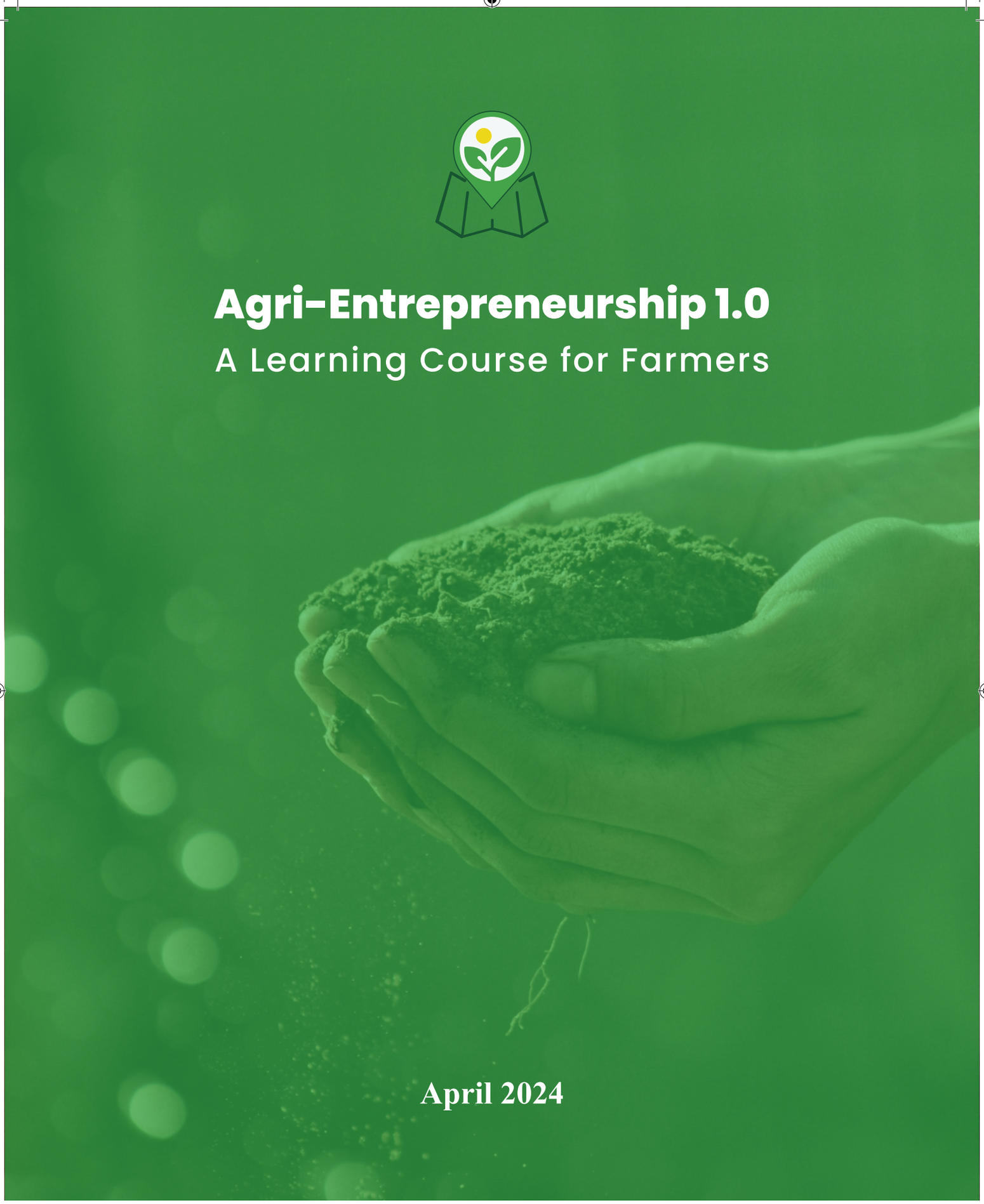
Agri-Entrepreneurship 1.0

A Learning Course for Farmers



April 2024

GRAPE
Green-Resilient Agricultural Productive Ecosystems

Co-funded by the European Union

SUOMI FINLAND

जर्मन सहयोग

Implemented by giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

WELT HUNGER HILFE

Youth Innovation Lab

First published
April 2024

Publication
Youth Innovation Lab
Bhakta Marg, Baluwatar
Ward No. 04, 44600 Kathmandu Nepal
Phone: 9851115919
Email: info@youthinnovatiolab.org
Website: www.youthinnovationlab.org

Welthungerhilfe (WHH) Nepal
Kalika Mandir Marg, Sanepa, Lalitpur
Tel.: +977-01-5452060/5420437
Email: npl.info@welthungerhilfe.de
Website: www.welthungerhilfe.org

Writing and Compiler
Dr. Badri Prakash Ojha
Dr. Raghunath Adhikari
Basudev Sharma
Tech Prasad Luitel
Dr. Jeet Chand
Pushpa Bhusal

Design
Sudin K. Shrestha
Youth Innovation Lab

This publication is prepared with the financial support of the European Union, the Ministry for Foreign Affairs of Finland and German Federal Ministry for Economic Cooperation and Development (BMZ). It contributes to the project "Green Resilient Agricultural Productive Ecosystems" (GRAPE) project of GIZ implemented under the Team Europe approach. The content is solely the responsibility of the authors themselves and does not necessarily reflect the views of the affiliated organizations. This publication contains links to external websites. The content of the external sites listed shall be the responsibility of the respective publishers.

