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THE IMPACT OF MODERN SCIENCE AND TECHNOLOGY ON AGRICULTURAL TOOLS USED IN ASSAM

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ABSTRACT

Assam has a long tradition in the field of agriculture. This tradition is not limited merely to food production as a basic need; it extends deeply into the folk life of Assam. Folk society regards agriculture with great respect, and everything associated with it occupies a position of significance in society. Cattle, ploughs (nangal), yokes (yuvali), and related implements are considered valuable assets of this agriculture-centred society. Likewise, various tools are employed in the cultivation and maintenance of crops. Different types of implements such as biriya, tamal, and kachi (sickle) are used for harvesting paddy. Numerous tools have traditionally been used since ancient times in subsequent operations such as threshing paddy (dhan mora) and husking paddy (dhan bana). These may be collectively termed traditional technology. However, from the latter part of the twentieth century, the rapid proliferation of science and technology across India has significantly influenced the agricultural sector. The use of modern agricultural implements began to replace their traditional counterparts. None of these modern tools were invented by Assamese scientists, and therefore they share no emotional bond with Assamese folk culture. On the other hand, the adoption of such modern implements is essential for increasing agricultural productivity. Against this backdrop, the purpose of this research paper is to examine how Assamese folk culture has been affected by this transition. The paper also investigates whether Assamese society has succeeded in transmitting folk culture into the modern era while maintaining a balance between change and tradition.

Keywords: *Agriculture, Tools, Tradition, Science and Technology, Folk Society, Folk Culture*

1. INTRODUCTION

1.1 Subject Overview

The scope of folk culture is vast. As **Sharma (2004)** has noted, folk culture encompasses the totality of the traditional beliefs, customs, and ways of life of a particular nation or community. The collective biological and intellectual thought patterns of a nation or community are reflected through their aggregate culture. Environment and circumstance shape the mode of living of a people, and upon this foundation arise customs, social norms, practices, religion, traditions, beliefs, festivals, and ceremonies.The northeastern region of India has been culturally rich since ancient times. The specific territory known as Assam is particularly diverse in language and culture. Like other states of the Northeast, Assam is home to numerous ethnic communities and nationalities. From prehistoric times, this region served as the meeting ground of Aryan and non-Aryan (known as Asura, Danava, and Kirat) peoples, resulting in a confluence of Aryan and non-Aryan cultures. As **Gogoi (2009)** has observed, the various ethnic communities living across different parts of Assam have preserved their distinct indigenous cultures through the centuriesWith the advancement of human civilisation, people have continuously invented new materials to improve their standard of living. The unceasing effort to fulfil human needs gave birth to the practice of science. Subsequently, science and technology developed at a pace exceeding human expectation across numerous fields. As **Majumdar (2003)** points out, today the influence of science and technology has permeated almost every aspect of life in virtually every region of the world, and its impact is even discernible in the domain of folk culture.The ethnic communities residing in Assam are rich in folk culture. Each nationality and community has its own distinctive methods of traditional house construction, agricultural practices, social life, folk food, attire, festivals, ceremonies, and agricultural activities. However, in the current era of globalisation, the widespread proliferation of science and technology has profoundly influenced the transformation of the traditional folk cultures of these communities. In earlier times, people used bullock carts and horse carts for transportation, and firewood for cooking. These have been replaced by cooking gas. People once gathered firewood from the forest and dried it in the sun before cooking — a process requiring considerable time. The invention of cooking gas eliminated this difficulty. New modes of thinking and awareness have similarly reached the ethnic communities of Assam, resulting in sweeping changes in their folk cultures. The proposed research project therefore aims to collect and analyse data through field-based studies on which aspects of the folk cultures of Assam's ethnic communities have been influenced by modern science and technology, and in what manner.

1.2 Review of Prior Studies

While a number of books and journals discussing various aspects of modern science and technology are available, no prior study specifically addressing the proposed research topic has been found to date.

In his book Folk Culture in Modern Society (2004), Nabin Chandra Sharma systematically identifies the characteristics of folk life, covering the origin and development of folk culture. The fourth chapter, titled 'Folk Culture in Modern Life,' discusses how certain elements of folk culture may persist in modern society even through transformation.

