Kepe, 2017; Agarwal, 2021).

Finally, the dominance of gender equity perceptions as the strongest determinant of perceived opportunity aligns with feminist political economy critiques of sustainability transitions. These studies emphasise that women's exclusion from land, finance, leadership, and decision-making positions systematically constrains the translation of skills and participation into meaningful opportunity (Kabeer, 1999; Doss et al., 2018; UN Women, 2022). In the context of food systems, recognition justice thus functions as a gateway condition: without it, digitalisation and skills development risk reproducing inequalities rather than enabling a just transition.

Taken together, the SEM results and corroborating literature demonstrate that youth inclusion in green food-system transitions depends less on capability accumulation alone than on whether institutional arrangements recognise, empower, and redistribute opportunity—particularly along gendered lines.

Focus group discussions and key informant interviews revealed that while a range of government and public sector initiatives exist to support youth employment and participation in the green economy, their effectiveness in enabling meaningful inclusion within the just food systems transition remains uneven. Participants acknowledged programmes such as public employment schemes (e.g. Expanded Public Works Programme), agricultural support initiatives

(e.g. Comprehensive Agricultural Support Programme), and youth employment platforms (e.g. Presidential Youth Employment Intervention) as important entry points into the labour market (DPWI, 2023; DALRRD, 2021; Presidency of South Africa, 2022). However, these interventions were widely described as short-term, fragmented, and insufficiently aligned with the specific demands of green jobs within food systems. This finding is consistent with broader evidence showing that youth employment programmes often fail to generate sustainable outcomes due to weak coordination, limited duration, and inadequate integration with structural constraints such as access to land, finance, and markets (ILO, 2015; World Bank, 2019; PCC, 2022). Improving youth inclusion therefore requires not only expanding existing programmes to reach rural youth, but also redesigning them to provide integrated and long-term support, strengthen access to productive assets, and ensure that youth voices are meaningfully incorporated into the governance of South Africa's just food systems transition.

4.5 Justice-Based Interpretation

The qualitative analysis shows that distributive justice in South Africa's just food system transition remains uneven. Those with access to land, finance, education, and markets benefit disproportionately, reflecting broader structural inequalities in the agrifood system (PCC, 2022; World Bank, 2018). Urban youth are more likely to access training, digital technologies, and innovation ecosystems, such as hubs located in Gauteng, while rural youth face persistent constraints related to infrastructure, connectivity, and market access (Battersby & Watson, 2019; Crush & Battersby, 2016). Furthermore, many green economy opportunities require long-term investment horizons that are misaligned with young people's immediate income needs, particularly among low-income groups. Young women, youth with disabilities, and economically marginalised groups face compounded barriers to participation, underscoring the intersectional nature of exclusion (FAO, 2023; Agarwal, 2021). Without deliberate redistributive measures and inclusive support systems, these groups remain structurally excluded.

Participants also indicated that procedural justice remains weak, with youth inclusion in decision-making forums often perceived as symbolic rather than transformative. Policy processes are largely dominated by government and agribusiness actors, while youth engagement is typically limited to consultation with minimal influence on outcomes. This pattern aligns with broader critiques of participatory processes in development, where inclusion does not necessarily translate into decision-making power (Cornwall, 2008; Chambers, 2017). Participation is particularly uneven for young women in rural areas, who remain largely excluded from key planning processes. While civil society platforms provide more inclusive spaces, their scale and influence remain limited. As a result, youth lack sustained avenues to shape priorities such as land access, finance, and training. Strengthening procedural justice will therefore require a shift toward co-decision-making, enhanced accountability mechanisms, and the integration of local and indigenous knowledge systems.

The findings further highlight recognition justice deficits, as youth are often treated as a homogeneous group in policy discourse. This obscures intersectional differences and renders rural, indigenous, disabled, and low-income youth largely invisible. Young women's contributions to agroecology, seed systems, and community food production remain undervalued, while patriarchal norms continue to constrain their access to land, finance, and leadership

opportunities (Doss et al., 2018; FAO, 2023). Youth with disabilities face both structural and attitudinal barriers that limit participation. These dynamics indicate that many youth groups are not fully recognised as legitimate actors in shaping food system transformation.

Finally, restorative justice remains constrained by the enduring legacy of apartheid, which continues to shape unequal access to land and agricultural opportunities (Hall & Kepe, 2017; World Bank, 2018). Participants emphasised the slow pace and complexity of land reform processes, which reinforce intergenerational inequalities. Environmental challenges, including soil degradation and water scarcity in both Eastern Cape and Gauteng, further limit entry into climate-sensitive agriculture (IPCC, 2022). While initiatives such as local agroecological food systems contribute to community resilience, their scale remains limited. Achieving intergenerational equity will therefore require accelerated structural reform, strengthened climate adaptation strategies, and meaningful youth inclusion in shaping resilient and sustainable food systems.

4.6 Emerging Green Opportunity Domains and Institutional Anchors

Beyond perceptions of opportunity, the study identified concrete green employment domains already emerging within provincial food systems, based on evidence from stakeholder workshops, focus group discussions, key informant interviews, and youth co-researcher engagement. These domains provide an empirical bridge between the econometric findings and actionable policy pathways. Similar domains have been identified in global assessments of green jobs in agrifood systems, particularly in climate-smart agriculture, agro-processing, renewable energy, and ecosystem services (FAO, 2021; ILO, 2018).

Across Eastern Cape and Gauteng, recurrent youth entry points include climate-smart and regenerative agriculture services, small-scale processing and value addition, renewable energy for food systems, circular economy activities, and knowledge- and service-oriented roles such as digital advisory services and ecosystem restoration. These activities typically combine relatively low capital thresholds with opportunities for skills accumulation and environmental co-benefits, consistent with evidence on green employment pathways in food systems (UNEP, 2019; FAO, 2021). The prominence of agroecological practices and climate-smart production further reflects global trends toward sustainable intensification and resilience-building in agriculture (Altieri & Nicholls, 2017).

A consistent institutional anchor across these domains is the role of universities and research institutions as sites of procedural and recognition justice, linking skills development to credible pathways for employment, enterprise formation, and policy engagement. This aligns with broader food systems literature emphasising the importance of knowledge institutions and innovation systems in enabling inclusive transformation (Clapp et al., 2018; CSIR, 2021).The evidence indicates that the just food systems transition is not starting from zero; rather, its scaling is constrained by fragmented governance, limited youth-targeted finance, and weak institutional coordination. These constraints are widely identified as major barriers to inclusive green transitions, particularly in developing country contexts (World Bank, 2019; PCC, 2022). Further, it reinforces earlier observations that, from a just transition perspective, food systems in

the Eastern Cape currently operate more as social safety nets than as drivers of decent or green employment. These dynamics limit the potential impact of climate-smart or green initiatives, which cannot yield transformative outcomes unless structural constraints are systematically addressed.

Table 4.7: Typology of Emerging Green Opportunity Domains, Justice Constraints, and Policy Instruments in the Just Food Systems Transition

Green Opportunity	Activities / Roles	Youth Entry Points	Case Study Examples	Justice Dimension	Key Actors	Policy/Programme Instruments
Agroecology & Climate-Smart Production	Organic farming, regenerative practices, indigenous crops, soil restoration	Smallholder production, service provision, demo farms	Siyakhana Food Gardens (Gauteng) Battersby. (2019) Masibamban Rural development Initiative (Eastern Cape)	Distributive, Procedural	Farmer organisations, universities, extension agencies	Youth land-leasing schemes; subsidised inputs; public extension contracts; climate-smart agriculture grants
Small-Scale Processing & Value Addition	Drying, milling, packaging, cassava processing, local food enterprises	Youth-led MSMEs, cooperatives, shared processing hubs	Tshimolong Digital Innovation Precinct for agriprocessing startups (Gauteng) CSIR (2021) Milling Cooperative (Eastern cape)	Distributive, Recognition	Cooperatives Local government, incubators	Shared processing facilities; concessional credit; youth-targeted procurement; food safety compliance support
Renewable Energy for Food Systems	Solar irrigation cold storage, energy maintenance for agri-hubs	Installation, maintenance energy service provision	TVET training for solar assembling	Distributive, Procedural	TVET institutions, municipalities energy agencies	Green public works; service contracts; blended finance; municipal renewable-energy tenders
Circular Economy & Waste-to-Value	Composting, bio-inputs, recycling, food waste recovery	Community enterprises, youth collectives	eKasi Lab Youth recycling UNEP (Gauteng)	Restorative Distributive	Municipalities, NGOs, community groups	Waste management concessions; startup grants; community-based environmental service payments
Digital & Climate Advisory Services	Digital extension, climate information, market platforms	Data collection and advisory roles platform management	Agritech Platforms	Procedural, Recognition	Universities, NGOs, agri-tech firms	Open data platforms; youth digital service contracts; public–private digital extension partnerships
Ecosystem Restoration & Nature-Based Solutions	Land rehabilitation, agroforestry, conservation agriculture	Project-led employment, community stewardship	Working for Water programme (Eastern Cape) DFFE (2020)	Restorative Recognition	Environmental agencies, donor programmes	Green public employment schemes; carbon/ecosystem service payments; restoration grants
Research, Innovation & Knowledge Brokerage	Applied research, incubation, policy advocacy, training	Research assistants, innovation fellows, trainers	Knowledge hubs CSIR (2021)	Procedural, Recognition	Universities, research councils, think tanks	Innovation fellowships; research–practice partnerships; youth-inclusive advisory councils

Source: Authors' synthesis based on fieldwork (FGDs, KIIs, stakeholder workshops) and supported by FAO (2021), ILO (2018), UNEP (2019), PCC (2022).

5. CROSS-CUTTING POLITICAL ECONOMY DYNAMICS

This section synthesises the econometric and structural findings as well as qualitative findings with political economy scholarship to explain why skills, digital access, gender equity, and justice perceptions translate into opportunity or exclusion in the ways observed**.** The results demonstrate that youth positioning within the just food systems transition is shaped less by individual capacity deficits than by power relations embedded in institutions, markets, and policy regimes (Fraser, 2009; Hall & Kepe, 2017). The political economy dynamics observed in this study are not abstract structural features but emerge directly from the empirical findings. In particular, the disconnect between skills acquisition and perceived opportunity, and the central role of gender equity as a mediating factor, point to institutional arrangements that regulate access to resources, markets, and decision-making power within food systems.