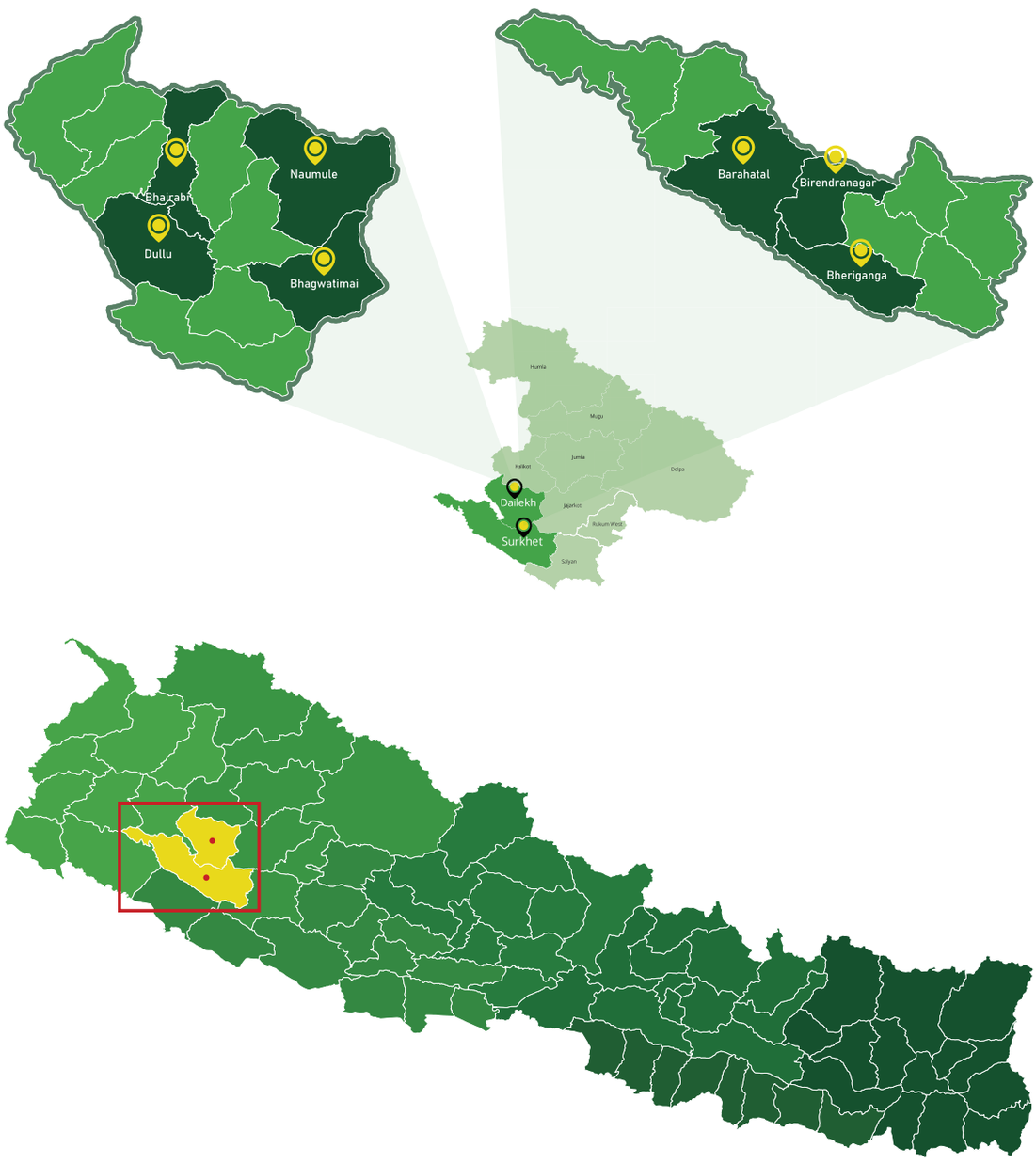
This material is developed under the project, "Business Incubation for Strengthened Local Agri-Food System in Karnali", implemented by Youth Innovation Lab and WHH Nepal as part of GRAPE.

Editorial

When the situation arises to establish any industry in Nepal, the most readily available raw materials are found in agriculture. Since Nepal's economy is based on rural areas, agriculture is also the main foundation of the country. Therefore, entrepreneurship in agriculture in Nepal is an urgent need today. Keeping this fact in mind, this training manual has been prepared for farmers. This manual is not a specific type of educational material but an informative document. It includes five modules, prepared by scholars involved in study, research, and extension services in various fields of agriculture. The topics included in this manual have also been prepared as audiovisual materials. Although some topics differ from each other, they are overall interrelated. The differences between written and audiovisual materials in terms of linguistic usage should be considered normal. Weaknesses that may arise due to the need to collect materials from various sources are acceptable. Suggestions are always welcome. It is hoped that farmers studying this manual will be able to learn skills to some extent. Heartfelt thanks to GIZ, WHH Nepal, Youth Innovation Lab, and the authors of the modules for their cooperation in preparing this manual.