Birendra Nath Dutta's The Nature and Study of Folk Culture (1998) presents theoretical aspects of folk culture while also offering a historical overview of folk culture scholarship conducted in Assam.

In Science, Technology and Society (2003) edited by Paramananda Majumdar, Prashanta Mishra has written an essay titled 'Science, Technology and Agriculture,' providing an authoritative account of how science and technology have substantially assisted the progress of agriculture. However, the influence on culture is not directly addressed.

The volume Assam's Agricultural Economy (2013), edited by Adip Kumar Phukan and Nayan Kumar Bora, contains essays with some relevance to the proposed research project.

Trends in Scientific Practice in Assam (2007), edited by Paramananda Majumdar, presents eleven essays providing informative explanations of how modern science and technology gradually entered the academic sphere of Assam.

1.3 Objectives and Significance of the Study

The study has several objectives. The influence of modern science and technology is pervasive in every aspect of contemporary society. This influence is also forcefully observed in agriculture-centred folk culture. Today, the sight of buffalo or multiple pairs of cattle ploughing the fields is no longer common; tractors and power tillers have taken their place. The primary objective is to examine all dimensions of this influence, analyse its causes, and study its likely future trajectory.

The specific objectives of the research are as follows:

(a) To determine the methodology for discussing modern science and technology and their influence in Assam.
(b) To determine the theory and methodology for studying the agriculture-centred folk culture of the selected districts' ethnic communities.
(c) To determine the theory and methodology for identifying the influences of modern science and technology on the agriculture-centred folk culture of Assam.
(d) To determine the theory and methodology for studying the various causes of this influence on agriculture-centred folk culture.

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(e) To determine the theory and methodology for studying the likely future of the agriculture-centred folk culture of Assam's ethnic communities.

1.4 Research Methodology

In studying this topic, both survey-based and analytical methods have been employed.

1.5 Research Questions: The following research questions have been formulated:

(i) What is the nature of modern science and technology, and what theory and methodology are appropriate for studying its history of influence in Assam?

(ii) What theory and methodology are appropriate for studying the nature of folk culture in the selected districts?

(iii) What theory and methodology are appropriate for studying the dimensions of Assam's agriculture-centred folk culture influenced by modern science and technology?

(iv) What theories and methods are appropriate for studying the causes of the influence of modern science and technology on agriculture-centred folk culture?

(v) What theory and methodology are appropriate for studying the likely future of the agriculture-centred folk culture transformed by science and technology?

1.6 Scope of the Study

Geographical Scope: The study will be conducted based on five districts of Assam within a defined timeframe. The selected districts are: Lakhimpur, Dhemaji, Dibrugarh, Majuli, and Sonitpur.

Subject Scope: Rather than examining the issue in the context of each individual community, this study is conducted on the basis of a common shared cultural framework. The study is confined solely to the domain of agricultural tools.

2. THEORETICAL FRAMEWORK FOR THE STUDY

In studying the proposed topic, several theories of folk culture study have been taken as a basis:

2.1 Historical Reconstruction Theory

According to this theory, using folk cultural materials as a thread, it is possible to draw a picture of the social past of a given society, and on that basis, the past can be reconstructed even in the present.

2.2 Contextual Theory

According to this theory, in order to fully and properly understand the significance of folk cultural materials, it is not sufficient to analyse only the text. As **Dutta (1998)** explains, it is also essential to examine the Performance Context (the environment of application or presentation) as well as the Sociological Context in an overall assessment.

2.3 Functional Theory

This theory, common in anthropology, holds that any cultural element of a given society has some form of function. The same applies to the elements of folk culture. In analysing these elements, attention should also be paid to the functions performed by them.

2.4 Oral Formulaic Theory

This theory relates to verbal arts — especially oral epic-type materials. As **Dorson (1982)** explains, it accounts for how an epic singer can sing hundreds of lines without stumbling: embedded within the lengthy sung material is a formula that assists the singer in accurately repeating the sequence of events and word arrangement.

In addition, Performance Theory and Genre Theory will be applied as required. Performance Theory holds that analysis of folk cultural material should be based as much as possible on its performance or presentation. Genre Theory places emphasis on the characteristics and status of the various genres or categories of folk cultural elements.