5.1 Power Asymmetries between Communities, the State, and Agribusiness

The findings point to a structurally asymmetric transition in which information, risk, and adjustment costs are decentralised to youth**,** while decision-making power and economic rents remain concentrated**.** Empirically, this asymmetry is captured by the coexistence of two core results: skills readiness increases perceived opportunity, while digital access reduces it. This pattern indicates that youth are being exposed to the transition without being empowered within**.**

Political economy research on agrarian change shows that market-led green transitions often expand transparency and participation rhetorically, while preserving incumbent control over land, finance, procurement, and standards (McMichael, 2013; Newell & Mulvaney, 2013). Qualitative evidence from this study mirrors these dynamics: youth described state programmes as opaque or elite-mediated, and agribusiness actors as setting entry conditions that systematically exclude small-scale and youth-led enterprises. The low mean Food System Justice Index reinforces this perception of institutional imbalance.

According to the review of the KII and FGDs, power dynamics within South Africa's food system remain uneven, with agribusinesses and state institutions often holding greater influence over land allocation, market rules, financing, and value-chain standards. Local communities, particularly small-scale farmers, youth, and women, typically have limited ability to shape these decisions due to weaker institutional support, fewer resources, and restricted access to information. These asymmetries affect who can participate meaningfully in production, distribution, and emerging green-economy opportunities. As a result, community voices are often overshadowed by larger actors whose interests drive strategic decisions, reinforcing historical inequalities and narrowing pathways for inclusive, community-led food system transformation. (Hall & Kepe, 2017; FAO, 2023; World Bank, 2019; PCC, 2022; Clapp, 2016). This implies that without deliberate restructuring of market access, financing systems, and governance arrangements, the green transition will continue to reproduce exclusion rather than expand opportunity for youth.

5.2 International Actors, Trade Regimes, and Financial Power

International actors shape local food systems not only through finance, but through rules, standards, and compliance regimes embedded in trade, climate finance, and sustainability frameworks. These instruments, often promoted by multilateral institutions, prioritise export competitiveness, scalability, and certification, frequently disadvantageing youth and small producers (Clapp, 2016; FAO, 2023).

The empirical results support this interpretation. Digital access improves skills readiness, but simultaneously heightens awareness of global compliance barriers, capital thresholds, and competitive pressures**,** helping explain its negative direct effect on perceived opportunity. Similar "capacity without access" dynamics have been documented in digitally mediated labour markets, where connectivity increases aspiration while revealing structural exclusion (Graham et al., 2019; Friederici et al., 2020). In this sense, global green transition agendas are experienced locally as aspirational but conditional, unless accompanied by redistributive and protective mechanisms.

Most participants were not aware of frameworks such as the European Green Deal or AfCFTA's environmental provisions. However, they were aware of global market shifts toward organic certification and sustainability standards. These standards influence export opportunities and access to sustainable markets. At the same time, they introduce new regulatory and compliance barriers. Participants expressed concern that African MSMEs lack the capacity to meet these requirements. Without support, youth-led enterprises risk exclusion from global value chains. Success will depend on aligning domestic support systems with global standards. Green finance, technical assistance, and export facilitation must prioritise youth and marginalised producers (Clapp, 2016; FAO, 2023; UNCTAD, 2022; ITC, 2021; OECD, 2020; Graham et al., 2019; Friederici et al., 2020). These qualitative insights align with broader evidence that while global sustainability standards create new market opportunities, they simultaneously impose compliance costs and institutional requirements that disproportionately exclude small-scale and youth-led enterprises unless targeted support is provided (UNCTAD, 2022; ITC, 2021; OECD, 2020). This implies that without deliberate restructuring of market access, financing systems, and governance arrangements, the green transition will continue to reproduce exclusion rather than expand opportunity for youth.

5.3 Youth and Women's Positioning within Political-Economy Structures

Across all models, gender equity perceptions emerge as the strongest predictor of perceived green opportunity, with women consistently reporting lower opportunity than men. Food system justice affects opportunity only indirectly, operating through gender equity. The findings therefore position gender not simply as a dimension of inequality, but as a structural condition that governs inclusion within the food systems transition. In this sense, gender operates as a gatekeeping mechanism that determines whether youth are able to convert capabilities, such as skills and digital access, into meaningful economic opportunities. These results provide empirical support for recognition-centred theories of justice, which argue that redistribution and

procedural reforms are ineffective unless they translate into lived inclusion and social recognition (Fraser, 2009; Schlosberg, 2007).

Feminist political economy literature shows that women's exclusion from land, finance, leadership, and decision-making positions constitutes a systemic constraint on equitable transitions (Kabeer, 1999; Agarwal, 2021). The findings here confirm that without recognition justice, addressing norms, representation, and power, skills and digital tools do not translate into opportunity, reinforcing gendered exclusion within green transitions. This interpretation is strongly supported by the empirical results, which show that the returns to skills and digital access are mediated through gender equity. Where gendered constraints persist, particularly in access to land, finance, and decision-making power, the effectiveness of otherwise enabling factors is significantly reduced.

A review of the KII and FGDs found that youth and women often occupy marginal positions within the political economy of South Africa's food system. Despite being central to labour, household food security, and community-level food production, they face structural constraints such as limited land access, restricted financing, and minimal representation in formal decision-making spaces. Their knowledge and lived experiences are acknowledged rhetorically but not always reflected in policy processes or market structures. This reduces their bargaining power and limits their ability to benefit from green-economy transitions. Without stronger inclusion mechanisms, youth and women continue to engage from the periphery, with fewer opportunities to shape or influence systemic change (Kabeer, 1999; Agarwal, 2021; FAO, 2023; ILO, 2018; World Bank, 2022; Hall & Kepe, 2017; UN Women, 2020). These findings are consistent with broader evidence that women's central role in agrifood systems is often not matched by equivalent access to assets, decision-making power, or market opportunities, resulting in systemic under-recognition and constrained participation (FAO, 2023; UN Women, 2020; World Bank, 2022).

5.4 Implications for a Just Food Systems Transition

Taken together, the political economy dynamics explain why the current transition produces uneven optimism, fragile trust, and selective inclusion. Qualitative evidence from focus group discussions and key informant interviews shows that many young people perceive green transition opportunities as distant and conditional rather than immediate and attainable. Participants repeatedly emphasised that while training programmes and digital platforms have expanded access to information and skills, these have not translated into secure livelihoods due to persistent barriers in accessing land, finance, and markets. As one recurring theme across sites indicated, *"opportunities exist, but not for people like us without connections or capital."* This helps explain why skills readiness is positively associated with perceived opportunity, yet overall confidence remains limited. Table 5.1 presents these indications.

The role of gender as a mediating mechanism is particularly important in this context, as it reveals that structural inequalities are not only embedded in resource distribution, but also in the social and institutional conditions that determine access. As a result, interventions that focus

solely on skills development or digital inclusion are unlikely to produce equitable outcomes unless they simultaneously address gendered power relations.

Table 5.1: Justice Dimensions, Empirical Constraints, and Policy Levers for Inclusive Youth Participation in Food Systems Transition

Justice Dimension	What It Means in This Study	Observed Constraints (Evidence from Results & Qualitative Data)	Implications for Youth Inclusion	Priority Policy Levers
Distributive Justice	Fair distribution of resources, assets, and economic opportunities (land, finance, skills, markets)	• Unequal access to land, finance, and markets • Urban bias in training, innovation hubs, and digital infrastructure • Rural youth face infrastructure and market access deficits • Green jobs require long-term investment beyond youth liquidity capacity	• Benefits of green transition captured by already advantaged groups • Rural youth structurally excluded • Skills gains do not translate into opportunity without asset access	• Youth-targeted land access and leasing schemes • Blended finance and concessional credit for youth agribusiness • Rural infrastructure and digital inclusion investments • Youth procurement quotas in food system value chains
Procedural Justice	Inclusion in decision-making, governance processes, and policy influence	• Youth participation largely consultative (“tokenistic”) • Policy processes dominated by government and agribusiness • Weak institutional platforms for sustained youth engagement • Limited influence over priorities (land, finance, training systems)	• Youth lack voice in shaping transition pathways • Policies misaligned with lived realities • Low trust in institutions and programmes	• Institutionalised youth representation in food system governance •Co-decision-making platforms at national and local levels • Participatory budgeting and programme design • Accountability frameworks for youth inclusion
Recognition Justice	Acknowledgement of diverse identities, roles, and contributions (gender, rural youth, informal actors)	• Youth treated as a homogeneous group in policy • Young women’s roles undervalued (e.g., agroecology, informal food systems) • Cultural and patriarchal barriers to land and leadership • Youth with disabilities largely excluded	• Invisible groups remain excluded from opportunities • Gender acts as a gatekeeping variable (confirmed in SEM) • Misrecognition limits programme effectiveness	•Gender-responsive programme design and targeting • Support for women-led and informal food system enterprises • Inclusion of youth with disabilities in programme design • Recognition of indigenous knowledge and local practices
Restorative Justice	Addressing historical injustices and structural inequalities (land, livelihoods, intergenerational equity)	• Legacy of apartheid shapes land access and asset inequality • Slow and complex land reform processes • Environmental degradation limits entry into agriculture • Small-scale initiatives exist but lack scale	• Persistent intergenerational inequality • Youth excluded from productive asset base • Limited pathways into sustainable livelihoods	• Accelerated and youth-inclusive land reform • Climate adaptation support (soil, water, resilience) • Scaling community-based agroecology initiatives • Long-term livelihood support (not short-term programmes)

Source: Authors’ synthesis based on survey data, SEM and regression analysis, and qualitative evidence (FGDs, KIIs, stakeholder workshops), supported by FAO (2021; 2023), ILO (2018), World Bank (2019), and PCC (2022).

Table 5.1 synthesises the study's findings across the four dimensions of justice; i.e. distributive, procedural, recognition, and restorative justice, linking empirical evidence from quantitative and qualitative analysis to concrete policy levers. The table shows that exclusion in the just food systems transition is multidimensional and cumulative: limited access to assets and markets (distributive injustice), weak voice and participation in decision-making (procedural injustice), and the under-recognition of diverse youth identities, particularly gendered and rural experiences (recognition injustice), interact to reinforce structural inequalities rooted in historical processes (restorative injustice). These overlapping constraints explain why improvements in skills and digital access do not automatically translate into inclusive opportunities.