Dr. Badri Prakash Ojha
Chief Editor

Municipalities covered by commercial promotion project for the strengthening of local agriculture-food system in Karnali



Content

MODULE 1

Introduction to Agri-Entrepreneurship

Dr Raghunath Adhikari

Introduction:

Agri-entrepreneurship is a way of embracing agriculture as a sustainable and profitable business, in contrast to traditional subsistence farming. It incorporates the principles of entrepreneurship in agriculture, and emphasizes increasing productivity, effectiveness and profit through an innovative approach to traditional knowledge and practices. Agri-entrepreneurs want to run a profitable business out of agriculture by identifying available opportunities in the sector. Agri-entrepreneurship includes the production of various food crops, fruits and cash crops; processing the produce; animal husbandry; building agriculture infrastructure; and business based in agriculture, among others.

Entrepreneurs involved in this sector are able to ensure the use of modern and indigenous technologies in farming, production of goods as per consumer demand based on value chain and a market for them. They are capable themselves to develop and manage an industry compatible with the market, and manage *haat bazaar*s—local, temporary—markets for local produce. What is considerable in this is that these entrepreneurs produce healthy agro products in an environment-friendly way. They are conscious of the impacts their work may potentially have on nature and humans. Therefore, they develop a perspective in doing business that identifies opportunities that don't harm the environment, and yet, makes profit through capitalization in the private sector.

Objectives:

This curriculum mainly aims to provide participants with an introduction to agri-entrepreneurship. Its salient objectives are as given below:

- Learn about the condition of entrepreneurship focusing on Nepal and one's local environs.
- Learn about Nepal's agriculture sector and where it stands.
- Learn the importance of the use of traditional technical knowledge and its current situation.
- Learn about the opportunities of agri-entrepreneurship in Nepal.
- Learn about the perspectives of entrepreneurs regarding agriculture.

Outcomes:

Participants in classes based on this curriculum will have been familiar with agri-entrepreneurship. They will gain some specific knowledge as given below:

Knowledge about the situation of entrepreneurship in their localities through field visits.

- Knowledge about the landscape of the agricultural scenario in Nepal.
- Knowledge about the opportunities of agri-entrepreneurship in Nepal.
- Learn the uses and importance of indigenous technical knowledge in agri-entrepreneurship.
- Learn about the mindset of entrepreneurs regarding agriculture business.

© Pixabay

Lecture 1 :
Observing agri-entrepreneurship

This class is based on observation of agri-entrepreneurship in Nepali context. It provides a brief introduction to agri-entrepreneurship and discusses how it differs from other forms of entrepreneurship. This curriculum will present the strong and weak aspects of agri-entrepreneurship in Nepal, its challenges and possibilities.

1. The agri-entrepreneurship sector

Agri-entrepreneurship refers to a modern way of doing agriculture that, unlike the traditional subsistence farming, aims at selling the produce in the market and making profit. It seeks to run agriculture as a sustainable, profitable business. This definition further elucidates agri-entrepreneurship: "Agri-entrepreneurship refers to activities of entrepreneurship within the agriculture sector and includes creation of a new agriculture business, its development and management (Rani, Naveen Kumar, & Arun Kumar, 2018). It incorporates the principles of entrepreneurship in agriculture, and emphasizes increasing productivity, effectiveness and profit through an innovative approach to traditional knowledge, methods and practices.

Agri-entrepreneurs want to do a business that makes profit by identifying opportunities in the agriculture sector. Agri-entrepreneurship includes the production of food crops and cash crops, their collection, grading, processing, trading, animal husbandy, building agri-technology and infrastructure and aims to increase agri-based business. It also refers to the use of innovative technologies and their use by agri-entrepreneurs, improve value chain, develop timely business, and finding markets to trade agricultural produces. Because they don't just run after money but are also environmentally-conscious ecopreneurs, they are aware of the impacts that industries may have on the nature and people. They want a development that doesn't hamper nature.

2. Possibilities of agri-entrepreneurship

There are many possibilities for agri-entrepreneurship in Nepal. Because the natural atmosphere in Nepal remains undisturbed, compared to many countries around the world, the importance of organic farming is high here. Given Nepal has three topographical regions-mountain, hill and Terai-and six seasons, the agriculture system is diverse in itself. Given that many rare species of animals and plants are found in niche areas in the country, the country is blessed by the nature. For example, we can take the Yarsagumba and some Himalayan herbs.

Nepal has got many advantages such as it biodiversity, diverse indigenous and organic knowledge, big markets like India and China, entrepreneurial mindset of its population, Nepali government's priority on agriculture, and provisions of crops and livestock insurance, among other things.

3. Drawbacks of agri-entrepreneurship

Nepal is a land-locked country between two giant neighbors with aggressive export-oriented markets, has a fragmented land owned in small amounts by many; declining fertility in land, and faces brain drain—these are the main drawbacks for agri-entrepreneuship in Nepal.

Other drawbacks include lack of provision of agriculture loan, lack of irrigation, lack of machinery, shortage of compost manure and fertilizers, corruption in agriculture subsidy programme, and lack of practical knowledge among technical manpower in agriculture. These necessisate improvement from the government and the private sector. Lack of infrastructure, lack of access to technology, a minimally competitive market, lack of quality in produce, lack of knowledge about value chain, etc. remain other drawbacks for agri-entrepreneurship in the country.

