INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD)
© 2026 IJNRD | Volume 11, Issue 11, November 2026 | ISSN: 2456-4184 | IJNRD.ORG

Views on Modernization: Special Reference to Change in Agricultural Practice among the Nyishi Community of Arunachal Pradesh

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Abstract
Modernization has significantly influenced indigenous societies across the globe, transforming traditional livelihood practices and socio-economic structures. Among the Nyishi community of Arunachal Pradesh, agriculture has traditionally served as the primary occupation and a repository of indigenous ecological knowledge. In recent years, modernization has introduced improved transportation, market-oriented cultivation, modern agricultural tools, chemical fertilizers, pesticides, and communication technologies that have altered traditional farming practices. This study examines agrarian change among the Nyishi community with particular reference to modernization. The study was conducted in four villages of Keyi Panyor District, namely Radhpu, Old Pania, Yazali, and Peni. A qualitative case study design involving semi-structured interviews, participant observation, and field visits was adopted. The findings reveal that modernization has enhanced productivity, market access, income generation, and convenience in daily life. However, it has also contributed to challenges such as declining indigenous knowledge, reduced youth participation in agriculture, environmental concerns associated with chemical inputs, and changes in traditional food systems. The study concludes that modernization among the Nyishi is not a process of complete replacement of traditional practices but a selective adaptation where indigenous and modern systems coexist.

Index Terms - Agrarian Transformation, Indigenous Knowledge, Modernization, Nyishi Community, Sustainable Agriculture, Traditional Farming Practices.

1. Introduction

Agriculture occupies a central place in the cultural, economic, and social life of indigenous communities in Arunachal Pradesh. The state is geographically bounded by Tibet (China) to the north, Myanmar to the east, Bhutan to the west, and Assam to the south. Covering approximately 83,743 square kilometres. The geographical coordinates of the state range from 26°28'N to 29°30'N latitude and 91°30'E to 97°30'E longitude (India Meteorological Department, 2022). The state comprises 26 districts, with an elevation ranging from sea level to approximately 7,000 meters. According to the 2011 Census, Arunachal Pradesh has a total population of 1.38 million. The state receives an annual average rainfall of 2083.8 mm (India Meteorological Department, 2022). The state is characterized by a per-humid ecosystem with elevated ridges and intermontane valleys with less than 2% of its total geographical area of 8.2 million ha in cultivated area. The soils are moderately deep, acidic, and low in phosphorus (ICAR, 2026). It is home to numerous tribes, including the Nyishi, Apatani, Adi, Monpa, Galo, Mishmi, and Tagin, among others. Among these, the Nyishi community is one of the largest tribal groups, primarily inhabiting the districts of Keyi-Panyor (newly bifurcated from Lower Subansiri) and Kurung-Kumey.

The Nyishi community, one of the largest indigenous groups in the state, has historically relied upon traditional farming systems that evolved through generations of interaction with the natural environment. This community has developed an intricate relationship with their environment, and their agricultural practices are deeply rooted in traditional ecological knowledge. These systems emphasized sustainability, biodiversity conservation, and community cooperation.

Economically Nyishis are self-sufficient through agricultural production and other economic activities and their economic life relies on agricultural economy, forest economy, river resource, vegetable vendor, livestock, barter system economy, hunting and fishing, arts, crafts and handloom etc. (Tada B., 2016)
The process of modernization has brought remarkable changes to rural and tribal societies. Developments in transportation, communication, education, agricultural technology, and markets have transformed traditional ways of life. While modernization is often associated with development and economic progress, it may simultaneously challenge indigenous knowledge systems and traditional cultural practices.

Within the Nyishi community, agricultural transformation has become increasingly evident through changes in cultivation methods, crop preferences, farming technologies, and market participation. Traditional subsistence farming is gradually being supplemented by commercial cultivation aimed at generating income. Such changes provide a useful context for examining how modernization is shaping agrarian life. The tribe, one of the largest indigenous groups of the state, has historically depended on agriculture not only for subsistence but also as the foundation of its social organization, economy, culture, and political life.