Importantly, the table highlights that effective policy responses must be equally multidimensional, combining asset redistribution, institutional reform, inclusive governance, and targeted recognition of marginalised groups. Addressing any dimension in isolation is unlikely to shift outcomes; rather, coordinated interventions across all four justice dimensions are required to enable meaningful youth inclusion in the transition. In this sense, the table reinforces the central argument of the study: that inclusion is not a technical outcome of capacity-building, but a political outcome shaped by how power, resources, and recognition are distributed across the food system.

These findings are consistent with broader evidence that skills development alone is insufficient to generate inclusive employment where structural constraints remain binding. Studies on youth employment and agrifood transitions highlight that access to productive assets, institutional support, and market integration are critical mediating conditions that determine whether skills translate into viable opportunities (FAO, 2023; World Bank, 2019). Without these enabling conditions, investments in human capital risk producing what has been described as *"frustrated capability*" where individuals are better prepared but remain excluded from economic participation.

Qualitative evidence further shows that digitalisation is experienced ambivalently by youth. While digital tools improve access to information, training, and networks, they also expose young people to the realities of high entry barriers, compliance requirements, and competitive pressures in formal value chains. Participants noted that digital platforms often reveal opportunities that require levels of capital, certification, or institutional linkage that are beyond their reach. This aligns with emerging evidence that digital inclusion can increase awareness and aspiration without necessarily improving access to opportunities, thereby intensifying perceptions of exclusion (Graham et al., 2019; Friederici et al., 2020). In this context, digitalisation functions not only as an enabler but also as a mechanism that makes structural inequalities more visible.

Gendered dynamics further reinforce these patterns of selective inclusion. Across qualitative accounts, young women reported additional constraints related to land access, cultural norms, unpaid care responsibilities, and limited representation in decision-making processes. Even where programmes are formally open to all, women often face informal barriers that reduce their effective participation. This reinforces the econometric finding that gender equity operates as a gateway condition through which broader justice dynamics translate into perceived opportunity. Similar patterns have been documented in agrifood systems globally, where women's

contributions remain under-recognised and under-resourced despite their central role in food production and household food security (FAO, 2023; UN Women, 2020).

Finally, qualitative evidence highlights weak procedural inclusion as a key constraint. Youth participation in policy and programme design was widely described as consultative rather than transformative, with limited influence on actual decision-making. Participants expressed frustration that their inputs rarely translate into tangible changes in programme design or resource allocation. This supports the argument that procedural reforms, in the absence of genuine power-sharing, do not produce meaningful inclusion. As such, the transition remains shaped by existing institutional hierarchies rather than by inclusive governance arrangements.

Taken together, these insights reinforce the central conclusion of this study: that expanding youth access to green employment opportunities requires integrated interventions that simultaneously address skills, gender inequality, institutional inclusion, and structural barriers to entry. A genuinely just food systems transition therefore requires re-politicising the transition agenda—explicitly addressing who controls resources, who sets rules, and who bears risks—rather than treating youth exclusion as a skills or information problem (Newell & Mulvaney, 2013; Hall & Kepe, 2017). Without such a shift, the transition risks deepening existing inequalities even as it expands the scope of green economic activity. This reinforces the conclusion that inclusion in the food systems transition is governed by a layered system of structural constraints, within which gender operates as a central axis shaping access, participation, and opportunity.

6. OPPORTUNITIES FOR A JUST FOOD SYSTEMS TRANSITION

Opportunities for a just food systems transition are already emerging across South Africa's agrifood landscape, particularly through youth-led practices, pilot initiatives, and green livelihood niches. Evidence from the mid-term phase shows that young people are actively engaged in agroecology, renewable energy applications, circular economy activities, food processing, and digital advisory services, even as structural barriers constrain scale and sustainability (FAO, 2023; ILO, 2023).

Evidence from the qualitative analysis reveals that South Africa's food system transition presents real opportunities for green jobs. However, this has not yet unfolded in a just or inclusive manner for youth and women. Structural inequalities, particularly land access, finance, skills, and geographic disparities, continue to limit youth participation. Procedural mechanisms are weak, recognition of diverse identities is uneven, and restorative approaches remain underdeveloped. This synthesis highlights that without addressing these justice dimensions in an integrated manner, South Africa risks undertaking a food systems transition that accelerates green economic growth while deepening the very inequalities it seeks to resolve (FAO, 2023; ILO, 2023; UNEP, 2021; PCC, 2022; Hall & Kepe, 2017; World Bank, 2019).

6.1 Pathways for Creating Green and Decent Work for Youth

As summarised in Annex Table 4.10, multiple green opportunity domains align with both environmental objectives and youth aspirations. However, econometric and qualitative evidence indicates that these pathways remain fragile, informal, and weakly institutionalised. While skills readiness improves perceived opportunity, it does not translate into durable employment without access to assets, markets, and supportive governance (OECD, 2022; World Bank, 2021). Qualitative findings further show that many youth enter green activities through informal or project-based arrangements with limited continuity, reflecting broader patterns of constrained transition pathways. Promising pathways therefore include anchored green value chains linked to public procurement, work-integrated transition programmes that combine training with paid placements, and youth enterprise ecosystems supported through shared infrastructure and incubation hubs (FAO, 2023; ILO, 2023).

Qualitative evidence highlights that young people are already engaging across diverse opportunity domains, including agroecology, food processing, renewable energy, circular economy activities, digital advisory services, and research and innovation. Entry points are similarly varied, ranging from community-based initiatives and cooperatives to apprenticeships, learnerships, and short-term public or NGO-led programmes. However, participants consistently emphasised that these pathways remain fragmented, short-term, and insufficiently connected to stable markets or institutional support systems. This aligns with broader evidence that youth employment in green sectors is often characterised by informality and limited upward mobility unless supported by structured transition pathways and enabling institutions (ILO, 2023; UNEP, 2021).

Strengthening these pathways therefore requires coordinated, long-term support and deliberate inclusion of marginalised youth. In particular, sustained decent work depends on strengthening institutional and market linkages, including public procurement systems that prioritise youth-led enterprises, concessional and blended finance tailored to early-stage ventures, and integrated support systems that combine skills, mentorship, and asset access. Without such measures, emerging green opportunities risk remaining transitional or exclusionary rather than forming the basis for durable and inclusive youth employment within South Africa's just food systems transition (PCC, 2022; World Bank, 2019).

6.2 Policy, Institutional, and Financial Enablers and Constraints

Finance, procedural complexity, and institutional behaviour emerge as the most binding constraints to youth entry into green jobs. The policy instruments outlined in Table 4.7 illustrate how distributive and procedural justice deficits can be addressed through targeted procurement, blended finance, land access mechanisms, and public service contracts (PCC, 2022; ILO, 2023). These findings corroborate the negative direct effect of digital access observed in regression and SEM results: increased awareness does not translate into opportunity when institutional gateways remain exclusionary (Friederici et al., 2020; Graham et al., 2019).

Participants in the FGDs displayed limited familiarity with national and international frameworks such as AfCFTA, Conference of Parties (COP) commitments or the Green Economy Accord. The few that were aware described them as *"elite and high-level policies with little local relevance."* Many youths felt disconnected from policy processes, perceiving government programmes as inaccessible or inconsistent. Notwithstanding, they acknowledged the Department of Agriculture Land Reform and Rural development (DALRRD), and the Department of Forestry, Fisheries and the Environment (DFFE) as key institutional actors in the food systems space. However, they criticised the lack of coordination and information flow to local youth networks. Policies were seen as urban biased and insufficiently tailored to rural realities (PCC, 2022; ILO, 2023; World Bank, 2019; UNDP, 2022; AU, 2021; Hall & Kepe, 2017). These findings align with broader evidence that policy frameworks and green transition strategies often remain disconnected from local realities, with limited awareness, weak institutional coordination, and insufficient targeting of marginalised youth constraining effective participation (UNDP, 2022; AU, 2021; World Bank, 2019). Table 6.1 summarises the key policy bottlenecks identified through econometric and qualitative analysis and links them to targeted, actionable solutions.

Table 6.1: Policy Bottlenecks and Strategic Solutions for Inclusive Youth Participation in Green Food Systems

Policy Bottleneck (Observed Constraint)	Empirical / Qualitative Evidence	Implication for Youth Inclusion	Targeted Policy Solution (What to Do)	Key Actors (Who Acts)
Limited Access to Finance	Youth report lack of start-up capital; high collateral requirements; exclusion from formal credit systems	Youth unable to enter or scale green enterprises despite skills readiness	• Blended finance (grants + concessional loans) • Youth-targeted credit windows • Guarantee schemes for youth agribusiness	Treasury, Development Banks, Commercial Banks, DFIs
Institutional Gatekeeping	Regression/SEM: digital access ↑ awareness but ↓ perceived opportunity; FGDs: *"opportunities exist but not accessible"*	Awareness without access leads to frustration and exclusion	• Simplified access procedures • Transparent selection criteria • Decentralised programme delivery	Ministries (DALRRD, DFFE), Local Government, Agencies
Weak Policy Awareness (AfCFTA, COP, Green Economy)	Majority of youth unfamiliar with frameworks; perceived as "elite" and distant	Youth excluded from strategic opportunities and global value chains	• Youth-targeted policy communication • Localised outreach and translation • Integration into training curricula	Government, NGOs, TVETs, Universities
Fragmented Institutional Coordination	FGDs: poor coordination between departments; duplication and inconsistency	Inefficient support systems; missed opportunities for scaling	• Inter-ministerial coordination platforms • One-stop youth agribusiness support centres • Integrated programme design	Presidency, PCC, Line Ministries
Urban Bias in Programme Design	Rural youth report limited access to hubs, infrastructure, training	Rural youth structurally excluded from green transition pathways	• Rural-focused investment in infrastructure • Mobile and decentralised training models • Rural innovation hubs	Local Government, Infrastructure Agencies, Donors
Short-Term, Project-Based Support	Youth engagement largely through temporary programmes (EPWP, NGO projects)	No pathway to sustained employment or enterprise growth	• Work-integrated programmes (training + paid placements) • Long-term incubation support • Enterprise graduation pathways	ILO, Government, Private Sector
Compliance and Standards Barriers	Youth aware of certification requirements but lack capacity to comply	Exclusion from high-value and export markets	• Technical assistance for certification • Subsidised compliance support • Collective certification models (cooperatives)	ITC, FAO, Export Agencies, NGOs
Weak Procedural Inclusion (Tokenism)	Youth describe participation as consultative, not influential	Policies misaligned with youth realities; low trust	• Institutionalised youth co-decision platforms • Participatory policy design • Accountability mechanisms	Government, Civil Society, Youth Networks

Source: Authors' synthesis based on mixed-methods evidence, including survey data, regression and structural equation modelling (SEM) results, and qualitative data from focus group discussions (FGDs), key informant interviews (KIIs), and stakeholder workshops, supported by FAO (2023), ILO (2023), World Bank (2019; 2021), and PCC (2022).

