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Livelihood dynamics of tobacco farmers: A review based on the sustainable framework

¹B Hema, ²M Sheshu Madhav, ³V Jyothi, ⁴LK Prasad, ⁵Y Subbaiah, ⁶V Sravya and ⁷Ajit

¹Scientist (Agricultural Extension), ICAR-National Institute for Research on Commercial Agriculture (ICAR-NIRCA), Rajahmundry, Andhra Pradesh, India

²Director, ICAR-National Institute for Research on Commercial Agriculture (ICAR-NIRCA), Rajahmundry, Andhra Pradesh, India

³Associate Professor (Agricultural Extension), Sri Venkateswara Agriculture College, Tirupati, ANGRAU, India

⁴Head, Division of Post Harvest and Value Addition, ICAR-National Institute for Research on Commercial Agriculture (ICAR-NIRCA), Rajahmundry, Andhra Pradesh, India

⁵Principal Scientist (Agricultural Extension), ICAR-National Institute for Research on Commercial Agriculture (ICAR-NIRCA), Rajahmundry, Andhra Pradesh, India

⁶Young Professional, ICAR-National Institute for Research on Commercial Agriculture (ICAR-NIRCA), Rajahmundry, Andhra Pradesh, India

⁷Technician, ICAR-National Institute for Research on Commercial Agriculture (ICAR-NIRCA), Rajahmundry, Andhra Pradesh, India

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Corresponding Author: B Hema

Abstract

Livelihood analysis provides a comprehensive framework for understanding agriculture as a multidimensional socio-economic system that extends beyond income and productivity. This review synthesizes national and international literature on the livelihoods of tobacco farmers using the Sustainable Livelihoods Framework (SLF), with emphasis on human, physical, financial, natural and social capitals. Global evidence from Africa, Asia, and Latin America indicates that tobacco cultivation particularly under regulated or contract-based systems has contributed to income stability, asset formation, employment generation and institutional integration, though outcomes remain heterogeneous and context-specific. In India, particularly FCV tobacco farming in Andhra Pradesh and Karnataka operates within a highly institutionalized system of regulated production, auction-based marketing, and specialized extension support, suggesting scope for positive livelihood transformation. However, the review identifies a critical empirical gap in India: the lack of comprehensive, capital-wise quantitative assessments capturing livelihood transformation beyond partial economic indicators. By examining conceptual foundations, capital-wise evidence, and index-based approaches such as the Livelihood Security Index (LSI/RLSI), this review underscores the relevance of Sustainable Livelihood Framework-based methods in capturing both gains and vulnerabilities, and identifies key priorities for future research and policy interventions in FCV tobacco systems.

Keywords: capital, livelihood, livelihood security index, sustainable, tobacco, DFID

Introduction

Livelihood is increasingly conceptualized as multidimensional system in which households combine resources, capabilities and strategies to sustain their well-being, rather than as outcomes defined solely by income or employment generation. Chambers *et al.*, (1992) ^[11] conceptualized livelihood as comprising the capabilities, assets both material and social activities necessary for sustaining life. Similarly, the Department for International Development (DFID, 1999; Carney *et al.*, 2000; De Stage *et al.*, 2002; Kollmair *et al.*, 2002) ^[14, 10, 13, 32] described a livelihood as sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its

capabilities and assets in the present and future, and do so without degrading the natural resource base. Since its emergence in the early 1990s, the Sustainable Livelihoods Approach (SLA), also referred to as the Sustainable Livelihoods Framework (SLF) (UNDP, 2017) ^[64], has become a widely adopted analytical tool in both academic research and applied development practice, particularly for examining rural livelihoods in developing regions of the global South. Livelihood refers to the combination of assets, capabilities, activities, and access mechanisms that shape how individuals and households sustain their living and secure their well-being (Perodi *et al.*, 2008; Gobind, 2008) ^[46, 24]. Livelihoods are shaped by the ways in which

individuals and communities organize themselves to transform their environment using technology, labour, power, knowledge, and social relations in order to meet their needs (Pradhan *et al.*, 2020) ^[47]. In this context, livelihood security refers to adequate and sustainable access to income and other essential resources that enable households to fulfill their basic needs. This includes reliable access to food, safe drinking water, healthcare, education, housing, and opportunities for community participation and social integration (Frankenberger, 1996) ^[23].

The notion of Sustainable Livelihoods forms the foundation of various Sustainable Livelihood Approaches (SLA), which have been adopted by several development agencies worldwide. Among these, the British Department for International Development (DFID) developed the Sustainable Livelihood Framework (SLF), which has become one of the most widely used conceptual tools in livelihood analysis and development planning. DFID framework was widely adopted by researchers as an effective framework for analysing household livelihood systems and addressing the underlying causes of rural poverty (Yin *et al.*, 2020) ^[68]. The Sustainable Livelihoods Approach gradually evolved into the Sustainable Livelihoods Framework (SLF) during the 1990s as it was adopted and operationalized by major development organizations. Early proponents included Oxfam in 1993, CARE International in 1994, and the UK's Overseas Development Administration (ODA) in 1995, which played a key role in formalizing and promoting the framework for development planning and livelihood analysis (Solesbury, 2003) ^[56]. The SLF provides a structured way to examine how different forms of capital *viz.*, human, natural, financial, physical, and social interact with institutional processes and vulnerability contexts to shape livelihood outcomes.