Traditionally, wealth among the Nyishis was measured by the extent of agricultural land owned and the number of mithuns (*Bos frontalis*), the state animal of Arunachal Pradesh, possessed by a household. Families with multiple agricultural fields, larger grain reserves, and numerous mithuns were regarded as prosperous and influential. Rice, millet, and maize constituted the principal crops, supplying food throughout the year. Agriculture also supported a barter economy, where grains were exchanged for livestock, labour, and other necessities. Historically, food scarcity and famine were frequent occurrences. Households lacking sufficient food production often depended on wealthy families possessing larger cultivation fields and grain storage facilities. Agricultural abundance enabled families to maintain food security during both *Dwr Enyi* (food-scarce season) and *Dera* (productive season).

Mithun occupied a central position in the socio-economic life of the Nyishis. It served not only as a measure of wealth but also as a medium for bride price, land transactions, settlement of customary obligations, and various social exchanges. The economic significance of agriculture was therefore closely linked with social status and cultural institutions. The community traditionally practised shifting cultivation, locally adapted to ecological conditions and governed by indigenous knowledge, natural indicators, magico-religious beliefs, and animistic traditions. Decisions regarding land selection, timing of cultivation, and agricultural activities were often influenced by faith in supernatural beings and observation of environmental cues.
In recent decades, modernization has influenced almost every aspect of Nyishi life. Agricultural transformation has become increasingly evident through the introduction of improved tools, mechanization, scientific weather forecasting, commercial crops, digital technologies, and market integration. While these developments have enhanced productivity and convenience, they have also generated concerns regarding environmental sustainability, indigenous knowledge erosion, and changing cultural practices.

The present study therefore examines agrarian transformation among the Nyishi community within the broader context of modernization.

2. Objectives of the Study

1. To understand how traditional agricultural practices of the Nyishi community have changed over time.

2. To examine the benefits and challenges associated with agrarian transformation brought about by modernization.

3. Methodology

The present study was conducted in four agriculturally significant and accessible villages, namely Radhpu, Old Pania, Yazali, and Peni of Keyi-Panyor District, Arunachal Pradesh. A qualitative case study approach was adopted to examine traditional agricultural practices and agrarian transformation among the Nyishi community. Purposive

sampling was employed to select ten subsistence farmers possessing extensive experience and knowledge of indigenous agricultural systems. Data were collected through semi-structured interviews, participant observation, field visits, and secondary sources. Field visits facilitated direct observation of soil management practices, pest control measures, crop cultivation methods, water management systems, traditional storage structures, and different cultivation fields. Participant observation further allowed the researcher to gain first-hand understanding of agricultural activities through active engagement with community members.

4. Results and Discussion

The findings presented in this section are based on data collected through semi-structured interviews, participant observation, field visits, and relevant secondary sources. The integration of primary and secondary data enabled a comprehensive understanding of agrarian transformation and modernization among the Nyishi community. The discussion highlights continuity and change in agricultural practices by examining traditional farming systems, indigenous ecological knowledge, technological interventions, and their socio-economic, cultural, and environmental implications.

4.1 Forms of Cultivation Practised by the Nyishi Community

The Nyishi community follows three distinct forms of cultivation:

Sepa (Wet Paddy Cultivation)
Sepa is ssed for growing rice in wet, terraced fields. Fields are levelled with bunds to retain water. Puddling is done multiple times to improve water retention and reduce weed growth. Organic manure, such as composted weeds and biomass, is mixed into the soil.

Bolung (Near-Home Cultivation/Kitchen Garden)
It is a small plot near homes where vegetables are grown for daily harvesting. Common crops: pumpkin leaves (Tapp), *Chinese mustard* (Guyeng), squash, maize (Top), yam (Engi), tapioca (Sen Ingin), chili (Yamdek), local garlic (Talap), and beans (Perin). Proximity to homes allows easy access to fresh produce without traveling long distances.

Rongo (Distant Field Cultivation)
It locates farther from the villages, this land is traditionally used for seasonal and late-harvest crops, such as millet, rice, maize, pulses, beans, pumpkin, cucumber, gourds, yam, tapioca, sweet potato, chili, mustard, local garlic, cherry tomatoes, etc**.** In recent years, the Nyishi community has also begun cultivating black cardamom, oranges, and pineapples in these fields, recognizing their potential for both commercial use and home consumption due to their good growth in the region.