3. RESEARCH METHODS AND DATA SOURCES

3.1 Methods of Analysis

Through bibliographic and field study processes, the influence of modern science and technology on the agriculture-centred folk culture of five districts of Assam will be analysed. Interviews with folk culture bearers will be conducted as necessary. Four principal methods are adopted:

(a) Historical Method

(b) Descriptive Method

(c) Analytical Method

(d) Experimental Method

3.2 Sources of Data

Primary Sources: Primary data were collected through field studies in the selected districts, employing interviews and questionnaires.

Secondary Sources: Various journals, books, newspapers, government publications, and digital sources have been consulted as secondary sources.

4. THE IMPACT OF MODERN SCIENCE AND TECHNOLOGY ON AGRICULTURAL TOOLS

The impact of modern science and technology on agricultural tools is observed in various ways. As a result of the continuous invention of advanced modern tools, the traditional agricultural implements used by farming communities of Assam have become largely obsolete. The following discussion examines how these modern tools have penetrated the lives of the people of Assam:

4.1 Tractor

The tractor is one of the most notable inventions of modern science and technology. A tractor can plough land in a very short period of time, and as a result, the use of cattle and buffalo for ploughing has declined progressively. Not only for ploughing, but tractors are also specially equipped to transport bundles of paddy at harvest time. Previously, paddy bundles were carried by people on shoulder poles (biriya or holonga), or bullock and buffalo carts were used. Modern tractors have also been equipped with threshing attachments. Depending on soil type, a tractor can plough two to three bighas of land in one hour, whereas cattle can plough only one to two kathas per hour. According to the **Directorate of Agriculture, Government of Assam (2024)**, empirical evidence confirms a strong correlation between farm mechanisation and agricultural productivity, and the government has been actively working to extend tractor usage to rural villages through schemes such as the Chief Minister Samagra Gramya Unnayan Yojana.

4.2 Iron Plough

The influence of science and technology has also reached the traditional plough (nangal). Across various regions of Assam, many people have been observed making iron ploughs in place of wooden ones. The reason is that wooden ploughs deteriorate or become unfit for use after just two or three years, whereas an iron plough, once made, does not easily break down.

4.3 Water Pump

The water pump is one of the most advanced agricultural tools introduced by science and technology. Unlike in the past, farmers today no longer have to wait for rain to cultivate crops. In earlier times, canals had to be dug from rivers or ponds to channel water into the fields — a labour-intensive process with modest returns. Today, in addition to diesel-powered water pumps, Honda machines run on kerosene and electric motors are widely used. Those who cannot afford a water pump can buy a motor for approximately ₹2,500 to ₹4,000 and supply water independently.

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4.4 Wheel Hoe (Hoil)

The wheel hoe (hoil) is another advanced agricultural tool introduced by science and technology. It is used for weeding and tilling the rows after planting rabi crops such as cabbage, chillies, and brinjal. It has an iron wheel at the front, three or four angled blades behind it, and two handles for gripping. By pushing the wheel while holding the handles, the blades dig into the soil. Previously this work was done with a hoe (kor).

4.5 Paddy Threshing Machine

Among the tools that have arrived in Assam relatively recently is the paddy threshing machine. Until a few years ago, people threshed paddy with their feet or by using cattle. Approximately five years ago, paddy threshing machines began penetrating rural areas of Assam. These specially engineered machines allow greater quantities of paddy to be threshed in less time, at lower cost, and with less effort. The machine separately outputs paddy and straw, thereby reducing labour.

4.6 Sprayer

Another agricultural tool introduced by science and technology is the sprayer. It is used for all types of crops, from paddy to rabi vegetables. The sprayer ensures that pesticides are evenly distributed over the crops to protect them from pests and insects.

4.7 Rice Husking Machine

As every village in Assam now has a rice husking machine, the number of people who still husk rice using the traditional foot-operated dheki is virtually nil. However, during the Bihu festival, the sound of the dheki can still be heard in some rural areas of Assam.

4.8 Rice Flour Grinding Machine

Under the influence of science and technology, rice flour grinding machines have also been invented and are now found in various parts of Assam. During Bihu and other festivals, people grind rice flour at the mill rather than using the traditional dheki. These machines are also equipped to grind turmeric.