4. Possibilities of agri-entrepreneurship

Many of Nepal's villages now have access to roads, electricity, drinking water, health facilities, and schools, and are in the process of urbanization. These villages have high demand of vegetables, fruits, milk, meat, and egg, among other quality agricultural produce. There is a good possibility of unseasonal vegetables and produces yielding high rates. Meanwhile, technologies imported from two giant neighbors is increasing the possibility of reforms in grading and processing. There is also a good possiblity of agri-tourism. Demand abroad for uniquely Nepali produces such as large cardamom, tea, coffee and other herbs in on the rise. Locally operated businesses such as horticulture, beekeeping, and meat business also hold possibilities.

5. Challenges of agri-entrepreneurship

There hasn't been enough research in Nepal to connect small farmers to capital investment, education and market chains. Small entrepreneurs have a hard time competiting with international products with their quality packaging and labeling. Competing in Indian market, which has a large investment and capitalization, is challenging. For small entrepreneurs, purchasing expensive agriculture goods is challenging. The increasing brain drain and labor migration has meant labor shortage. On the other hand, climate change has led to a loss of productivity.

To protect small and medium-scale entrepreneurs, the government should do these things: expand trade in large scale and reduce investment; upgrade capacity to be able to meet the demand; increase quality of products; upgrade the capacity of entrepreneurs; and rethink customs policy to protect the country's entrepreneurs.

***Conclusion**:* Agri-entrepreneurship has an important place in Nepali economy. It has a possibility to help reduce poverty and generate employment in the country. Nepal's biodiversity, and diverse climate and topography means there is ample possibility for Nepali agricultural produce in the international market. The changing eating habits, brought about by globalization, has also provided opportunities. But there are challenges such as international competition, climate change and labor migration. There is importance of research and study on capital market, technology and market in Nepal and training to produce skilled manpower.

Lecture 2 :
Agricultural landscape in Nepal

This lesson is related to the general identity of agriculture being done in Nepal based on topography. In its background section, general information will be given about the agricultural landscape of Nepal. Specifically, the forms, scenarios, and finally the agricultural methods and practices of Nepal are presented based on environmental adaptation in Tarai, hill, and Himalayan regions.

1. A scenario of agriculture according to geography

According to geography, Nepal is divided into three regions—mountainous, hilly, and Tarai plains. Temperate climate is prevalent in the Himalayan region, subtropical in hills, and tropical in Tarai and inner Madhesh regions. That's why, Nepal is considered a country with diverse climate. For instance, apple, orange and mango can all be grown here. In terms of area, the Himalayan region covers 35 percent of the country, hilly 42 percent and Tarai 23 percent. But only 21 percent of the land is cultivated (Nepal,2022).

2. Scenario of agriculture in Tarai

Tarai has a tropical climate. It is made of fertile land made by rivers flowing from the Himalayan region to the south. It spread from Mechi in the east and Mahakali in west. It has a plain land that is conducive to agricultural mechanization and about 17 percent of the land is arable. It is also called a the bread basket of Nepal (Infopedia, 2023). It main food crops include paddy, maize, wheat and pulse; while oil crops such as mustard, yellow mustard, sunflower, and flax seeds. Cash crops such as sugarcane, potato, and tobacco are also cultivated here. Among vegetables cultivated here are potato, tomatos, cauliflower, cabbage, cucumber, and beans, among others. Among fruits found here are mango, jackfruit, pineapple, banana, Sunpat, and papaya. The major livestock reared in the region include goats, cows, buffalos, pigs, and among domestic birds are chicken, ducks and pigeons.

3. Scenario of agriculture in the hills

Nepal's mid-hill region is considered a favorable area for fruit farming and animal husbandry. The food crops cultivated here include maize, millet, buckwheat, and potato, while the cash crops are tea, coffee, large cardamom, potato, and honey. In the past when there was no access to transportation, the region was self-sufficient in agriculture. Many others fruits such as mango, jackfruit, orange and lemon are cultivated here. Other fruits include the new breeds such as avocado and dragon fruit. Among the livestock reared here include cow, buffalo, goat, sheep, pig, duck and chicken.

4. Scenario of agriculture in Himalayan region

This region hosts some of the world's tallest mountains. It has a cold climate. Although the region is not all that favorable for agriculture, locals grow buckwheat, potato, barley and Uwa, among others. Fruits found here include apple, Kiwi fruit. The region also produces medicinal herbs and tea, honey, cheese, and Chhurpi, among others. People use horses and mules for transportation here while people rear sheep and mountain goats for meat and wool, and yak for milk. Animal husbandry is a major means of subsistenc in the region.

5. Scenario of agricultural methods and practices

The remote areas of Nepal run subsistence farming. Farmers there are dependent on physical labor and traditional equipments for agriculture. The indigenous knowledge, methods and skills prevalent here for millenia are environment-friendly and are equally important in the age of globalization. For instance, the terrace farming in hills controls soil erosion and keeps land fertile, helping farmers use the fertility to the maximum.