Livelihood analysis of farmers

Livelihood analysis is fundamental to understanding agriculture as a multidimensional socio-economic system rather than merely a production or income-generating activity (Ellis, 2000) ^[16]. By integrating five key forms of capital *viz.*, human, physical, financial, natural, and social, it offers a holistic framework to assess how farming households cope with and adapt to stresses such as climatic variability, market volatility, and policy changes (Scoones, 1998; DFID, 1999) ^[14, 52]. In developing countries, where poverty and economic vulnerability are widespread, the concept of livelihood has gained central importance as a key framework for understanding how rural households sustain themselves and cope with risks and uncertainties (Bryceson, 2000; Ellis and Allison, 2004) ^[8, 15]. In agricultural systems increasingly shaped by globalization, commercialization, and regulatory frameworks, livelihood analysis helps identify structural constraints, resilience strategies, and livelihood trade-offs that are often overlooked in conventional assessments based solely on income or productivity (Ellis *et al.*, 2004; Scoones, 2015) ^[18, 53].

Such insights are crucial for designing context-specific extension services, formulating inclusive agricultural policies, and promoting sustainable rural development that strengthens income stability, social equity, and long-term resource sustainability (Carney, 1998; DFID, 1999) ^[9, 14].

Within this broader analytical framework, the relevance of livelihood analysis becomes particularly pronounced in highly commercialized and institutionally regulated crops like tobacco, where farmers' livelihood outcomes are shaped by complex interactions among markets, institutions, and policy environments. Systematic assessments of livelihood assets and strategies among tobacco- and non-tobacco-growing households in the South Nyanza region of Kenya were conducted by Kibwage *et al.*, (2009) ^[31], providing important insights into the livelihood dynamics and comparative resilience of farming communities engaged in different cropping systems.

Significance of FCV tobacco in farmers' livelihoods

Flue-Cured Virginia (FCV) tobacco represents one such system in which livelihood analysis provides critical insights beyond conventional economic evaluation. Globally, tobacco is recognized as a high-value commercial crop with assured marketability and strong export linkages, sustaining smallholder livelihoods in several developing countries, including Malawi, Zimbabwe, Zambia, and Kenya (FAO, 2003; Makoka *et al.*, 2017; Magati *et al.*, 2019) ^[22, 37, 35]. In India, FCV tobacco functions not merely as a commercial crop but as an institutionalized livelihood system characterized by regulated production (Reddy *et al.*, 2019) ^[50] auction-based marketing, and specialized research and extension support (Hema *et al.*, 2017) ^[27].

Concentrated mainly in Andhra Pradesh and Karnataka states, FCV tobacco cultivation provides relatively stable income, employment opportunities, and asset formation for farming households operating in specific agro-ecological zones. Compared to competing crops, FCV tobacco offers predictable returns and access to institutional credit, enabling farmers to better manage production and price risks. However, FCV tobacco cultivation also requires substantial capital investment, skilled labour, quality-sensitive management, and participation in regulated auction markets, making farmer livelihoods highly dependent on the interaction between financial security, physical infrastructure, human skills, and institutional support.

In this context, income-based evaluations alone are insufficient to capture broader dimensions of livelihood sustainability, including vulnerability to policy-induced shocks, labour constraints, market risks, and adaptive capacity to regulatory changes (Scoones, 1998; Kumar *et al.*, 2020) ^[52, 33]. India's commitment to the WHO Framework Convention on Tobacco Control (FCTC) has further complicated the policy landscape, as public health objectives may at times conflict with farmers' livelihood interests. Consequently, assessing whether FCV tobacco continues to provide stable and sustainable livelihoods or whether diversification pathways need to be strengthened has emerged as a critical policy concern.

A livelihood-based perspective also enables meaningful comparison across regions such as Andhra Pradesh and Karnataka in terms of productivity, profitability, labour use, and market access, thereby supporting the design of targeted and region-specific interventions. Recent fluctuations in cultivated area and prices, along with increasing emphasis on sustainability and energy-efficient curing technologies, have added further complexity to FCV tobacco-based livelihoods (Kumar *et al.*, 2020) ^[33]. These evolving

dynamics underscore the need for periodic and comprehensive livelihood assessments to inform evidence-based policy and extension strategies.

Sustainable Livelihoods Framework (SLF).

The transition of sustainable livelihoods from a conceptual approach (SLA) to a structured analytical framework (SLF) was further strengthened by the publication of an influential IDS working paper by Scoones (1998) ^[52]. This work

provided a clear visual representation of the framework, highlighting the central role of institutions and organizations in shaping livelihood opportunities, access to resources and overall livelihood outcomes (Fig 1). Subsequently, DFID advanced the framework by simplifying and operationalizing Scoones' original conceptual model, refining it into a more structured and practical tool that could be applied as a methodology for livelihood analysis and development planning (Carney, 1998) ^[9].