4.9 Power Tiller

The power tiller enables a greater area of land to be tilled in less time and reduces the need for manual labour. Since the price of a power tiller is lower than that of a tractor, the number of power tiller users in Assam is higher. Some individuals also earn a livelihood by using power tillers to till land for others. As noted by **Assam Times (2015)**, however, the use of tractors and power tillers in Assam remains largely limited to land preparation and tillage, with the full range of attachments for sowing, harvesting, and post-harvest operations yet to be widely adopted.

In addition, science and technology have recently produced machines for harvesting paddy, wheat, and mustard, as well as machines for digging potatoes and picking various fruits. These machines assist farmers in harvesting crops and reduce physical labour, though their impact in Assam remains limited to date.

Table 1: Comparative Overview of Modern Agricultural Tools and Their Traditional Counterparts in Assam

Modern Tool	Traditional Counterpart	Primary Use / Function	Efficiency Gain (Inferred)	Impact on Folk Culture	Current Status in Assam	Economic Benefit
Tractor	Cattle / Buffalo and wooden nangal (plough)	Ploughing land; transporting paddy bundles	Can plough 2–3 bighas/hour vs. 1–2 kathas/hour with cattle; significant reduction in time and human hardship.	Declining use of traditional plough and associated implements (dila, yuvali, sholmari); loss of traditional rest days (Amavasya/Purnima).	Progressively replacing cattle for ploughing; widely used in rural Assam.	Lower expenditure and higher returns compared to traditional methods; significant economic relief.
Power Tiller	Cattle and wooden nangal (plough)	Tilling land	Tills greater areas in less time with reduced manual labour.	Contributes to obsolescence of traditional cattle-based farming and associated folk customs.	Higher usage than tractors due to lower price point.	Provides livelihood for owners who till others' land; more affordable for individual farmers.
Iron Plough	Wooden nangal (plough)	Ploughing	Higher durability; does not break down easily unlike wooden versions.	Replaces the traditional wooden craft, a significant cultural asset in folk society.	Observed in various regions as a replacement for wooden versions.	Cost-effective due to longer lifespan (wooden ploughs last only 2–3 years).
Rice Husking / Flour Grinding Machines	Dheki (foot-operated husker) and Ural (mortar and pestle)	Husking paddy and grinding rice flour (pitha-guri)	Large quantities processed very quickly compared to manual husking.	Dheki sound now heard only during Bihu; machines lack the emotional and cultural connection of traditional tools.	Found in every village; traditional usage is virtually nil except during festivals.	Efficiency in food preparation; commercial milling opportunities for entrepreneurs.
Paddy Threshing Machine	Threshing with feet or cattle (dhan mora)	Separating paddy from straw	Greater quantities threshed in less time with less effort; separates paddy and straw automatically.	Displaces traditional threshing methods involving animals or physical human labour.	Significantly penetrated rural areas over the last five years.	Lower cost and reduced labour requirements.
Water Pump (Diesel / Kerosene / Electric)	Manual canal digging from rivers or ponds	Irrigation; supplying water to fields	Supplies water rapidly; removes dependence on rainfall entirely.	Reduces communal labour of canal-digging; alters the traditional seasonal cycle of cultivation.	Widely used; accessible even to lower-income farmers through small motors.	Ensures crop cultivation regardless of rainfall; motors available for approx. ₹2,500–₹4,000.
Wheel Hoe (Hoil)	Kor (hand hoe)	Weeding and tilling rows for rabi crops	Allows weeding in much less time than manual hoeing.	Gradual replacement of the traditional manual hoeing process.	Used by a considerable number of farmers for cabbage, chillies, and brinjal.	Time-saving in labour-intensive weeding tasks.
Plastic Sacks and Buckets	Tom (seed-soaking container) and Duli (bamboo basket)	Seed soaking and storage of paddy	Easier to handle and more readily available than woven bamboo or cane items.	Traditional items such as 'tom' are unrecognised by younger generations; 'duli' is almost impossible to find in households.	Widely used throughout rural households.	Cheap and durable alternative to traditional craft items.

Source: Field study data and analysis by the authors.