These are the positive aspects of possibilities. Nepal often suffers drought, late entry of seasons, low quality seeds, fertilizers, and irrigation. These areas need reform through modern irrigation, new technology, marketization, diversification, packaging, branding and price revision. Because of limited access to resources, education and infrastructure, the adoption of technology has been slow. Entrepreneurship based on market research and reach on market and value chain can benefit many. A collective effort is essential to resolve the problems of lack of new technology, market access and loans.

On the other hand, Efforts are being made to bring new technologies and agricultural methods to urbanized areas, promoting modern agriculture and agri-entrepreneurship. This has led to increased production of vegetables, fruits, fish, and poultry within urban perimeters, along with a focus on cash crops like tea, large cardamom, and medicinal herbs. Organic farming is also gaining popularity due to its sustainable practices and market potential internationally.

***Conclusion**:* Nepal's agriculture sector has immense possiblities. This geographically diverse country is also rich in biodiversity thanks to climatic and environmental diversity. People here are naturally capable of taking indigenous and organic crops and produces to the local and international markets. That's why, entrepreneurs can reap the benefits of this diversity, embrace new technology and sustainable practices to create new sustainable economic opportunities for the local communities. Agri-entrepreneurship appears to have a journey of immense possiblities as the country moved towards agricultural prosperity.

Lecture 3 :
Application of indigenous knowledge and techniques in agri-entrepreneurship

This course focuses on indigenous knowledge and practices in Nepal, highlighting their importance in land conservation and environmental protection. It also covers topics like organic farming, processing, and the cultivation of medicinal plants, with a brief look at how indigenous communities use traditional techniques in agriculture.

1. Indigenous knowledge and practices in agriculture, horticulture, and herbal cultivation

Indigenous knowledge and techniques in agriculture encompasses the accumulated wisdom, skills, and practices passed down through generations by various castes and tribes residing in specific ecological niches long before the advent of modern industrial society. This type of knowledge is referred to by various terms, such as basic knowledge, traditional knowledge, indigenous knowledge, local knowledge, environmental knowledge, tribal knowledge, technical knowledge, rural knowledge, and farmer's knowledge, as noted by Warren (1991). Indigenous knowledge is defined as "a body of knowledge created by a group of people living in close contact with nature for generations" (Johnson & In R. Ellen, 1992). In the course of social development, such technical knowledge is passed down from generation to generation through oral or practical performance. Throughout the course of social development, this indigenous knowledge was transmitted from one generation to the next through oral traditions or practical demonstrations. The unique agricultural produce, culinary delicacies, and artisanal goods with indigenous origins, characterized by their natural flavors and materials found exclusively in specific regions of Nepal, hold immense appeal for external consumers.

2. Indigenous knowledge in environmental protection and natural resource management

Indigenous knowledge is crucial for environmental conservation and sustainable resource management. In Nepal's Terai plains and hilly regions, the widespread construction of ponds and irrigation channels facilitates various uses of water for drinking and agriculture. Preserving water sources and planting shade trees are essential for maintaining these resources.

Protecting forests and ponds in hilly areas preserves water sources and recharges groundwater. Indigenous knowledge informs practices such as building gardens and fields to prevent landslides, retain moisture, and conserve soil fertility. Human understanding of soil, developed over thousands of years, underscores its importance.

For instance, in Eastern Madhesh, Gamhari paddy's leaf-covered pods confound birds and monkeys, delaying recognition of ripeness. Junge paddy, a deterrent to birds and animals, is planted in forest-field buffer zones. Pani paddy, grown in waterlogged areas until ripening, exemplifies animal-friendly traditional wisdom. Additionally, mixed cropping and crop rotation, along with seed selection and preservation tailored to local conditions, are integral components of indigenous practices.

3. Indigenous knowledge in organic agriculture production and processing

In agriculture, traditional indigenous knowledge, which prioritizes environmental sustainability, encompasses what we know as organic and natural farming practices. These practices include using nitrogen-rich roots like Asuro, Sanaiful, Khirro, Ghansi, Kosebali, as well as natural pesticides and fertilizers such as cow dung, Juto, and Suli, reflecting the principles of organic farming.

Indigenous agricultural methods for crop preservation and pest control use native plants and resources like neem leaves, mugwort, cow urine, and ash solutions. For example, neem leaves and ashes are applied to protect seeds and crops from moths, without the adverse effects of chemical pesticides.

Certain seeds like corn, cereals, vegetables, and fruits are treated with smoke and sunlight for insect protection. Traditional practices include drying gourd, luffa, eggplant, and okra seeds and fruits.

Similarly, traditional methods of storage, such as utilizing natural air-conditioning, are rooted in indigenous knowledge. For instance, Chayote is stored underground and retrieved after approximately three to four months. Knowledge of producing items like dry chickpeas, hog plum, Masyura (fermented sun-dried vegetable balls), Sattu (protein-rich flour made from powdered chana or other pulses and cereals), ghee, cheese, and Churpi (traditional cheese) is also derived from tradition.

In this indigenous knowledge system, fundamental practices are developed for local organic production and processing.