The matrix (Table 6.1) shows that youth exclusion from green employment is not driven by a single constraint but by a combination of financial, institutional, informational, and governance barriers that reinforce one another. In particular, limited access to finance, institutional gatekeeping, and weak policy awareness interact to prevent young people from translating skills and digital access into meaningful opportunities. At the same time, fragmented institutional coordination, urban bias, and short-term programme design further constrain the sustainability of youth engagement in emerging green sectors. The table highlights that effective policy responses must be systemic and coordinated, combining financial innovation, institutional reform, decentralised delivery, and genuine youth inclusion in decision-making. Addressing these bottlenecks is critical to transforming existing green opportunity pathways into durable and inclusive employment outcomes. Ultimately, the matrix reinforces the study's central finding that inclusion is not a function of opportunity availability alone, but of how institutions structure access to those opportunities.

6.3 Community-Driven and Participatory Models for Inclusion

Participatory and community-based models emerge as particularly effective for redistributing access and strengthening youth voice. Youth associations, cooperatives, and university-linked innovation hubs provide scalable mechanisms for embedding gender equity, pooling risk, and improving accountability in food systems governance (FAO, 2022; Hall & Kepe, 2017). These models directly address the justice deficits identified in the empirical analysis.

Participants identified Siyakhana Food Garden (Gauteng), which promotes inclusive participation through community-based agroecology, training, and local food production. In the Eastern Cape, initiatives linked to Fort Hare University support youth through farmer training and research-extension partnerships. Pikitup recycling and composting programmes (Johannesburg) create entry points in the circular economy, while Working for Water programmes (Eastern Cape) provide youth with opportunities in ecosystem restoration. These models demonstrate inclusive entry points but remain limited in scale and sustainability (FAO, 2022; Hall & Kepe, 2017; ILO, 2018; UNEP, 2021; Department of Forestry, Fisheries and the Environment, 2020; City of Johannesburg, 2021). These findings are consistent with evidence that community-based and participatory models can enhance inclusion, accountability, and local ownership in food systems, but often remain constrained by limited scale, financing, and institutional integration (FAO, 2022; UNEP, 2021; ILO, 2018).

7. SYNTHESIS AND DISCUSSION

7.1 Integrating Justice Dimensions and Analytical Lenses

Across descriptive, regression, and SEM analyses, recognition justice (captured through gender equity perceptions) emerges as the most consistent driver of perceived inclusion. Distributive justice operates ambivalently: while skills readiness enhances perceived opportunity, digital access exerts a strong negative direct effect. SEM results clarify this paradox by showing that digital access improves skills while simultaneously intensifying awareness of exclusionary institutional practices (Graham et al., 2019; van Dijk, 2020; ILO, 2023). Procedural justice deficits operate indirectly, shaping opportunity perceptions through gender equity rather than through direct institutional trust (Schlosberg, 2007; Fraser, 2009). This reinforces the study's central finding that exposure without access produces perceived exclusion rather than inclusion.

7.2 Tensions and Synergies in the Transition

The findings reveal tensions between information access and material inclusion, and between skills-led and justice-led transition strategies. Digitalisation expands knowledge but exposes persistent barriers to land, finance, and markets. Skills development is necessary but insufficient unless embedded within gender-equitable and procedurally fair institutional environments (Newell & Mulvaney, 2013; FAO, 2023; World Bank, 2019; UN Women, 2022). Gender equity, by contrast, functions as a synergistic catalyst, amplifying the benefits of skills readiness and justice improvements (UN Women, 2022). This highlights the need to shift from skills-first to systems-first transition strategies.

7.3 Directions for Further Research

Future research would benefit from longitudinal designs to assess whether improvements in skills and justice perceptions translate into realised employment outcomes. Greater integration of political-economy variables, such as land tenure, procurement regimes, and agribusiness power, would further strengthen understanding of structural barriers to just transitions (Acemoglu & Robinson, 2012; North et al., 2009; PCC, 2022). This would enable clearer identification of how institutional arrangements shape the translation of green opportunities into inclusive employment outcomes.

8. POLICY AND PRACTICE RECOMMENDATIONS

The recommendations below translate the empirical findings into actionable interventions that address not only capability gaps but also the institutional and structural conditions governing access to opportunity. The analysis shows that skills readiness (SRI), digital access (DAAI), and gender equity (GEPI) operate within a broader system in which institutional arrangements, market structures, and power relations determine whether capabilities translate into livelihoods (World Bank, 2022; FAO, 2023).

Effective policies must move beyond expanding opportunities to restructuring the pathways through which young people access land, finance, markets, and decision-making power.

8.1 Policymakers and Public Institutions

A central priority is to shift from fragmented, skills-led interventions toward pipeline-based green employment systems that link training directly to jobs. The Department of Higher Education and Training (DHET), Sector Education and Training Authorities (SETAs), TVET colleges, and the Department of Agriculture, Land Reform and Rural Development (DALRRD), in collaboration with private agribusiness firms, should embed mandatory work-based learning, apprenticeships, and placement agreements within training programmes in agro-processing, logistics, and climate-smart agriculture. This can be operationalised through the National Skills Development Plan (NSDP 2030) and existing TVET–industry partnerships (DHET, 2019; OECD, 2020), ensuring that training pathways lead directly into employment opportunities.

Addressing youth exclusion also requires tackling structural barriers to enterprise entry, particularly access to land, finance, and markets. DALRRD, the Land Bank, National Treasury, and provincial departments of agriculture should implement bundled support packages that combine subsidised land access (through leasing or land reform allocations), concessional finance (via blended finance instruments), and guaranteed market access (through offtake agreements). These interventions can be anchored within existing programmes such as the Comprehensive Agricultural Support Programme (CASP), the Land Reform Programme, and the Land Bank Blended Finance Scheme (DALRRD, 2020; Land Bank, 2021), thereby shifting from fragmented assistance to integrated enterprise development pathways.

Public institutions should further use procurement systems as a market-creation tool. National Treasury, together with sector departments such as Basic Education and Health, should institutionalise youth- and gender-responsive procurement quotas in public food systems, including school feeding programmes and hospital supply chains. Implementing these measures through the Preferential Procurement Policy Framework Act (PPPFA) and programmes such as the National School Nutrition Programme (NSNP) can create stable demand and significantly lower entry barriers for youth- and women-led enterprises (National Treasury, 2017; Department of Basic Education, 2021).

Given the central role of gender equity, all transition policies must adopt gender-transformative approaches that address structural inequalities in asset ownership, labour participation, and decision-making. The Department of Women, DALRRD, and provincial governments should operationalise gender-responsive budgeting, targeted land allocation, and dedicated financing windows for women-led enterprises, alongside support mechanisms such as childcare and leadership quotas. These interventions can be implemented through existing national gender policy frameworks and sectoral strategies (UN Women, 2022; Agarwal, 2021) to ensure that women are not only included but positioned to benefit equitably from emerging opportunities.

Digitalisation strategies must also shift from expanding access to enabling real economic participation. DALRRD, the Department of Forestry, Fisheries and the Environment (DFFE), extension services, and digital platform providers should integrate digital tools into functioning economic systems by linking them to extension services, input supply chains, certification processes, and market platforms. Embedding digital platforms within existing agricultural extension reforms and digital agriculture initiatives will ensure that connectivity translates into participation in formal value chains (World Bank, 2021; Friederici et al., 2020).

Recognising that many young people operate under conditions of risk and precarity, policymakers should align social protection systems with transition pathways. The Department of Social Development, National Treasury, and relevant sector departments should integrate income support mechanisms such as grants and public employment programmes, with skills development, enterprise support, and green job placement pathways. Existing initiatives such as the Expanded Public Works Programme (EPWP) and youth employment schemes provide practical entry points for linking social protection with sustainable livelihood opportunities (ILO, 2023).

Finally, these interventions must address spatial inequality. Provincial governments, DALRRD, and DFFE should prioritise targeted investments in rural infrastructure, extension services, and market access in underserved regions such as the Eastern Cape. Leveraging mechanisms such as the District Development Model (DDM) can support coordinated, place-based interventions that reduce geographic disparities in access to opportunity (Presidency of South Africa, 2020).

8.2 Civil Society, Farmer Organisations, and Cooperatives

Civil society organisations, farmer groups, and development agencies play a critical role in mediating access to opportunities, particularly where individual-level constraints are binding. Scaling cooperative and collective enterprise models can enable youth to pool assets, reduce risk, and strengthen bargaining power within value chains. This can be supported through cooperative development programmes and NGO-led enterprise initiatives that facilitate access to finance, inputs, and markets (Hall & Kepe, 2017).

In addition, strengthening participatory governance and accountability mechanisms is essential for improving procedural justice. Civil society organisations and local governments should institutionalise community monitoring, participatory planning, and transparent beneficiary

targeting to ensure that programmes reflect local priorities and effectively reach marginalised youth and women (FAO, 2022).

8.3 Youth and Women's Movements

Youth and women's movements are central to reshaping the power dynamics that underpin exclusion. While digital access increases awareness, it does not automatically translate into inclusion unless linked to agency and collective action. Youth organisations and advocacy groups should leverage digital platforms for policy engagement, collective mobilisation, and accountability, strengthening their ability to influence decision-making processes (Graham et al., 2019).

At the same time, addressing systemic barriers requires cross-sector alliances that connect youth, gender, climate, and land justice movements. Building such alliances can enhance collective bargaining power and enable more effective engagement with state and market actors, particularly in shaping governance arrangements within the food systems transition.