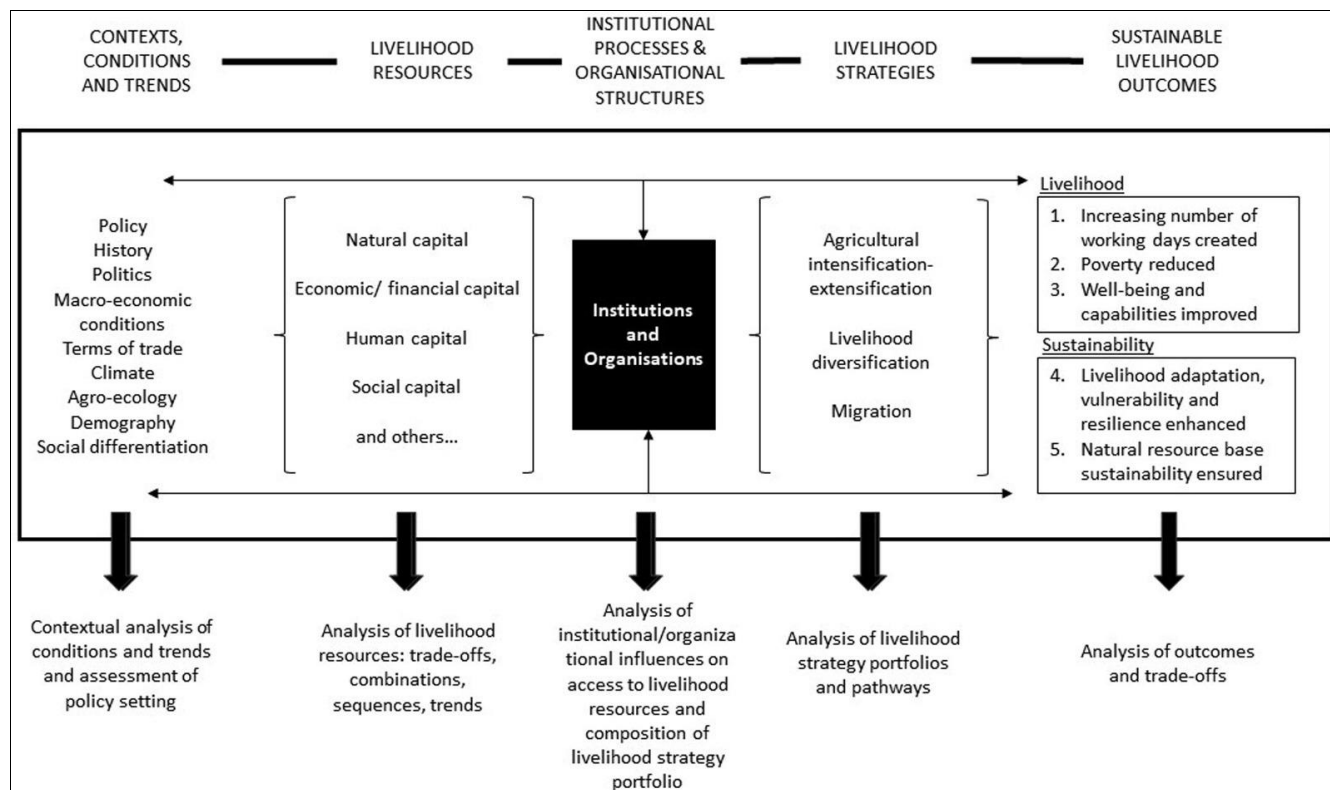


Fig 1: Sustainable rural livelihoods: a framework for analysis (Scoones 1998) ^[52]

DFID Framework

The Sustainable Livelihoods Framework (SLF), developed by the United Kingdom's Department for International Development (DFID), provides a comprehensive and integrative approach for analysing livelihoods in rural and agricultural contexts. Rooted in the seminal work of Chambers *et al.*, (1992) ^[11], the framework conceptualizes livelihoods as the capabilities, assets, and activities required for a means of living and define livelihood sustainability in terms of the ability to cope with and recover from stresses and shocks without undermining the natural resource base. DFID operationalized this conceptual foundation into a structured analytical framework that explicitly links household assets, vulnerability contexts, institutional processes, livelihood strategies, and livelihood outcomes (DFID, 1999; Carney, 1998) ^[14].