4. Indigenous knowledge in production and processing of herbs and medicinal plants

Within traditional, native, eco-friendly, and local knowledge, indigenous medicine constitutes a distinct domain. The knowledge of indigenous medicine, accumulated over thousands of years through trial and error by local communities residing in specific geographical and climatic regions since ancient times, is both precise and original. Even today, dozens of types of medicinal plants that can be found in every village of Nepal have been used by the local community. For example, Neem, Tulsi, Chiraito, Teepati, Khirro, Siundi, Ganja, Bhang, Dhaturo, Chariyamilo, Harro, Barro, Amla, Panchaunle, Kutki, Jatamsi, Yarsagumba, Lothsalla, Silajit, Pakhanveda, and Bojo, among others, contribute to the list of 700 to 1600 medicinal plants found in Nepal. Additionally, 187 types of medicinal and aromatic plants have been identified (IUCN, 2004). Similarly, as per another study (Medicine, 2021), Nepal boasts 13,067 plant species, with 2,500 of them recognized for their medicinal properties. These diverse medicinal plants are utilized in various forms such as dried, powdered, liquid extracts, or even in the form of smoke for medicinal purposes. Local traditional healers, known by names such as Kaviraj, Vaidya, Jharphuke, Dhami, Jhankri, Ojha, and others, are practitioners of traditional medicine who utilize such remedies. Ayurveda and natural healing practices are integrated into these methods of treatment.

5. Indigenous knowledge in agro product processing

Indigenous agricultural knowledge, deeply rooted in indigenous practices, spans a wide spectrum, ranging from small-scale household production to organized, profit-oriented enterprises. In our tradition, there are practices such as using wooden oil presses, making sour tart, and cooking methods, grinding flour in mills, crafting ghee, Churpi, and cheese from cow, buffalo, and cow's milk. Additionally, we have techniques for extracting ghee from Indibutter trees and crafting items such as rugs, blankets, and sweaters from it. Other practices include beekeeping and honey production, as well as the art of drying, storing, and selling vegetables and fruits like Sinki, Gundruk, Masyura, and Titoura. Furthermore, our traditions encompass making food products from sugarcane, including molasses, Chaksala, Pustkari, and raw sugar. We also have expertise in crafting bamboo baskets, Nanglo, Namlo, Damlo, Purlung, Dhakre, Mandro, Chitro, and Thunse. Additionally, we have knowledge of crafting musical instruments like flutes, pipes, and sinka. Furthermore, there are numerous industries based on local alcoholic beverages such as raksi, Jaand, Tongba, Chhyaang, etc., which are part of our indigenous knowledge.

Conclusion: indigenous knowledge plays a crucial role in advancing agricultural enterprises due to its eco-friendly, sustainable, and locally accessible nature. It holds immense potential for fostering the development of organic agricultural products, pharmaceutical enterprises, and various other agricultural-based ventures.

Lecture 4 :
Opportunities in agricultural enterprises in Nepal

This curriculum focuses on agricultural entrepreneurship opportunities in Nepal, covering various sectors such as manufacturing, processing, and marketing. It will provide a comprehensive overview of these opportunities within the agricultural domain in Nepal.

1. Agricultural enterprise opportunities

Nepal is an agrarian country rooted in traditional agriculture. According to a 2021 World Bank study, 28.75% of land in Nepal is arable (WB, 2024), while currently, 64.8% of the population is engaged in agriculture-related activities. However, the agricultural sector contributes only 24.1% to Nepal's total gross domestic product (CBS, 2024). As Nepal integrates into the global economy, the areas of need have expanded, but purchasing power remains weak for the majority of the population engaged in agriculture to meet their evolving needs.

Nepal has untapped potential for agricultural enterprises due to its diverse geography and climate. It is abundant in rare natural products such as Yarsagumba, morel mushrooms, Panchaunle, Jatamasi, and Cardamom, showcasing its rich natural offerings.

One of our key advantages lies in Nepal's strategic location between India and China, two densely populated countries, offering a vast market for consumption. Additionally, Nepal boasts rich biological diversity and a wealth of diverse traditional and indigenous knowledge. Consequently, Nepal presents numerous opportunities for agricultural enterprises spanning production, processing, and marketing sectors.

2. Production related agribusiness opportunities

Nepal's dependence on agricultural imports, as highlighted by the Kathmandu Post, reveals a significant reliance on external sources. The data reveals that in the fiscal year ending on July 15, 2022, Nepal imported agricultural products valued at 325 billion rupees, primarily from India (Prasain, 2024).

This highlights the massive demand within Nepal's internal market for agricultural goods, even for domestic consumption. As more of Nepal's agricultural workforce transitions to non-agricultural sectors, the country is witnessing a shift towards becoming a consumer-driven market.

Conversely, Nepal's top-quality indigenous products are in high demand in both Northern and Southern markets. The natural and organic agricultural produce, including a diverse range of flavors and seasonal vegetables unique to Nepal's geography and climate, are sought after both domestically and internationally. Additionally, exclusive Himalayan herbs like Yarsagumba, Panchaunle, Kutki, Lwanthsalla, Chiraito, Pakhanveda, and aromatic products command considerable attention. Moreover, businesses involved in fruit and flower cultivation tailored to the local environment, beekeeping, dairy, and meat production exhibit similar potential.

3. Opportunities in agro-processing industry

With aggressive markets from both the north and south making inroads into Nepal, there is a growing potential for processing agricultural products. Activities such as grading, packaging, labeling, and more not only create jobs but also enhance the economy by adding value to products and providing business opportunities for entrepreneurs. Agricultural product processing includes fruits, vegetables, grains, medicinal herbs, spices, dairy, and animal products.