4.2 Field Preparation Techniques for Wet Paddy Field

Traditional Land Preparation Techniques in Wet Paddy Cultivation
In traditional farming, land preparation is a crucial step to ensure better crop growth, water retention, and soil fertility. Various indigenous methods are used, each serving a specific purpose in the cultivation process.

Tilling the Wet Paddy Field (Sepa Panam)
Tilling is performed using a hoe to loosen and aerate the soil, ensuring a deep and well-textured seedbed. This process enhances the soil's water-holding capacity and helps in the natural decomposition of vegetation, thereby improving soil fertility. Additionally, tilling aids in the removal of weeds, insects, and pests, creating a healthier growing environment.

Harrowing (Sepa Pameknam)
Harrowing is conducted after tilling, particularly when the soil moisture is slightly reduced. This practice helps to break down large soil clods, ensuring a smooth and uniform field surface. Harrowing also aids in destroying weeds and unwanted grasses, while simultaneously mixing organic matter with the topsoil, enriching its nutrient content.

Puddling (Sepa Chameknam)
Puddling involves churning the soil with water when the field has a standing water level of 5–10 cm. Traditionally, farmers stomp on the soil using their feet, ensuring proper mixing and softening. This method is essential for reducing water loss through percolation, making the soil soft and ideal for transplanting rice seedlings. Additionally, puddling helps suppress weed growth by decomposition, ensuring the paddy plants receive maximum nutrients.

Land Levelling (Sepa Poyinam)
Land levelling is traditionally done to ensure uniform water distribution in the field. This method minimizes soil erosion, enhances rainwater conservation, and allows for efficient crop growth and mechanization. A well-leveled field ensures better weed control, improved irrigation management, and optimal conditions for rice establishment.

4.3 Indigenous Agricultural Knowledge and Sustainable Practices

Natural Repellents and Pest Control
The Nyishi community traditionally employs ash from fireplaces used for cooking as a natural pesticide, disease cure, and soil fertilizer. Various forms of ash, including those derived from wood, millet and rice husks, and other biodegradable sources, have been extensively used. Farmers believe that burying seeds such as wild potato, pumpkin, and cucumber along with ash enhances their aroma and promotes better growth.

Granary Structure and Storage Methods
The traditional Nyishi granary locally known as Nosu is built using timber planks and bamboo. The body of the structure is square-shaped, with a conical overhanging roof that was originally made of wild banana leaves but is now commonly replaced by tin sheets. Within the granary, different sections are designated for storing various crops. Rice is stored in a cylindrical structure made of bamboo mat called Hodo, a cylindrical bamboo-matted structure, while maize for consumption is stored separately from maize seeds, which are hung in their cobs. Millet is similarly stored in its respective Hodo, with seeds being hung along with the stems. Rice seeds are kept in bamboo baskets or large-sized gourds (Uppum). Seeds of pumpkin, mustard, cucumber, beans, sorghum, and other vegetables are preserved in bottle gourds (Yohak).

Sustainable Water Management
The Nyishi community has developed efficient water management systems by utilizing overflow water from upper fields to irrigate lower fields. In times of water scarcity, they wait for the upper fields to complete their rice planting before diverting the available water for their own use. A small irrigation channel, called Silam, is connected to a larger river. At the start of each planting season, the entire community gathers to clean and maintain the Silam, ensuring a fair and efficient water distribution system.

Crop Diversity and Mixed Cropping
Nyishi farmers cultivate a variety of crops, including cereals (rice, maize, and millet,), legumes (beans, pigeon pea, rice bean, pea, soybean, and cowpea), oilseeds (groundnut and mustard), root crops (cassava, potato, colocasia, yam, and sweet potato), cucurbits (bottle gourd, winter squash, pumpkin, cucumber, bitter gourd, melons, and ridge gourds), and other vegetables (okra, chili, brinjal, and tomato). A typical farm includes 8-35 species within a small plot of 2 to 2.5 hectares, with simultaneous sowing and sequential harvesting. This approach enhances soil fertility, facilitates nutrient recycling, and minimizes nutrient loss.