At the core of the DFID-SLF is the livelihood asset pentagon (Pandey *et al.*, 2017; Baffoe & Matsuda, 2018; Abbassi *et al.*, 2020) ^[44, 6, 1], which comprises five forms of capital: human, physical, financial, natural, and social (Fig 2). These capitals represent the resource base from which households construct their livelihood strategies (Scoones, 1998; Ellis, 2000) ^[52, 16]. This approach has received considerable attention over the past two decades (Fang *et*

al., 2014) ^[19] and has been widely adopted by international organizations such as the FAO, World Bank, UNDP and DFID to assess and understand the socio-economic conditions of rural communities in developing countries (Ansoms and McKay, 2010; Huang *et al.*, 2021) ^[5, 28]. Human capital includes education, skills, health, and labour availability; physical capital refers to infrastructure and productive assets; financial capital encompasses income, savings, credit, and insurance; natural capital includes land, soil, water, and environmental resources; and social capital captures social networks, institutional linkages, trust, and collective action (DFID, 1999; Ellis, 2000; Scoones, 2015) ^[14, 16, 53]. The framework emphasizes that these capitals are interdependent, and that deficiencies or strengths in one capital can significantly influence others.

Beyond assets, the DFID-SLF explicitly incorporates the vulnerability context, recognizing that livelihoods are shaped by external factors such as climatic variability, market fluctuations, policy changes, and demographic trends (Chambers *et al.*, 1992; DFID, 1999) ^[11, 14]. These shocks, trends, and seasonalities interact with household assets to influence livelihood choices and outcomes. The framework further highlights the role of transforming structures and processes, including policies, institutions,

organizations and social relations, which mediate access to resources and determine how assets are converted into livelihood strategies (Scoones, 1998; Carney, 1998) [52, 9]. This institutional dimension distinguishes the SLF from purely economic or farm-level analytical models.

The ultimate focus of the DFID-SLF is on livelihood outcomes, such as increased income, improved well-being, reduced vulnerability, enhanced food security, and sustainable use of natural resources (DFID, 1999) [14].

Importantly, the framework does not prescribe specific livelihood strategies but instead provides a flexible and people-centred approach that can be adapted across contexts, sectors, and scales (Ellis, 2000; Scoones, 2015) [16, 53]. As a result, the SLF has been widely applied in empirical livelihood studies, poverty assessments, and development planning across agriculture, natural resource management, and rural development domains (Hussein *et al.*, 1998) [29].

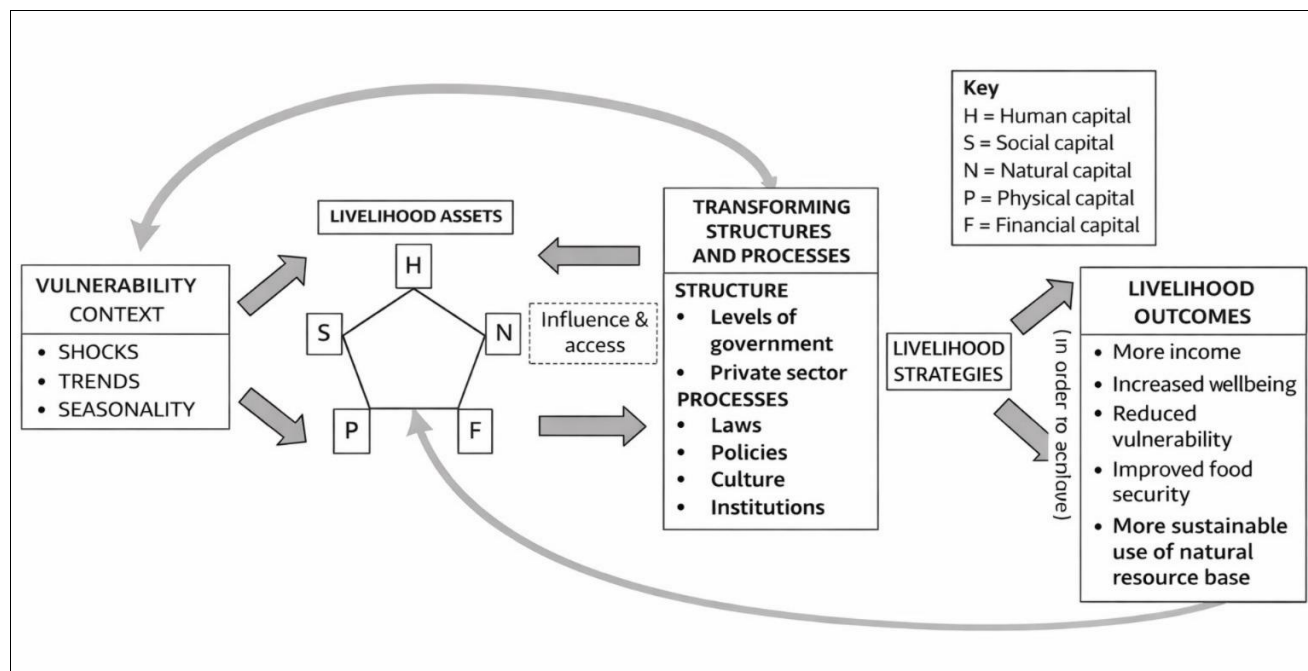


Fig 2: DFID Sustainable Livelihood framework flowchart

Livelihood Security Index (LSI) Dimensions and its Variables

The Livelihood Security Index (LSI) is grounded in the Sustainable Livelihoods Framework (SLF), which conceptualizes livelihoods as outcomes of interactions among multiple asset capitals, vulnerability contexts, and institutional processes (Chambers *et al.*, 1992; Scoones, 1998; DFID, 1999; Kedir, 2015) [52, 11, 14, 30]. The LSI transforms this conceptual framework into an empirical tool by operationalizing each livelihood capital through context-specific indicators and aggregating them into a composite measure of livelihood security (Hussein *et al.*, 1998; Ellis, 2000; Yang *et al.*, 2020) [29, 16, 67].