Taken together, these recommendations demonstrate that inclusive green employment is not primarily a function of expanding opportunities, but of restructuring the institutional, market, and governance systems that determine access to them (Fraser, 2009; Schlosberg, 2007). Without such reforms, the food systems transition risks reproducing existing inequalities even as it generates new forms of economic activity.

9. CONCLUSION

This study set out to examine the drivers and systemic barriers shaping youth employment and green job creation within a just food systems transition in South Africa. Across quantitative and qualitative analyses, the findings demonstrate that youth inclusion is determined less by deficits in motivation or awareness than by structural misalignments between skills development, institutional arrangements, and power relations.

In answering the study's core research question, the results show that while skills readiness enhances perceived access to green opportunities, it does not independently translate into inclusion. Similarly, digital access plays a dual role: it strengthens capabilities and information flows, but also heightens awareness of persistent structural barriers, including limited access to land, finance, and markets. These findings underscore that technological and human capital investments, in isolation, are insufficient to generate inclusive employment outcomes.

Most critically, gender equity emerges as the strongest and most consistent determinant of perceived opportunity. Across regression and structural equation modelling results, gender equity mediates the effects of institutional fairness and access, highlighting the centrality of recognition justice in shaping inclusion. Procedural justice, reflected in participation and institutional responsiveness, operates primarily through these recognition pathways, reinforcing the importance of governance structures that enable meaningful youth engagement.

The study further challenges deficit-oriented narratives by demonstrating that young people are already actively engaged in green and agri-food activities. However, these engagements remain fragmented, informal, and precarious due to weak market integration, limited financial access, and institutional gatekeeping. In this regard, food systems in the Eastern Cape and similar contexts continue to function largely as buffers against poverty rather than as pathways to dignified and sustainable livelihoods.

A distinctive contribution of this study lies in its participatory methodology, which engaged youth as co-researchers throughout the research process. This approach operationalises procedural and recognition justice not only as analytical constructs but also as practical principles that can inform more inclusive research and policy design.

From a just transition perspective, the findings highlight that sustainability initiatives that neglect structural inequalities risk reproducing existing patterns of exclusion. For South Africa, and for food systems across Africa more broadly, the central challenge is therefore not whether green transitions will occur, but whether they will be governed in ways that redistribute opportunity, recognise marginalised groups, and ensure meaningful participation.

A just food systems transition must therefore move beyond technical solutions to embed gender equity, institutional accountability, and youth-centred governance at its core. Only through such integrated approaches can environmental sustainability be aligned with inclusive economic transformation and the creation of durable, dignified livelihoods for young people.

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Annexes

Annex 1: Key Informant Interview Guide

Facilitator Name	
Location	
Interviewee	
Date	

Introduction

Thank you for making time to speak with me today. Your expertise is invaluable to our research, which examines how South Africa's transformation into a sustainable and equitable food system can generate meaningful green employment opportunities for young people.

We are especially interested in understanding how different groups of youth — across gender, geography, race, class, education, and other social factors — experience opportunities and barriers within this transition. Your insights will help us identify both systemic gaps and inclusive solutions.

There are no right or wrong answers — we welcome your honest reflections and recommendations. All responses will remain confidential and anonymised in our reporting. This discussion will inform actionable recommendations for policymakers and stakeholders.

With your permission, may I start recording so that we can capture your opinions clearly?

Research Question I: How can a just food systems transition contribute to green jobs for youth in Africa?

- How does your institution define *'green jobs'* within South Africa's food system transition, and what measurable targets exist to ensure youth (ages 18–35) are prioritised in these opportunities?

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_____

- Do young people from different backgrounds (e.g., rural vs. urban, men vs. women, indigenous/ethnic minorities, low-income households, those with disabilities) experience different opportunities or barriers in accessing these jobs? Please provide examples.

_____
_____
_____
_____

- What are the most significant gaps between current youth green job initiatives and the skills demanded by emerging sustainable agriculture/value-chain sectors? How should training programmes bridge these gaps in ways that address **different sub-groups of youth**?

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_____
_____
_____

Research Question II: How do national and international institutional and regulatory frameworks shape opportunities for young people in the food systems transformation?

- Which national policies or international agreements (e.g., AfCFTA, COP commitments) most directly influence youth opportunities in food systems? Where do you see alignment or conflict between these frameworks?

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_____
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_____

- How do regulatory barriers (e.g., land tenure laws, access to finance, trade restrictions) disproportionately limit youth entrepreneurship in green food enterprises? Which groups of youth (young women, rural youth, those with limited education, marginalised ethnic groups) are most affected, and what reforms are being prioritised?

_____
_____
_____
_____

Research Question III: How are the different justice dimensions captured in national efforts to transform the food system?

- How are principles of distributive justice (equitable benefits) and procedural justice (youth participation in decision-making) operationalised in national food transition strategies? Please share examples.

_____
_____
_____

- Where do you see trade-offs between economic efficiency and justice (e.g., gender, racial, geographic, or class equity) in current food system projects? How should these be mitigated to ensure inclusivity?

_____
_____
_____

- To what extent do current food system transition strategies address **multiple overlapping forms of exclusion** (e.g., being young, female, rural, low-income, or disabled at the same time)? What are the biggest blind spots?

_____
_____
_____

Research Question IV: How can food systems transition strategies in Africa take advantage of digital technologies to accelerate economic opportunities and safeguard the livelihoods of young people?

- What scalable digital innovations (e.g., AgriTech platforms, fintech, data analytics) show the greatest potential to create youth-led livelihoods in South Africa's food sector? What enables their success?

_____
_____
_____

- How do digital divides differently affect various groups of youth (rural youth, low-income households, young women, those with lower levels of education)? What strategies — including public-private partnerships — are most effective in addressing these divides?

_____
_____
_____

Research Question V: Gender and Intersectional Disparities in Green Agriculture

1. What quantifiable data exist on gender disparities in youth access to green agriculture resources (land, finance, training)? How does your institution use these data to inform programming?

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_____
_____

2. Within these disparities, which sub-groups of young women (e.g., single mothers, rural women, women with limited education, women from marginalised ethnic communities) face the steepest challenges? How do your programmes address them?

_____
_____
_____

3. Beyond gender, what other intersectional barriers (e.g., race, disability, geography, poverty) limit youth participation in green jobs? How can policy, finance, and agribusiness actors respond to these overlapping inequalities?

_____
_____
_____

4. What concrete actions are needed from policymakers, financiers, and agribusinesses to dismantle structural barriers (e.g., biased land inheritance, childcare gaps, exclusion from leadership spaces) limiting youth participation in green agriculture?

Wrap-up Question

From your perspective, what are the most urgent intersectional inequalities (gender, race, geography, class, disability) that must be addressed to ensure South Africa's food system transition delivers green jobs for all youth?

_____
_____
_____

Closing

Thank you for your time and insights. Your contributions will directly inform our recommendations for a more inclusive and equitable food systems transition in South Africa.

Annex 2: Focus Group Discussion Guide

Research on "Green Jobs for Youth in the Just Food Systems Transition in South: Case Studies in the Eastern Cape Gauteng Provinces"

Focus Group Discussion (FGD) Guide

Group type: _____
Facilitator Name: _____
Location: _____
Participants: Male: ____ Female: ____ Other: ____ Total: ____
Date: _____

Introduction

Thank you all for joining us today for this focus group discussion. Your participation is crucial as we explore the topic of green jobs in South Africa's food systems transition.

This is a safe and respectful space for open dialogue. There are no right or wrong answers. We value each perspective, and what you share will remain confidential and anonymous in our reporting.

Our aim is to understand not only the opportunities and challenges for young people, but also how these vary across different groups of youth — for example, young men and women, rural and urban youth, those from wealthier or poorer families, different racial or ethnic groups, and youth with disabilities.

Before we start, here are a few ground rules:

1. Please respect each other's views.
2. Only one person speaks at a time.
3. Everyone should have an equal chance to share.
4. You may choose not to answer any question.

Let's begin.

Research Question I: How can a just food systems transition contribute to green jobs for youth in Africa?

- What does a *'green job'* in South Africa's food system mean to you? Could you describe examples of opportunities you've seen or heard about in your community?

_____
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_____

- Do some young people (e.g., women, rural youth, ethnic minorities, youth with disabilities, low-income families) face more challenges or fewer opportunities than others? Why?

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_____

- What are the greatest barriers to accessing green jobs, and what support would help different groups of youth overcome these barriers?

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_____
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Research Question II: How do national and international institutional and regulatory frameworks shape opportunities for young people in the food systems transformation?

6. Are you familiar with any government or international initiatives (e.g., AfCFTA, COP commitments, national policies) that support youth in food systems? Have these helped or limited opportunities for you or people you know?

_____
_____
_____
_____

7. Do these initiatives work differently for different groups (rural vs. urban youth, women vs. men, educated vs. less educated)?

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_____
_____
_____

8. If you could change one law or policy affecting youth in South Africa's food system, what would it be and why?

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_____
_____
_____

Research Question III: How are the different justice dimensions captured in national efforts to transform the food system?

1. Do food system initiatives provide fair benefits to all youth, or do some groups (young women, rural poor, ethnic minorities, disabled youth) get left out? Please share examples.

_____
_____
_____
_____

2. What does *'justice'* in food systems mean to you? Can you give examples where young people have been excluded or empowered?

_____
_____
_____
_____

3. Where do you see trade-offs between efficiency (e.g., quick profits, scaling projects) and fairness (e.g., equity for women, rural, or marginalised youth)?

_____
_____
_____
_____

Research Question IV: How can food systems transition strategies take advantage of digital technologies to accelerate economic opportunities and safeguard the livelihoods of young people?

1. In what ways are you or others using digital tools in farming, agribusiness, or food-related work? What worked well and what didn't?

_____
_____
_____
_____

2. Who is most left behind by the digital divide (e.g., young women, rural poor, youth without higher education)?

_____
_____
_____
_____

3. Which digital technologies or skills would most improve youth opportunities, and what support is missing to make them accessible to all?

_____
_____
_____
_____

Research Question V: Gender and Intersectional Disparities in Green Agriculture

- In your experience, how are young women's opportunities in farming, training, finance, or land ownership different from young men's?

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_____
_____
_____

- Within women, which groups (e.g., rural women, single mothers, women with less education, women from minority communities) face the biggest barriers?