5. ECONOMIC CAUSES OF CHANGE

Economic causes and influences are involved in every dimension of human development. Field studies reveal that the cost of farming using traditional agricultural methods is considerably high in the current era. Furthermore, unlike in the past, no one works without pay, and productivity in comparison to expenditure is substantially lower. By contrast, farming with new methods and tools invented by modern science

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and technology yields higher production and greater profit for farmers. As **Sentinel Assam (2024)** reports, the move towards mechanisation in Assam is already yielding impressive results, enhancing productivity and efficiency while alleviating the physical strain on farmers and making agriculture a more attractive prospect for younger generations.

This principle applies to every stage — from nursery bed preparation and ploughing to transporting and threshing paddy. As **Mishra (2011)** has observed in his study of modern agricultural practices, the guiding principle throughout is the same: less expenditure, less labour, less time, fewer workers, and greater returns. It is precisely for greater economic benefit that the general population has adopted tools and methods invented by modern science and technology.

6. INTELLECTUAL AND EDUCATIONAL CAUSES OF CHANGE

Among the causes of the influence of modern science and technology on agriculture-centred folk culture, intellectual and educational causes must also be discussed. Education has spread among the general population across various districts of Assam. Having been educated through modern education, people have become capable of employing various modern methods. Modern education has rendered traditional folk beliefs increasingly irrelevant. A significant number of books, journals, and government advisories related to agricultural work and methods have also become widely available.

People in Assam today no longer follow all the customs, traditions, and beliefs of the past in the same way. Previously, all villagers refrained from ploughing on new moon (amavasya) and full moon (purnima) days; today, a considerable number of people do not observe this belief. Furthermore, the indirect reason for not ploughing on those days was to give cattle two days of monthly rest. But since tractors and power tillers have replaced cattle, the question of rest does not arise, and ploughing may be done on any day at any time.

7. CRISES EMERGING IN VARIOUS DIMENSIONS

As human society has reached the heights of civilisation, sweeping changes have taken place in its economic, social, and cultural dimensions. Electronic media and modern technology have not only brought the world closer but have also enabled the merging of languages and cultures from various parts of the globe. While this process has enriched the language and culture of some nationalities, it has simultaneously threatened their very existence. As **Bardoloi (2011)** observes, folk culture is timeless — it existed in the past, exists in the present, and will continue to live in the future. In some instances, traditions have transformed and folk culture has survived in a refined form in the modern era. Today, however, under the influence of new discoveries in science and the spread of technology, some aspects of folk culture are facing a serious crisis.The root cause of the various crises in Assam's agriculture-centred folk culture is the influence of modern science and technology. With the invention of tractors and power tillers, the use of the traditional plough (nangal) has declined. Simultaneously, various other traditional implements associated with the plough — such as the dila, yuvali, sholmari, jotjori, and aontjori — are also in jeopardy. Similarly, the 'tom' (a traditional seed-soaking container) is practically out of use today. The duli, once found in every household in rural Assam, is now almost impossible to find.The traditional folk implements — the dheki (foot-operated rice husker) and the ural (mortar and pestle) — are in crisis owing to the invention of rice husking and flour grinding machines. In present-day Assam, if anyone still has a dheki or ural at home, it is used only during the Bihu festival when it cannot be avoided.

8. CONCLUSION

While technological development has been an ongoing process since ancient times, modern science and technology represent an entirely new development — and in the case of Assam, an even more recent one. It was only after the Treaty of Yandaboo that the development of modern science and technology began in Assam, and its influence began to permeate various aspects of society. Field studies conducted in the selected districts of Assam confirm that under the influence of modern science and technology, the use of cattle for ploughing — which had traditionally been the foundation of agriculture — has now been neglected.

Based on the above discussion, the following conclusions may be drawn:

1. The influence of modern science and technology has brought changes to the various dimensions of agriculture-centred folk culture. The novelty that has entered every aspect of agriculture — its tools, festivals, beliefs, and traditions — has at its root the influence of modern science and technology.

2. The primary occupation of the majority of Assam's population is agriculture. Since rabi crop cultivation is more profitable than paddy cultivation, the farming communities of Assam are giving greater importance to rabi crops grown using advanced agricultural methods, which yield substantially higher production volumes.

3. The people of Assam no longer sustain themselves solely by growing paddy. With the assistance of modern science and technology, new forms of cultivation have been initiated. In the contemporary context, animal husbandry, fish farming, and poultry farming have also gained prominence.

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