Human Capital

Human capital refers to the skills, knowledge, education, health status, and labour availability that enable households to pursue and sustain livelihood strategies (DFID, 1999; Ellis, 2000) [14]. Within agricultural livelihoods, human capital determines farmers' capacity to adopt technologies, manage production risks, and respond to market and policy signals (Schultz, 1964; Scoones, 1998) [51, 52]. Education and farming experience enhance decision-making efficiency and productivity, particularly in technically intensive commercial crops (Feder *et al.*, 1985) [20].

In FCV tobacco systems, human capital assumes heightened importance due to the crop's labour-intensive and skill-dependent nature, especially in nursery management, curing,

grading, and quality compliance. Studies from Malawi and Zambia showed that household labour availability and farming experience strongly influence tobacco productivity and economic viability (Makoka *et al.*, 2017) [37]. At the same time, international evidence highlights labour scarcity, youth disengagement, and occupational health risks such as green tobacco sickness as significant constraints affecting livelihood security among tobacco growers (WHO, 2017; Magati *et al.*, 2019) [35, 66]. These findings underscore the need to incorporate both capability and health-related variables when assessing human capital in FCV tobacco livelihood analysis.

Physical Capital

Physical capital comprises the basic infrastructure and producer goods that support livelihood activities, including irrigation systems, machinery, storage facilities, housing, transport, and energy access (DFID, 1999; Scoones, 1998; Makhetha, 2010) [52, 36]. Adequate physical capital reduces production risks, improves efficiency, and enhances access to markets (Ellis, 2000; Reardon *et al.*, 2000) [16, 49].

In FCV tobacco cultivation, physical capital is particularly critical due to the need for curing barns, grading sheds, storage facilities, reliable electricity, and fuel sources for curing. Evidence from Zimbabwe demonstrates that the availability and condition of curing infrastructure directly influence leaf quality, production costs, and farm incomes (Scoones *et al.*, 2018) [54]. Studies from Malawi similarly

emphasize that investments in barns and curing technology are central to sustaining tobacco-based livelihoods but also increase farmers' capital exposure and dependency on tobacco markets (Makoka *et al.*, 2017) ^[37]. These international findings justify the inclusion of FCV-specific physical assets as key indicators in livelihood security analysis.

Financial Capital

Financial capital refers to the financial resources that households can mobilize to pursue livelihood objectives, including income, savings, access to credit, insurance and debt management capacity (DFID, 1999; Ellis, 2000; Morse & McNamara, 2013) ^[14, 16, 40]. Financial capital provides liquidity for investment, smoothens consumption, and buffers households against shocks (Hussein *et al.*, 1998) ^[29]. In commercial tobacco systems, financial capital is often the most visible livelihood dimension due to relatively high gross returns. However, international studies caution that profitability alone does not equate to livelihood security. Empirical analyses from Malawi show that once full costs including labour, credit, and curing inputs are accounted for, net livelihood gains from tobacco are often modest and volatile (Makoka *et al.*, 2017) ^[37]. Research across Kenya, Zambia, and Malawi further indicates that farmers' continued engagement in tobacco is driven by perceived income stability and access to credit rather than consistently superior profits (Magati *et al.*, 2019) ^[35]. These findings highlight the importance of capturing not only income but also debt burden, savings, investment capacity, and financial risk exposure in FCV tobacco livelihood analysis.

Natural Capital

Natural capital encompasses the stock of natural resources such as land, soil, water, climate, and biomass upon which agricultural livelihoods depend (Scoones, 1998; DFID, 1999) ^[52, 14]. The quality and sustainability of natural capital directly affect productivity, vulnerability, and long-term livelihood security (Ellis, 2000; FAO, 2003) ^[16, 22].

In FCV tobacco, natural capital is closely linked to soil suitability, rainfall reliability, irrigation access, and availability of biomass for curing. Studies from Zimbabwe and southern Africa document the environmental pressures associated with FCV tobacco cultivation, particularly deforestation and fuel wood scarcity linked to curing requirements (Scoones *et al.*, 2018; WHO, 2017) ^[55, 66]. Evidence from Malawi also highlights farmers' growing vulnerability to climatic variability, including droughts and erratic rainfall, which directly affect tobacco yields and livelihood stability (Makoka *et al.*, 2017) ^[37]. These international insights reinforce the need to integrate environmental and resource-based indicators into livelihood security assessments of FCV tobacco farmers.