For instance, fruit processing yields a variety of products such as juice, jam, sauce, pickles, and rice or potato chips. Similarly, spices like cardamom, ginger, turmeric, and garlic can be processed for profitable ventures. Nepal's conducive climate and terrain contribute to the production of high-quality tea and coffee, making processing and packaging enterprises vital.

Moreover, the country's rich biodiversity of herbs presents opportunities for processing enterprises focused on grading, drying, packaging, and labeling medicinal products. There's also a growing interest in indigenous grains like millet, buckwheat, and barley, offering potential for value addition through milling and packaging.

Additionally, mustard and oilseed crops can be processed to produce oil, while honey production stands out due to Nepal's diverse flowering plants. Dairy processing, including milk, curd, cheese, and ghee, holds promise, with opportunities for value-added products like flavored yogurt and cheese spreads. Furthermore, there's potential in processing materials from sheep, goats, poultry, and other livestock. With increasing demand for processed poultry and meat products, establishing processing units for various meats can cater to both domestic and potential export markets.

4. Opportunities in marketing-related agricultural enterprises

Systematic marketing of agricultural products, both produced and processed, represents a significant area for agricultural enterprise. However, in Nepal, there has been insufficient focus in this domain. There are numerous opportunities to enhance the value of processed agricultural goods and expand market reach, including through avenues such as e-commerce, branding infrastructure, market research, and technological advancements. Agricultural education and training are pivotal for effective marketing strategies, with institutions such as agricultural training centers and online platforms playing a crucial role. Additionally, there is a growing potential for agricultural enterprises intertwined with tourism, known as agritourism, given the burgeoning tourism industry in Nepal. As urbanization increases and more people move away from traditional agriculture, agritourism farms offer a unique opportunity to engage urban populations with agricultural practices through recreational activities.

Conclusion: Agricultural entrepreneurship has never been more crucial, particularly in the realms of production, processing, and marketing, contributing significantly to employment generation and socioeconomic development in Nepal.

Lecture 5 :
Entrepreneurial mindset in agriculture

This course is related to the mindset of agricultural entrepreneurship within the agricultural sector of Nepal. It includes the meaning and general role of entrepreneurial mindset in agricultural entrepreneurship, analysis of attractors and repulsors of mindset and aspects of incentives for entrepreneurship.

1. The entrepreneurial mindset

The entrepreneurial mindset encompasses the attitudes and perspectives individuals hold towards starting and managing a business. It can be viewed from two angles: attraction and repulsion. The attraction mindset involves recognizing entrepreneurial potential, acquiring relevant knowledge and skills, and adapting to both internal and external environments. Individuals with this mindset can mobilize resources effectively, develop strategies to mitigate risks, and capitalize on business opportunities. They are proactive in pursuing new business ventures and view failures as learning experiences that lead to alternative opportunities.

On the other hand, those with a repulsion mindset believe that starting a business is not feasible or attainable without the necessary knowledge and skills. To achieve success in business, they recognize the importance of continuous learning and skill development. In the context of agricultural entrepreneurship, the attraction mindset revolves around enhancing productivity, promoting sustainability, and fostering innovation in the agricultural sector.

Challenges such as limited mechanization, inadequate access to agricultural inputs like fertilizers and seeds, fluctuating market prices for agricultural products, and lack of financial support have led to disillusionment among agricultural professionals. Even now, while 64.8% of our population is engaged in agriculture, the contribution of agriculture to the total national income is only 24.1% (CBS, 2024). Despite the significant proportion of the population engaged in agriculture, its contribution to the national income remains disproportionately low.

Nepal's agricultural sector, which should be the cornerstone of the economy, has been neglected and overlooked. The existing situation in agricultural entrepreneurship does not align with the aspirations for growth and development. There exists a stark disparity between the current state and the envisioned potential. The landscape is characterized by both opportunities and challenges, with layers of possibilities juxtaposed with adversities. Amidst aspirations and setbacks, hopes and disillusionment, there lies a complex interplay of attraction and repulsion across production, processing, distribution, and marketing activities.

Various factors, including the political landscape, access to global markets, and policy implementation, influence the entrepreneurial ecosystem. Addressing these factors and bridging the gap between potential and reality is essential for fostering a conducive environment for agricultural entrepreneurship to thrive.

2. Distracted or repulsed mindsets in agri-entrepreneurship

(a) Lack of agricultural entrepreneurial culture: The absence of education focused on modern agricultural entrepreneurship leads to low awareness and a deficient entrepreneurial culture. Consequently, the popular perception remains entrenched in the notion of agricultural labor as menial work, as captured by the saying "Padhe gune kaun kaam jotyo halo khayo maam," meaning, 'It's not certain what work you'd get after formal education, but plough the land, and you're certain to have rice to eat'.

(b) Neglected agriculture and agribusiness: Agri-entrepreneurship often suffers from the misconception that individuals engaged in agricultural activities are uneducated, low-status individuals, perpetuating the stereotype that agricultural work is relegated to rural dwellers.

(c) Trade bias: Conversely, there exists a bias favoring individuals involved in agribusiness, who are perceived as educated, articulate, and possessing strong communication skills. They are believed to have better consumer outreach capabilities compared to those in agricultural production.