_____
_____
_____
_____

- Beyond gender, what other factors (e.g., poverty, disability, race, rural location) combine to make it harder for some youth to succeed in green jobs?

_____
_____
_____
_____

- What can communities, government, or businesses do to remove these barriers and make opportunities more equal?

_____
_____
_____
_____

Closing

From your perspective, what are the most urgent intersectional inequalities (e.g., gender, race, geography, class, disability) that need to be addressed to ensure South Africa's food system transition creates green jobs for all youth?

_____

_____

_____

_____

Thank you for your participation — your voices will help shape more inclusive policies and programmes.

RECORD THE ATTENDANCE HERE (NAMES & CONTACTABLE TELEPHONE NUMBERS)

S/NO.	NAME OF PARTICIPANT	AGE OF PARTICIPANT	TELEPHONE NUMBER
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

Annex 3: Youth/Household Survey questionnaire

Questionnaire Number:			
Date of the Interview:		of Respo	
Province:			
Suburb:			
Region:	Urban	Peri-urban	Rural

GREEN JOBS FOR YOUTH IN A JUST FOOD SYSTEMS TRANSITION IN SOUTH AFRICA

QUESTIONNAIRE

1. Demographic and Socio-Economic Information (Put X)

Gender of respondent	Male	1
	Female	2
	Non-Binary	3
	Prefer-Not-To-Say	4
Age of respondent		
Education level	No formal Education	1
	Primary level	2
	Secondary level	3
	Post-secondary level	4
	Other (Specify)	5
Marital status	Never Married	1
	Married	2
	Widowed	3
	Other (Specify)	4
Employment status & sector	Traditional agri-food job	1
	Green job	2
	Self employed	3
	Student	4
	Unemployed	5
	Not in Education, Employment & Training (NEET)	6

2. How familiar are you with these environmentally sustainable job roles in agriculture (1 – Not at all familiar and 5 – Extremely familiar)

	1	2	3	4	5
1.Precision Agriculture Specialist					
2.Organic Certification Manager					
3.Agro-forestry Coordinator					
4.Renewable Energy Technician					
5.Water Stewardship Officer					
6.Agroecology Field Advisor					
7.Food Waste Valorisation Manager					
8.Carbon Farming Analyst					
9.Indigenous Crop Developer					
10.Fair Trade Compliance Officer					

3. How accessible are training programmes for green jobs? (1-not at all; 5 – Easily)

1	2	3	4	5

4. Rate the skills/training you possess (1 - None; 5 – Expert)

Skills	**1**	**2**	**3**	**4**	**5**

Digital skills					
Business/entrepreneurship training					
Technical sustainability skills					
Certification knowledge					
Practical green farming skills					
Soft skills					
Other (specify)					

5. Rate how each sector delivers on job security (1 = seasonal; 5 – long term)

Job security	**1**	**2**	**3**	**4**	**5**
Crop production					
Livestock/Dairy					
Agro-processing					
Retail/business					
Agri-tech/Digital services					

6. Rate how each sector delivers on career advancement (1 = no career growth; 5 – clear career advancement pathway)

Career advancement	**1**	**2**	**3**	**4**	**5**
Crop production					
Livestock/Dairy					
Agro-processing					
Retail/business					
Agri-tech/Digital services					

7. Rate how each sector delivers on renumeration benefits (1 = poor pay no benefits; 5 – excellent pay & competitive benefits)

Renumeration benefits	**1**	**2**	**3**	**4**	**5**
Crop production					
Livestock/Dairy					
Agro-processing					
Retail/business					
Agri-tech/Digital services					

8. Rate the following statements on green jobs (1 = strongly disagree; 5 – strongly agree)

Statement	**1**	**2**	**3**	**4**	**5**
Green jobs offer better job security than traditional agrifood jobs					
Green jobs offer better social benefits (health, pension) than traditional agrifood jobs					
Green jobs offer better working conditions than traditional agrifood jobs					

Green jobs offer more career advancement opportunities than traditional agrifood jobs					

9. To what extent do you agree with the following statements about fairness in the food system? (1 = strongly disagree; 5 = strongly agree)

Statement	1	2	3	4	5
Youth and older farmers have equal opportunities in food system policies.					
Rural and urban youth are treated fairly in food programmes.					
Policies recognise the needs of minority and marginalised communities.					
Future generations are considered when designing agricultural policies					

10. In your opinion, which justice issue is <u>MOST</u> neglected in current food system policies?

	Fair distribution of resources (land, finance, subsidied)
	Recognition of diverse voices (gender, rural youth, minorities)
	Participation in decision-making (procedural fairness)
	Protecting the rights of future generations (Intergenerational justice)
	Other (Specify)

11. Rank in order of priority challenges the youth face

Challenge	Rank 1-6
Access to land /inputs	
Skills training gaps	
Start-up funding	
Market access barriers	
Digital connectivity	
Discrimination	

12. What prevents youth from benefiting from food policies? *Select in order of priority 1-6*

Barriers	Rank 1-6
Complex application processes	
Lack of youth representation in policy design	
Insensitive to rural realities	
Corruption/favouritism	
Discrimination	
Inadequate implementation funding	

13. In which areas could policies create youth opportunities? *Select in order of priority 1-6*

Opportunity	Rank 1-6
Green export certifications	
Climate adaptation subsidies	

Digital marketplace platforms	
Co-operative support programmes	
Land lease schemes for youth	
Other (Specify)	

14. To what extent do policies target these groups? (1- To no extent at all; To a very large extent)

Group		**1**	**2**	**3**	**4**	**5**
Rural youth						
Young women						
Youth with disabilities						
Urban informal youth						
Peri-urban youth						

15. **Which inclusion tools/Methods are used or are you aware of to target these groups**?

Inclusion tool	**Yes/No**
Quotas for youth in decision making	
Targeted grants/loans	
Mobile outreach programmes	
Gender-sensitive training	
Affirmative procurement	

18. Have you ever been invited to contribute to the design, consultation, or monitoring of a food or agricultural programme? ☐ Yes ☐ No

19. If yes, how meaningful was your participation? (1 = not at all meaningful; 5 = very meaningful) Scale: 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐

1. **Rate the extent of gap of these services between rural and urban areas (1-No gap; 5-Extreme gap)**

Service	1	2	3	4	5
Digital Infrastructure					
Transport Costs					
Market Access					
Training Quality					

2. **Rate the severity of the competitive barriers for Micro Small & Medium Enterprises (1- not severe; 5- Extremely severe)**

Competitive Barrier	1	2	3	4	5
Input monopolies (seeds, fertiliser)					
Supermarket slotting fees					
B-BBEE compliance costs					

3. **Should large agri-firms pay a ‘market dominance levy’ to fund Micro Small & Medium Enterprise incubators? Y/N**

4. **Rate the following statements on youth engagement (1 = strongly disagree; 5 – strongly agree)**

Statement	1	2	3	4	5
Youth are consistently included in designing provincial food policies from the earliest stages.					
Information about youth engagement opportunities is consistently well-publicised in rural townships and former homelands					
Youth feedback meaningfully influences concrete changes to food policies and programmes					

5. **When environmental goals (e.g carbon-neutral farming) raise food prices, who should bear the costs?**

	Commercial farms		Consumers via taxes		State subsidies		Other (specify)

6. **Have you used any AI-driven farming apps (e.g., Khula, ZwartTech, FarmBetter etc) to reduce water or input costs in the past year? Yes/No**

7. **Have you heard of any digital tools used for farming or food selling in South Africa? Yes/No**

8. **How familiar are you with these technologies used in SA agriculture (1- Not at all; 5- very familiar)**

Technology	1	2	3	4	5
Mobile money (e.g Momo, Kazang)					
E-market places (e.g Khula, Grown4U)					
Drone monitoring					
Blockchain traceability (e.g woolworths farming for future)					

9. **Where did you learn or hear about digital farming tools?** ***Select all that apply***

Source	Mark with 'X'
Government programmes (NYDA, Land Bank)	
Private companies	
Socia media	
NGOs	
Never learned/ heard about them	

10. **Do digital technologies improve crop yields more for large-scale commercial farms than for youth-led smallholder farmers? Mark with 'X'**

1. Much more for large farms	

2. Somewhat more for large farms	
3. Equal improvement	
4. Somewhat more for smallholdings	
5. Much more for small holdings	

11. Relative to traditional markets, do digital platforms increase participation opportunities for black women youth farmers/entrepreneurs in value chains? Mark with 'X'

1. Yes, significantly more opportunities	
2. Slightly more opportunities	
3. No difference	
4. Fewer opportunities	

12. How severely do these factors limit your access to AgriTech tools? (1- Not severe; 5 – Extremely severe)

Barrier	**1**	**2**	**3**	**4**	**5**
Power cuts (Eskom loadshedding)					
Mobile data cost					
Poor network signal					

13. What stops you from using digital farming tools? Select all that apply. (Mark with an X)

1. Can't afford devices or software	
2. No ID/bank account for app registration	
3. Tech not in my language	
4. No training centres in my municipality	
5. Fear of data exploitation	
6. No barriers	

14. Are you aware or use these digital tools for clean access? (1- Not aware; 5- very aware)

App/platform	**1**	**2**	**3**	**4**	**5**
Eskom solar rebate portal					
PayGo Solar Apps (e.g Green Grid)					
Municipal Smart Meter Dashboards					
SA Weather service alerts					
DALRRD's AgriCloud SA					
Land Bank Digital Market place					

15. What is your experience with these digital work platforms? (1- No experience; 5- Excellent)

Platform	**1**	**2**	**3**	**4**	**5**
1. DEFF CarbonCrop SA					
2. Green Jobs SA					
3. Working on Fire GIS Tools					

16. To what extent are you concerned about these risks of digital agriculture? (1 = not concerned; 5 = very concerned)

Risks	1	2	3	4	5
Misuse of personal/farm data					
Dependence on expensive foreign technology					
Exclusion of farmers without internet access					
Loss of traditional/local farming knowledge					

17. Do you trust government or private companies more to manage digital farming platforms? (Mark with an X)

Government	
Private companies	
Both equally	
Neither	

18. To what extent do you agree with these Gender statements (1 = strongly disagree; 5 – strongly agree)

Gender dimension	1	2	3	4	5
1. Gender-based stereotypes significantly influence access to green jobs in agriculture for young people of different genders.					
2. Young women face more barriers than young men and other gender-diverse youth when accessing green jobs in agrifood value chains.					
3. Cultural norms and community-defined gender roles limit the participation of young people of different genders in green agriculture.					
4. Promoting gender equality and young women's empowerment is essential for transitioning to a just food system.					
5. Women and other gender-diverse youth are adequately represented in decision-making roles within green agriculture initiatives.					
6. Women, men and other gender-diverse youth, have equal access to emerging technologies and innovations in green agriculture.					