Social Capital

Social capital refers to the social resources upon which households draw in pursuit of their livelihoods, including networks, institutional linkages, trust, collective action, and access to information (DFID, 1999; Putnam, 1993; Scoones, 2015; Altasseb, 2021) ^[14, 53, 4]. Social capital facilitates cooperation, reduces transaction costs, and enhances adaptive capacity (Ellis, 2000; Woolcock *et al.*, 2000) ^[16, 65].

In regulated tobacco systems, social capital is strongly shaped by institutional arrangements involving regulatory bodies, extension agencies, auction platforms, and, in some countries, contract farming companies. International literature from Malawi and Zimbabwe highlights how institutional dependence and market structures create both livelihood security and "lock-in" effects for tobacco farmers, limiting diversification options (Scoones *et al.*, 2018) ^[55]. Trust in market institutions, access to timely price information, and support during market or policy shocks have been shown to significantly influence livelihood resilience among FCV tobacco growers. Therefore, social capital indicators are indispensable for capturing the institutional and relational dimensions of livelihood security in tobacco-dependent regions.

Livelihood Security Index (LSI) computation

In the livelihood literature, composite indices such as the Livelihood Security Index (LSI) are widely employed to translate the Sustainable Livelihoods Framework (SLF) into an empirical and comparable measure of household livelihood status (DFID, 1999; Scoones, 1998; Ellis, 2000) ^[14, 52, 16]. While DFID does not prescribe a fixed computational method, it explicitly encourages context-specific operationalization of livelihood capitals and the use of aggregated measures to capture multidimensional livelihood outcomes (DFID, 1999) ^[14]. Consequently, several studies have developed LSI-type indices by integrating indicators representing human, physical, financial, natural, and social capitals into a composite score (Hussein *et al.*, 1998; Hahn *et al.*, 2009) ^[29, 25].

Across empirical livelihood studies, the most common procedure involves normalizing indicators measured in different units and aggregating them into capital-wise sub-indices, which are subsequently combined into an overall LSI (Hahn *et al.*, 2009) ^[25]. Typically, indicators are standardized using min-max or z-score normalization, and negative indicators such as indebtedness or illness are reverse-coded to ensure directional consistency (OECD, 2008) ^[43]. Capital-wise indices are then computed as the arithmetic mean or weighted sum of normalized indicators under each capital.

The overall Livelihood Security Index is most commonly expressed as an equal-weighted average of the five capital indices, particularly in review-oriented and policy studies where differential weighting lacks strong empirical justification (Filmer *et al.*, 2001; Hahn *et al.*, 2009) ^[21, 25].

$$LSI_i = (HCI_i + PCI_i + FCI_i + NCI_i + SCI_i) / 5$$

Where:

LSI_i = Livelihood Security Index of the i-th household

HCI_i = Human Capital Index

PCI_i = Physical Capital Index

FCI_i = Financial Capital Index

NCI_i = Natural Capital Index

SCI_i = Social Capital Index

Alternatively, some studies apply differential weights to capitals based on empirical relevance or policy priorities, expressed as:

$$LSI_i = \sum (W_k * C_{ik}),$$

Where,

$$\sum W_k = 1$$

Here, C_{ik} represents the k -th capital index and W_k its corresponding weight (OECD, 2008; Hahn *et al.*, 2009) ^[43].

The study conducted by Opiyo *et al.*, (2024) ^[42] applied the Sustainable Livelihood Framework of tobacco and non-tobacco farmers to assess the status of human, natural, social, physical, and financial capitals among rural households. The findings demonstrated (Table 1) that variations in livelihood capital assets significantly influenced livelihood strategies and sustainability outcomes. The study highlighted the usefulness of the SLF as an effective tool for evaluating livelihood resilience and identifying priority areas for rural development interventions.

Table 1: Comparison of livelihood capital indices among rural households

Livelihood Capital	Index Value Range	Relative Ranking	Sustainability Interpretation
Social Capital	0.64 - 0.69	I	High
Physical Capital	0.60 - 0.67	II	Moderate to high
Natural Capital	0.60 - 0.64	III	Moderate
Human Capital	0.55 - 0.65	IV	Moderate
Financial Capital	0.44 - 0.57	V	Low to moderate
Overall Livelihood Sustainability Index	Moderate level		Moderate

Source: Opiyo *et al.*, (2024) ^[42]

Relevance of SLF for FCV tobacco

The DFID Sustainable Livelihoods Framework is especially relevant for analysing FCV tobacco livelihoods because FCV is not simply a crop enterprise it is a capital-intensive, institutionally mediated and risk-exposed livelihood system where household well-being is shaped by the interaction of assets, vulnerability, and governance arrangements rather than by income alone (DFID, 1999; Scoones, 1998) ^[14, 52]. In FCV, the SLF's five-capital lens helps explain why farmers continue tobacco cultivation even under contestation: perceived "viability" depends on a bundle of capitals skills and labour (human), curing barns and infrastructure (physical), credit and liquidity (financial), soil-water-fuelwood dependence (natural), and institutional linkages/market trust (social) that jointly determine

resilience and choices. Evidence from African FCV systems shows that institutional arrangements (contract farming, marketing governance, input and credit relationships) can simultaneously stabilize market access and create dependence or "lock-in," making SLF's "transforming structures and processes" component crucial for interpreting livelihood trajectories beyond farm-level profitability (Scoones *et al.*, 2018) ^[55].