4.4 Field Preparation Techniques for Rongo and Bolung

For both Rongo and Bolung, the initial land preparation follows a similar approach, although the specific crops grown and the scale of the land differ. The process begins with tilling the soil using a hoe, which is used to loosen and aerate the soil. This practice is crucial for breaking up soil clumps and ensuring a suitable environment for seed germination. For certain crops like maize, pumpkin, and potatoes, the seeds or tubers are often directly buried into the soil without the need for pre-tilling, relying on natural soil conditions and moisture for growth. This method is particularly effective for crops that thrive in slightly more compact soil or are sensitive to over-tilling.
After the initial tilling, soil clumps are further broken down to create a fine, workable soil texture. This is particularly important for crops that require good soil structure for root development. At this stage, locally prepared manure is

added to the soil in the Bolung (kitchen gardens), where organic matter such as composted plant material, animal dung, and other natural fertilizers are integrated into the soil to improve its fertility. This helps enrich the soil with essential nutrients, creating a more fertile environment for the crops that will be grown in close proximity to the household.

In contrast, the Rongo cultivation areas (the more distant fields) use intercropping as a form of natural soil enrichment. Intercropping is a sustainable practice where different crops are grown together in the same field, which not only maximizes space but also enhances soil fertility. The different plants in an intercrop arrangement help support each other's growth by fixing nitrogen, preventing soil erosion, and improving the overall health of the soil. In this way, the process of intercropping itself acts as a manure cycle, reducing the need for additional external fertilization. The plants contribute organic material back into the soil as they grow, and their roots work together to maintain soil structure and health.

Thus, while both Rongo and Bolung fields benefit from tilling and soil preparation techniques, the key difference lies in how the fertility of the soil is managed. Bolung fields receive added organic manure to boost fertility in small, highly managed plots close to the home. In contrast, Rongo fields rely more on intercropping to naturally cycle nutrients, ensuring the long-term health of the soil without the need for external chemical inputs.

This method of land preparation, rooted in traditional knowledge, ensures sustainability and reduces the dependency on synthetic fertilizers, thereby supporting the Nyishi community's commitment to eco-friendly and climate-resilient agricultural practices. Through these practices, the Nyishis enhance soil fertility, promote biodiversity, and improve the long-term productivity of their land.

4.6 Indigenous Indicators of Seasons and Weather

The Nyishi community relies on traditional ecological knowledge to predict seasonal changes and weather patterns, which are crucial for their agricultural planning. These indicators, derived from observations of plants, animals, celestial bodies, and other natural signs, help ensure food security and preparedness for climatic variations.

Plant-Based Indicators

The emergence of leaves, peach flowers, and wild orchids (Gayi Oppu) signals seasonal transitions. Wild bamboo flowering, known as Tolum Lamnam, is considered an ominous sign, indicating an impending famine. When wild bamboo starts flowering, the community prepares by planting alternative crops like wild potatoes and increasing wild food collection.

Animal and Bird Behavior

The presence of rain birds and their calls indicate approaching rainfall. An abundance of grasshoppers is seen as a sign of femine. The appearance of an unusual number of rats (Kubung Bungli Engnam) signals an upcoming famine. When this phenomenon of unusual surge in rat population in a given year, people prepare by setting local traps called Gurang Penam to control them and consume as a crucial food source.

Celestial and Weather Observations

Before burning slashed forests for shifting cultivation (this is when the community was still practicing shifting cultivation), the community examines the night sky. A clear sky with visible stars suggests no rain the next day, making it suitable for burning. Moon phases also guide agricultural activities. A clear moon with visible stars is an ideal time for forest burning.

Rice cultivation requires an abundance of water, making timely rainfall crucial for successful planting. Traditionally, farmers observed natural indicators to predict rainfall, ensuring that fields were prepared in advance. This practice allowed them to maximize rainwater usage for paddy fields, as rice thrives in waterlogged conditions.

These indigenous forecasting methods have historically allowed the Nyishi people to adapt to environmental changes, ensuring resilience in their agricultural practices.