19. In the past 2 years, have you personally experienced any of these barriers due to your gender identity? (Select all that apply- Mark with and X)

Denied access to land/inputs	
Denied credit or finance	
Excluded from training opportunities	
Excluded from leadership/decision-making roles	
Paid less than men for similar work	
None	

20. Who do you believe benefits more from green agriculture initiatives in your community? (Mark with and X)

Young men	
Young women	
All genders	
Other (specify)	

THANK YOU FOR YOUR PARTICIPATION!!!

Annex 4: METHODOLOGICAL NOTES

A4.1 Introduction

This section outlines the methodological approach adopted to examine the drivers and barriers shaping youth employment and green job creation within a just food systems transition in South Africa. Given the complexity of food systems and the multidimensional nature of justice, inclusion, and employment outcomes, the study employed a mixed-methods, participatory research design that integrates qualitative and quantitative approaches. The methodology was designed to capture perspectives across multiple scales—household, community, value-chain, and institutional—while ensuring that youth and other key stakeholders were actively involved in the research process. The section details the research design and underlying paradigms, data collection methods, case selection rationale, and stakeholder engagement strategy, providing transparency on how evidence was generated and how analytical rigour and ethical considerations were

A4.2 Description of research design

The study adopted a mixed-methods participatory research design, combining exploratory analysis with in-depth case studies conducted in selected sites in South Africa. This design was selected in recognition of the complex, multi-actor, and multi-scale nature of food systems, which encompass diverse production, value-chain, institutional, and governance dynamics. Such complexity requires an approach capable of capturing both measurable patterns and lived experiences, particularly with respect to inclusivity, equity, and youth participation in a just food systems transition.

The research design integrated participatory approaches to ensure that the perspectives of key stakeholders—including youth, food-system workers, smallholder farmers, agribusiness actors, policymakers, and civil society organisations—were actively incorporated into the research process. Participatory engagement enabled co-creation of knowledge, facilitated validation of emerging findings, and strengthened the relevance of the study to policy and practice.

The study was guided by constructivist and pragmatic research paradigms. The constructivist paradigm informed the qualitative components of the research by emphasising the socially constructed nature of knowledge and the importance of understanding actors' perceptions, experiences, and interpretations of food-system transformation. This paradigm shaped the use of qualitative methods such as stakeholder workshops, key informant interviews, and focus group discussions, which were designed to elicit insights into justice dimensions, power relations, institutional constraints, and opportunities for youth inclusion and green job creation.

Complementing this, the pragmatic paradigm underpinned the overall mixed-methods strategy by prioritising methodological flexibility and problem-solving orientation. Rather than privileging a single methodological tradition, the pragmatic approach enabled the integration of qualitative and quantitative methods to generate evidence that is both analytically robust and policy-relevant. Quantitative components supported the analysis of patterns related to employment, participation, and institutional access, while qualitative data provided depth and contextual understanding of the drivers and barriers shaping a just transition in food systems.

The case study approach allowed for detailed examination of how national policies, institutional frameworks, and local contexts interact to influence food-system outcomes. By focusing on selected sites, the study captured variation across socio-economic, spatial, and institutional settings, while maintaining analytical coherence with the national-level policy environment. This design facilitated comparative insights across cases and enabled the identification of cross-cutting themes relevant to youth employment, green jobs, and equity.

Overall, the mixed-methods participatory research design strengthened the study's capacity to address complex questions at the intersection of climate change, food systems, and youth employment. By combining exploratory inquiry, stakeholder engagement, and empirical analysis, the design ensured that the research findings are grounded in both evidence and stakeholder realities, thereby supporting the formulation of inclusive and actionable policy recommendations.

A4.3 Data Collection methods

The study employed a mixed-methods data collection strategy, integrating qualitative, quantitative, and participatory approaches to capture the complexity of food systems transformation and its implications for youth employment, equity, and green job creation in South Africa. The combination of methods enabled triangulation across data sources and perspectives, strengthening the robustness and policy relevance of the findings.

A4.3.1. Participatory Stakeholder Workshops

Participatory stakeholder workshops constituted a core component of the data collection process. These workshops convened diverse food-system actors, including youth representatives, smallholder farmers, agribusiness actors, policymakers, labour organisations, civil society groups, and researchers. The workshops were used to explore perceptions of a just food systems transition, identify drivers and barriers to youth participation and green employment, and validate emerging findings. Structured facilitation techniques—such as guided plenary discussions, breakout sessions, and prioritisation exercises—were employed to promote inclusive dialogue and co-creation of knowledge.

A4.3.2. Key Informant Interviews

Semi-structured key informant interviews were conducted with individuals possessing in-depth expertise in food systems governance, climate policy, youth employment, and agricultural development. Interviewees included senior government officials, industry

representatives, development practitioners, researchers, and leaders of youth-focused organisations. The interviews focused on institutional frameworks, regulatory environments, political economy dynamics, and implementation challenges affecting food systems transformation.

A4.3.3. Focus Group Discussions

Focus group discussions (FGDs) were conducted with youth and other relevant stakeholder groups to capture shared experiences, social dynamics, and collective perspectives related to participation in food-system activities. Where appropriate, FGDs were disaggregated by gender and age to ensure inclusivity and encourage open discussion. Topics covered included employment pathways, access to productive resources, skills development, perceptions of green jobs, and barriers to inclusion.

A4.3.4. Household and Youth Surveys

To generate quantitative evidence at the household and individual youth levels, the study administered close-ended questionnaires through structured face-to-face interviews**.** The household and youth surveys were designed to capture standardised information on socio-demographic characteristics, employment status, participation in food-system activities, access to resources, skills and training, perceptions of green jobs, exposure to climate-related shocks, and constraints to engagement in food-system transformation.

The use of structured interviews ensured consistency in question delivery, reduced measurement error, and enhanced data quality, particularly in contexts with varying literacy levels. Enumerators were trained to administer the questionnaires, explain response categories where necessary, and adhere to ethical standards, including informed consent and confidentiality. The survey instruments enabled the generation of comparable quantitative data across respondents, supporting statistical analysis of patterns, disparities, and associations relevant to youth employment and just food systems outcomes.

A4.3.5. Document and Policy Review

A systematic review of relevant policy, strategy, and programme documents was undertaken to contextualise primary data and assess how justice, youth employment, and green jobs are reflected in existing frameworks. Reviewed materials included national development plans, climate and agricultural policies, food-system strategies, labour market reports, and international just transition guidelines.

A4.3.6. Secondary Quantitative Data Analysis

Secondary quantitative data were drawn from national and international sources, including labour force surveys, agricultural statistics, and youth employment datasets. These data were used to analyse trends in employment, informality, and demographic characteristics within food systems, complementing primary survey findings.

Collectively, these data collection methods enabled comprehensive triangulation across qualitative insights, participatory inputs, and quantitative evidence. This integrated approach ensured that the study captured both structural patterns and lived

experiences, providing a robust empirical foundation for analysing the drivers and barriers shaping a just food systems transition that supports inclusive youth employment and green job creation.

A5. QUANTITATIVE ANALYSIS – INDEX CONSTRUCTION, MODEL SPECIFICATION, ESTIMATIONS

This study is guided by the Just Transition Principles, with a focus on equity and inclusivity, and is underpinned by the Sustainability Transitions Framework. Accordingly, inductive thematic analysis was employed to analyse information derived from Key Informant Interviews (KII), Focus Group Discussions (FGD), household/youth surveys, and document analysis examining respondents' perceptions of youth unemployment, food system performance, and climate change impacts (Gray, 2021; Clarke & Braun, 2013; Trahan & Steward, 2013). The steps followed in conducting the analysis were: transcription; reading and familiarisation; coding; statistical and econometric analyses/modelling, identifying; reviewing; defining and naming themes; and report writing.

For the quantitative data, a range of statistical methods was applied to analyse the survey data generated in the research. These included descriptive analysis, correlation analysis, regression analysis, and structural equation modelling. Triangulation will be employed to enhance validity and reliability.

Composite Index Construction

Four composite indices were constructed to summarise multi-dimensional aspects of youth readiness, justice, and inclusion in the just food systems transition, following established practices in composite index construction and social indicator analysis (OECD, 2008; Nardo et al., 2005).
First, a Skills Readiness Index (SRI) was created as the simple average of six items capturing access to and participation in relevant training: digital skills, business skills, technical skills, certification-oriented training, practical "learning-by-doing" exposure, and soft skills (Train_Digital, Train_Business, Train_Technical, Train_Cert, Train_Pract, Train_Soft). This approach aligns with skills-based and capability-oriented assessments of youth employability and preparedness for decent and green work (Sen, 1999; ILO, 2013; FAO, 2021). The derivation of the index is shown below.

Raw index (row-wise mean):

$$SRI\_raw\_i = (Train\_Digital\_i + Train\_Business\_i + Train\_Technical\_i + Train\_Cert\_i + Train\_Pract\_i + Train\_Soft\_i) / 6 \quad \text{.....(1)}$$

Normalised index (min–max scaling):

$$SRI_i = \frac{\left(SRI_{raw_i} - \left(SRI_{raw}\right)\right)}{6}\left(\left(SRI_{raw}\right) - \left(SRI_{raw}\right)\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Second, a Food System Justice Index (FSJI) combined five Likert-type items measuring perceived fairness of youth targeting, rural inclusion, policy design, future opportunities, and neglect of marginalised groups (Fair_Youth, Fair_Rural, Fair_Policies, Fair_Future, Justice_Neglected). These dimensions reflect core elements of distributive and procedural justice within food systems and just transition frameworks (Schlosberg, 2007; Newell & Mulvaney, 2013; FAO, 2023). For SRI and FSJI, items were measured on comparable scales and therefore aggregated using row-wise means; the resulting indices were subsequently normalised to the [0,1] interval using min–max rescaling, a standard technique in composite indicator construction (OECD, 2008). The derivation of the index is shown below.