Further, FCV tobacco livelihoods are strongly shaped by the SLF's vulnerability context viz., price and demand shocks, labour scarcity, climate variability, and policy shifts. Therefore, capital based assessment is needed to capture differential coping capacity across farm sizes and regions (Scoones *et al.*, 2018) ^[55]. The SLF is also well suited to FCV tobacco because it explicitly integrates environmental sustainability into livelihood assessment: curing and cultivation can intensify pressure on forests and other natural resources, linking natural capital status (fuel wood availability, land and water conditions) to livelihood security and long-term viability (WHO, 2017) ^[66]. Finally, FCV tobacco operates within a contested policy space where public health goals (FCTC) interact with rural livelihood dependence; SLF provides a balanced way to assess trade-offs and identify feasible transition pathways by diagnosing which capitals constrain diversification and which institutional supports would be required for sustainable alternatives (Scoones *et al.*, 2018) ^[54].

Livelihood Transformation in Tobacco farming: Evidence across countries

Across countries, tobacco cultivation, particularly under regulated or contract systems has contributed to positive livelihood changes across all five capitals, most visibly in financial and physical capital, followed by human and social capital (Table 2). In low-cash economical countries, tobacco farming can generate cash to pay for necessities like education and health care (Tobacco Atlas, 2025) ^[60]. In few countries (e.g., Argentina and North Macedonia) farmers seek government subsidies for tobacco, which is counter to the Framework Convention on Tobacco Control (FCTC). However, improvements are heterogeneous and conditional, with long-term sustainability depending on institutional safeguards, labour health, and natural resource management. This capital-wise evidence reinforces the relevance of SLF-based Livelihood Security Index approaches for capturing both gains and vulnerabilities in tobacco-dependent livelihoods.

• Human Capital

Table 2: Evidence of livelihood improvement through capitals across countries

Country	Indicator of human capital improvement	Quantitative evidence	Source
Zimbabwe	Education & health outcomes of tobacco households	Mean score 3.44 (education) and 3.61 (health access) on 5-point Likert scale among tobacco farmers	Mapfumo and Mushunje (2022) ^[39]
Kenya	Employment generation (labour days)	Tobacco required ~220-250 labour days/ha, generating seasonal employment	ACS (2018)
Malawi	Skill acquisition through contract farming	>70% contract farmers reported improved agronomic and curing skills	Makoka <i>et al.</i> , (2017) ^[37]
India (AP & Karnataka)	Skill-intensive FCV operations	FCV tobacco employs family + hired labour, higher than cereal crops	Hema <i>et al.</i> , (2018)

• Physical Capital

Country	Physical asset improvement	Quantitative evidence	Source
Zimbabwe	Farm infrastructure	68% of tobacco households invested in barns, wells, or housing improvements	Scoones <i>et al.</i> , (2018) ^[55]
Malawi	Curing & storage assets	Contract farmers owned 1.8×more barns than non-contract farmers	Makoka <i>et al.</i> , (2017) ^[37]
India (FCV regions)	Curing infrastructure	Majority of FCV growers own curing barns; During crop season for the year 2022-23, a total of 83,304 growers covering 90,731 barns were registered with Tobacco Board, India for cultivation of FCV tobacco	Tobacco Board (2023) ^[62]
Brazil	On-farm infrastructure	Tobacco households reported higher machinery and housing asset index than non-tobacco farms	FAO (2003) ^[22]

• Financial Capital

Country	Financial indicator	Quantitative evidence	Source
Malawi	Gross margins (cash income)	US\$630/acre (contract); US\$417/acre (independent)	Makoka <i>et al.</i> , (2017) ^[37]
Kenya	Share of household income	Tobacco contributed ~65% of total household income	ACS (2018)
India (AP & Karnataka)	Net farm returns	Net returns ₹25,000-35,000/ha, higher than many alternatives	Hema <i>et al.</i> , (2018)
Bangladesh	Net profitability	Farmers with access to credit from tobacco companies were 6.12 times more likely to grow tobacco. This indicates the strong institutional influence of contract farming and credit linkages. Access to short-term financial support increased the likelihood of tobacco cultivation by 4.68 times. Tobacco companies often provide advance payments, making tobacco attractive to resource-constrained farmers.	Talukder <i>et al.</i> , (2020) ^[59]
Zimbabwe	Productivity gain (proxy for income)	Contract farming increased productivity by ~39%	Pangapanga Phiri <i>et al.</i> , (2023) ^[45]