4.5 Modernization and Agrarian Transformation

Modernization has significantly altered agricultural practices among the Nyishi community. Commercial crops such as black cardamom, oranges, and pineapples are increasingly cultivated in Rongo fields. Improved transportation,

agricultural machinery, weather forecasting systems, digital technologies, and market integration have transformed farming from a primarily subsistence-oriented activity into an increasingly commercial enterprise.
At the same time, many indigenous farming practices continue to coexist with modern innovations, illustrating a selective adoption rather than complete replacement of traditional systems.

4.6 Comparison between Traditional and Modern Agricultural Practices

Earlier studies by Gupta documented a rigid division of agricultural labour where men performed physically demanding tasks such as forest clearing, fencing, and land preparation, while women carried out sowing, weeding, harvesting, threshing, and storage activities. Children also assisted in crop protection. The present study found that this division has become less rigid with modernization and mechanization. Men and women increasingly share agricultural responsibilities, with work allocation determined more by convenience, availability, and capability than by traditional gender norms. Similarly, traditional agriculture depended entirely on natural indicators for predicting weather and seasons. Contemporary farmers increasingly rely on meteorological forecasts, mobile applications, and scientific advisory services.

4.7 Benefits of Modernization

i. With the advancement of modern technology, agricultural productivity has increased significantly.
ii. The use of improved farm equipment, high-yielding seeds, and fertilizers has enabled farmers to produce surplus food, thereby enhancing food security, reducing the incidence of food scarcity and famine, and generating produce for commercial sale.
iii. The introduction of advanced transportation and digital services has improved market access for rural farmers.
iv. Farmers now have access to more reliable weather forecasting systems based on scientific data, which assist in agricultural planning and decision-making.
v. Mobile applications help farmers monitor soil health, identify suitable crops, and access agricultural information.
vi. The introduction of farm machinery and improved tools has reduced the burden of heavy manual labour.
vii. Modernization has contributed to an improved standard of living and has created greater economic opportunities for farming households.

5.8 Challenges of Modernization

i. Increased dependence on chemical fertilizers and pesticides has contributed to soil degradation, environmental pollution, and potential health risks associated with agrochemical exposure.
ii. Heavy reliance on modern technologies has led to the gradual loss of indigenous knowledge systems. As more farmers adopt advanced farming methods, the transmission of traditional agricultural knowledge, such as preparing natural manure, using organic pest repellents, and interpreting natural indicators of weather and seasons, has declined.
iii. The preference for hybrid and commercial crop varieties has reduced the cultivation and preservation of indigenous crop varieties.
iv. Mechanized and input-intensive farming practices may reduce biodiversity and weaken traditional mixed-cropping systems that have long supported ecological sustainability.
v. The declining use of traditional agricultural practices may contribute to the erosion of cultural values, customs, and indigenous ecological knowledge associated with farming.

5. Conclusion

The study examined agrarian transformation among the Nyishi community in the context of modernization. The findings reveal that modern agricultural technologies, improved tools, mechanization, scientific forecasting, market integration, and digital innovations have significantly reduced labour, improved productivity, enhanced food security, and created new economic opportunities. These developments have undoubtedly improved the convenience and efficiency of agricultural activities.

However, the findings also demonstrate that traditional Nyishi agricultural systems embody several sustainable practices that remain relevant today. Indigenous methods such as mixed cropping, natural pest management through ash and organic materials, traditional seed preservation, ecological forecasting, community-based irrigation systems, and organic nutrient cycling have supported environmental sustainability and community resilience for generations. Therefore, modernization should not be viewed as a complete replacement of traditional agricultural knowledge. Embracing new technologies and scientific advancements is necessary for improving productivity and keeping pace with changing times; nevertheless, indigenous practices that continue to offer ecological, health, and social benefits should be preserved and integrated into contemporary farming systems. The objective should not be to maintain traditional practices merely for cultural preservation, but to recognize their practical value in supporting sustainable agriculture, environmental conservation, food security, and human well-being.

The future of Nyishi agriculture lies in achieving a balance between tradition and innovation, where modern technologies complement rather than eliminate indigenous knowledge systems. Such an approach can ensure sustainable agricultural development while preserving the strengths of a farming tradition that has successfully sustained the community across generations.

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