Raw index (row-wise mean):

$$FSJI\_raw\_i = (Fair\_Youth\_i + Fair\_Rural\_i + Fair\_Policies\_i + Fair\_Future\_i + Justice\_Neglected\_i) / 5 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Normalised index (min–max scaling):

$$FSJI_i = \frac{\left(FSJI_{raw_i} - \left(FSJI_{raw}\right)\right)}{5}\left(\left(FSJI_{raw}\right) - \left(FSJI_{raw}\right)\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

The third index, the Digital Agriculture Access Index (DAAI)**,** captures both access to and use of digital tools for agriculture and livelihoods. It combines 15 items on ownership and use of digital tools, access to connectivity and electricity, affordability, identification and language barriers, training, fear of misuse, and other self-reported obstacles (Digital_tools, Tech_money, Tech_market, Tech_drones, Tech_blockchain, Digital_Participation, Access_Power, Access_Data, Access_Network, Digital_tools_Afford, Digital_tools_ID, Digital_tools_language, Digital_tools_training, Digital_tools_fear, Digital_tools_barriers). This operationalisation is consistent with literature on the digital divide, digital inclusion, and the role of digitalisation in agrifood systems transformation (van Dijk, 2020; World Bank, 2021; FAO, 2022). Because these variables were measured on different original scales, each item was first standardised into a z-score, and the DAAI was computed as the average of all z-scores for each respondent, before being rescaled to the [0,1] interval (Nardo et al., 2005; OECD, 2008). The derivation of the index is shown below.

Let *ZkiZ_{ki}Zki* denote the **z-score** of digital access variable kkk for individual iii.

Step 1: Standardisation (z-score) of each component:

$$Z_{ki} = \frac{\left(X_{ki} - mean\left(X_k\right)\right)}{15} sd\left(X_k\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

$where XkiX_{\{ki\}Xki} = \ original\ value\ of\ item\ kkk\mu k\mu_{k\mu k} = \ mean\ of\ item\ kkk\sigma k\sigma_{k\sigma k} = \ standard\ deviati$

Step 2: Raw index (mean of standardised scores; 15 items):

$$DAAI_{raw_i} = \frac{\left(Z_{1i} + Z_{2i} + \ldots + Z_{15i}\right)}{15} \ldots\ldots (6)$$

Step 3: Normalised index (min–max scaling):

$$DAAI_i = \frac{\left(DAAI_{raw_i} - \left(DAAI_{raw}\right)\right)}{15}\left(\left(DAAI_{raw}\right) - \left(DAAI_{raw}\right)\right) \ldots\ldots (7)$$

The fourth and final index is the Gender Equity Perception Index (GEPI)**,** which summarises respondents' perceptions of gender norms and their own experiences of exclusion. It combines 11 items capturing attitudes toward gender roles, diversity and equality, representation and access, as well as reported instances of being denied access or credit, excluded from training and leadership, and being paid less (Gender_stereotypes, Gender_diverse, Gender_norms, Gender_equality, Gender_represent, Gender_access, Denied_access, Denied_credit, Excluded_training, Excluded_leadership, Paid_less). This index reflects gender-responsive and intersectional approaches to analysing inequality in labour markets and food systems (Kabeer, 1999; Doss et al., 2018; FAO, 2020). As with the DAAI, each component was first standardised to a z-score and the GEPI was computed as the row-wise mean of these z-scores, subsequently rescaled to the [0,1] interval. The derivation of the index is shown below.

Let X_mi denote the original value of gender-related variable m for individual i.

Step 1: Standardisation (z-score) of each component:

$$Z_{mi} = \frac{\left(X_{mi} - mean\left(X_m\right)\right)}{11} sd\left(X_m\right) \ldots\ldots (8)$$

Step 2: Raw index (mean of standardised scores; 11 items):

$$GEPI_{raw_i} = \frac{\left(Z_{1i} + Z_{2i} + \ldots + Z_{11i}\right)}{11} \ldots\ldots (9)$$

Step 3: Normalised index (min–max scaling):

$$GEPI_i = \frac{\left(GEPI_{raw_i} - \left(GEPI_{raw}\right)\right)}{11}\left(\left(GEPI_{raw}\right) - \left(GEPI_{raw}\right)\right) \ldots\ldots (10)$$

Higher values of all four indices indicate higher skills readiness, stronger perceived food system justice, greater digital access, and more gender-equitable conditions respectively.

A6 Quantitative Data Analysis and Triangulation

Quantitative data generated through the household and youth surveys were analysed using a structured, multi-stage analytical strategy designed to examine patterns of youth inclusion, skills, justice perceptions, and access to green employment opportunities within the food system. Analysis began with descriptive statistics, including frequencies, means, and standard deviations, to profile respondents and to summarise key variables and composite indices across study sites. These descriptive results provided an initial overview of youth participation, skills readiness, digital access, gender equity perceptions, and food system justice.

This was followed by bivariate correlation analysis to examine associations among the composite indices and key outcome variables. Correlation analysis was used to assess the direction and strength of relationships between skills readiness, digital access, justice perceptions, gender equity, and perceived access to green employment opportunities, and to inform subsequent multivariate model specification.

To examine determinants of perceived access to green employment opportunities, the study employed regression analysis, including ordered logistic regression models where outcome variables were ordinal in nature, and ordinary least squares (OLS) regression as a robustness check. These models controlled for relevant socio-demographic characteristics and contextual factors, enabling assessment of the independent effects of skills readiness, digital access, justice perceptions, and gender equity on youth employment outcomes.

Building on the regression results, structural equation modelling (SEM) was used to examine the causal architecture and mediation pathways linking the composite indices. SEM enabled simultaneous estimation of direct and indirect effects, allowing the study to test whether gender equity and food system justice mediated the relationships between skills, digital access, and perceived employment opportunities. Model fit was assessed using standard goodness-of-fit indicators, and alternative specifications were explored to ensure robustness of results.

Finally, triangulation was employed to enhance the validity and reliability of the findings. Quantitative results were systematically compared with qualitative evidence from key informant interviews, focus group discussions, stakeholder workshops, and youth co-researcher reflections. Convergences and divergences across data sources were examined to refine interpretation and to ensure that statistical patterns were grounded in institutional and lived realities. This mixed-methods triangulation strengthened confidence in the conclusions and supported integrated analysis of justice, inclusion, and youth employment in the food systems transition.

Annex 7: STRUCTURAL EQUATION MODELLING ESTIMATION TABLES

Annex Table 4.7. Indirect and Total Effects (Justice-Mediated Pathways)

Pathway	Indirect Effect	Std. Error	p-value
DAAI → SRI → Green Opportunity	0.336	0.112	0.003
FSJI → GEPI → Green Opportunity	0.226	0.051	<0.001
DAAI → FSJI → GEPI → Green Opportunity	0.014	0.017	0.412

Source: Field Data processed in STATA, 2025

Annex Table 4.8: Decomposition of Direct, Indirect, and Total Effects on Perceived Green Opportunity

Predictor	Direct Effect	Indirect Effect	Total Effect
Digital Agriculture Access (DAAI)	−1.557***	+0.336**	−1.221
Food System Justice (FSJI)	n.s.	+0.226***	+0.226
Skills Readiness (SRI)	+0.863**	—	+0.863
Gender Equity Perception (GEPI)	+2.148***	—	+2.148

Interpretation note:

- Digital access has a positive indirect but dominant negative direct effect.
- Food system justice influences opportunity only through recognition (GEPI).

Source: Field Data processed in STATA, 2025

Annex Table 4.9: SEM Model Fit Statistics

Fit Statistic	Value	Interpretation
Observations	612	—
Estimation Method	MLMV	Robust to missing data
χ^2 (df = 4)	84.30	—
p-value (χ^2)	<0.001	Expected in behavioural SEM
RMSEA	0.084	Acceptable
CFI	0.921	Good
TLI	0.883	Acceptable
SRMR	0.041	Good

Note:

Given the complexity of justice-related perceptions and the multi-equation structure, model fit falls within accepted thresholds for applied social science SEM. Emphasis is placed on path consistency and theoretical coherence rather than perfect global fit.

Source: Field Data processed in STATA, 2025

Annex Table 4.10: Summary of Justice Pathways Identified by SEM

Justice Dimension	SEM Evidence
Distributive Justice	Digital access increases skills but does not guarantee opportunity
Procedural Justice	FSJI does not directly affect opportunity
Recognition Justice	GEPI is the strongest determinant of perceived opportunity
Restorative Justice	No direct structural repair pathway observed

Source: Field Data processed in STATA, 2025

Key structural coefficients summarised as:

DAAI → SRI: $\beta = 0.389$, $p < 0.001$

FSJI → GEPI: $\beta = 0.105$, $p < 0.001$

SRI → Green Opportunity: $\beta = 0.863$, $p = 0.001$

GEPI → Green Opportunity: $\beta = 2.148$, $p < 0.001$

DAAI → Green Opportunity: $\beta = -1.557$, $p < 0.001$

These results provide crucial clarification.

Annex 8:
List of Organisations where Key Informants were contacted

1. Community leaders, Mdantsane Nu10
2. Youth groups in the Eastern Cape and Gauteng
3. Farmer in Gauteng
4. KKI Academy, Youth Agriculture and Climate Change,
5. Department Of Rural Development And Agrarian Reform, Eastern Cape
6. Gauteng Department of Agriculture and Rural Development
7. National Department of Agriculture, Environmental Affairs, Rural Development and Land Reform
8. Department of Community & Social Development, Tshwane
9. Local Economic Development Manager at the Ingquza Municipality
10. Eastern Cape Appropriate Technology Unit
11. University of Pretoria
12. University of Fort Hare
13. Food, Agriculture and Natural Resources Policy Analysis Network
14. Future Africa
15. Statistics South Africa
16. Africa Sustainable Energy Transition
17. Independent Consultancy: Agriculture systems

Annex 9:
List of Stakeholders for Focus Group Discussions

- Agricultural advisers
- Smallholder farmers
- NEET youth
- Youth community leaders
- Rural youth and women farmers
- Community cooperative groups
- Extension officers
- Informal traders/ street traders
- Youth employment organisations
- Entrepreneurs

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