• Natural Capital

Country	Natural capital outcome	Quantitative evidence	Source
Zimbabwe	Land productivity	Tobacco yields 2-3× higher gross value/ha than maize	Scoones <i>et al.</i> , (2018) ^[54]
Malawi	Land use intensity	Tobacco grown on <1 ha still provides main cash income	Makoka <i>et al.</i> , (2017) ^[37]
India (FCV regions)	Soil-water suitability	FCV tobacco concentrated in light soils with assured irrigation, supporting stable yields. Average productivity levels were recorded at 1,360 kg/ha in Southern Light Soils, 1,983 kg/ha in Southern Black Soils, 2,405 kg/ha in Northern Light Soils (assured irrigation), and 1,832 kg/ha in Northern Black Soils, indicating notable variation across soil types and production regions.	Tobacco Board (2022) ^[61]
Brazil	Land efficiency	Tobacco provides ~4× income per unit land vs food crops	FAO (2003) ^[22]

• Social Capital

Country	Social capital indicator	Quantitative evidence	Source
Zimbabwe	Institutional linkage	>80% growers linked to contractors/auction systems	Scoones <i>et al.</i> , (2018) ^[54]
Kenya	Market access & trust	Contract farmers received timely payments (significantly higher than independents)	ACS (2017)
Malawi	Credit & input access	>70% contract farmers accessed inputs via institutional credit	Makoka <i>et al.</i> , (2017) ^[37]
India (FCV system)	Organized marketing	100% FCV marketed through regulated auctions, reducing price uncertainty	Tobacco Board (2024) ^[63]

Implications for livelihood-oriented interventions and way forward

In India, Flue-Cured Virginia tobacco has been widely acknowledged as a livelihood-supporting commercial crop, particularly in Andhra Pradesh and Karnataka, where regulated production, auction-based marketing, and institutional oversight have contributed to income stability, employment generation (Srinivas *et al.*, 2020) ^[57] and asset formation among farming households. Empirical studies indicate that FCV tobacco farmers benefit from assured market access, institutional credit, curing infrastructure, and specialized extension services, enabling better management of production and price risks compared to many competing crops (Kumar *et al.*, 2020) ^[34]. These features suggest a positive transformation of socio-economic aspects (Hema *et al.*, 2021) ^[26] particularly in financial and physical variables. However, most Indian evidence remains fragmented and largely confined to partial economic indicators such as cost-return analysis, productivity, or auction price trends, without systematically capturing broader livelihood dimensions such as human capital enhancement, social capital strengthening, or long-term natural resource sustainability (Scoones, 1998; Ellis, 2000) ^[55, 16]. As a result, claims of “positive livelihood transformation” among FCV tobacco farmers in India remain largely inferential rather than empirically quantified in a multidimensional framework.

The way forward lies in adopting livelihood-oriented, capital-wise quantitative approaches that are firmly grounded in the Sustainable Livelihoods Framework (SLF) (DFID, 1999; Scoones, 2015) ^[14, 55]. International literature increasingly demonstrates the value of composite indices such as the Livelihood Security Index for capturing both gains and vulnerabilities across human, physical, financial, natural, and social capitals in commercial farming systems (Hussein *et al.*, 1998; Hahn *et al.*, 2009; Natarajan *et al.*, 2022) ^[29, 25, 41]. Applying such frameworks to FCV tobacco in India would enable robust measurement of livelihood transformation across regions, farm sizes, and institutional contexts, and allow assessment of resilience to policy, market, and climatic shocks. However, the Sustainable Livelihoods Approach has been critiqued for its limited attention to deeper structural factors and power dynamics within and between communities, which are essential for understanding inequalities and designing more effective and inclusive development interventions (De Haan, 2011) ^[12]. Future research should prioritize large-sample, stratified surveys across major FCV zones, integrate longitudinal or recall-based methods to capture change over time, and move beyond income-centric metrics to include health, skills, institutional linkages, and environmental sustainability (Ellis *et al.*, 2004; Scoones *et al.*, 2018) ^[16, 55]. Generating such evidence is critical for designing balanced, evidence-based interventions ranging from skill development and occupational health safeguards to infrastructure upgrading and phased diversification strategies that safeguard farmer livelihoods while aligning with broader economic, environmental, and public-health objectives (WHO, 2017) ^[66].

Conclusion

This review underscores the value of a multidimensional livelihood perspective for understanding FCV tobacco

farming beyond income-based assessments. International evidence shows that regulated and contract-based tobacco systems have contributed to positive livelihood outcomes, particularly in financial and physical capital, with spill overs to human and social capital. In India, FCV tobacco has supported farmer livelihoods in Andhra Pradesh and Karnataka through stable income, assured markets and institutional support. However, Indian evidence remains largely limited to partial economic indicators, leaving broader livelihood transformations insufficiently quantified. The review identifies a clear research gap in capital-wise, quantitative assessment of positive livelihood change. Application of SLF-based composite indices such as the Livelihood Security Index is essential for informing balanced, livelihood-oriented interventions and sustainable transition strategies.

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