(d) High costs of agricultural processing enterprises: The processing sector in Nepal entails significant investment and is not directly linked to production. Challenges such as inadequate infrastructure, lack of suitable equipment, and transportation issues contribute to a reluctance towards engaging in processing activities.

(e) Cost-return disparity: Individuals accustomed to subsistence agriculture weigh the perceived benefits of agricultural entrepreneurship against the low returns. This often leads to younger generations seeking opportunities abroad, while the elderly population continues with traditional agricultural practices.

(f) Globalization and market competition: The increasing globalization and market competitiveness pit budding agricultural enterprises against cheap imports and stringent international quality standards, posing a significant challenge for new ventures.

(g) Seasonal and climatic risks: Dealing with the unpredictability of weather patterns and the onslaught of natural disasters can be daunting, causing individuals to turn away from agricultural enterprises.

(h) Limited access to resources: The lack of access to essential resources such as land, capital, agricultural tools, and technology further compounds the indifference towards agricultural entrepreneurship.

3. The attraction to agri-entrepreneurship mindset

In Nepal, there's a growing attraction towards agricultural entrepreneurship driven by several factors. Firstly, there's a rising demand for organic products and seasonal vegetables, coupled with the availability of land, both owned and easily accessible. Additionally, there's a trend of increasing urbanization internally, as well as opportunities in the global market externally. Another appealing aspect of agricultural entrepreneurship is the potential for starting a business with relatively lower investment compared to other sectors. Moreover, advancements in tools and technology, such as polyhouses, mulching, composting, organic fertilizers, drip irrigation, and improved seed varieties, have made agricultural entrepreneurship more enticing.

Entrepreneurs in this field are also drawn to incentives like subsidies for agricultural products, access to credit, support for processing and price promotion, and priority marketing channels.Moreover, access to education, training, and information on modern agricultural enterprise management and marketing has further increased the allure of entrepreneurship in agriculture.

The experiences of young individuals returning from foreign employment, equipped with professional skills and experiences acquired abroad, have also inspired them to venture into agricultural enterprises. Despite limited success stories, individuals are motivated to initiate new agricultural ventures, driven by the potential for growth and success in this sector.

4. Encouragement in agri-entrepreneurship

There is encouragement from the state for agricultural entrepreneurship.

"The Constitution of Nepal, in its Rights List, has outlined the Agricultural Development Strategy (2015-2035) as a roadmap for the overall development of the agricultural sector and guiding principles for sustainable development goals.

This strategy aims to make this sector competitive by promoting commercialization, mechanization, and diversification of agricultural and livestock production" (Rayo, 2076).

Therefore, to promote agricultural entrepreneurship, it is necessary to adhere to the major policies outlined in the document.

5. Necessary resources for entrepreneurship:

Skilled manpower, capital, technology, abundant and diverse resource provisions, infrastructure development, entrepreneur-friendly state policies and regulations, encouragement for innovation, capacity to produce goods according to consumer demand, certainty in production materials and traded goods, continuity, ability to produce quality goods and compete, diversity of entrepreneurship, risk-bearing capacity development, insurance arrangements, education, awareness, and training, market management information, communication technology development, research and development of new techniques according to time, and the establishment of conducive national and international entrepreneurial relations are essential factors.

Conclusion: Ultimately, fostering entrepreneurship is crucial to mitigate the apathy and stagnation prevalent among the general populace in the agricultural sector, and to establish agriculture as a primary entrepreneurial domain. By integrating innovation, productivity enhancement, value addition, and market integration into agriculture, sustainable development in the agricultural sector can be ensured. Addressing the main challenges of agricultural development through the implementation of agricultural entrepreneurship policies and incentives can empower entrepreneurs with enhanced competitive capabilities. Effective implementation of agricultural entrepreneurship-related strategies is imperative to promote entrepreneurship in agriculture and to accelerate holistic agricultural development in Nepal.

Evaluation Questionnaires

Mark the right answer with the (✓) symbol.

1. **What is the difference between entrepreneurship and agri-entrepreneurship?**

a) Agri-entrepreneurship is related only non-profit sector.
b) Entrepreneurship refers to any business-related enterprise while agri-entrepreneurship is specifically related to agriculture.
c) Agri-entrepreneurship is related to innovation and technology in agriculture.
d) Agri-entrepreneurship depends entirely on traditional agriculture methods.

2. **What are the possibilities of agriculture business in Nepal?**

a) Fertile land and availability of water.
b) Prevalence of biodiversity.
c) Massive internal and neighboring markets in India and China.
d) All of the above.

3. **What is not the weak aspect of agri-entrepreneurship in Nepal?**

a) Availability of indigenous and traditional knowledge.
b) Gradual erosion of soil fertility.
c) Lack of irrigation.
d) Fragmentation of land and ownership model.

4. **What is not the possibility of agri-entrepreneuship in Nepal?**

a) Rise in demand for quality agriculture produces such as fruits, vegetables, milk, meat, egg, etc.
b) Rise in access to road, electricity, health facilities and drinking water in remote areas.
c) Increasing labor migration among youths.
d) Good market for unseasonal vegetables.

5. **What are the challenges of agri-entrepreneurship in Nepal?**

a) Lack of access to modern knowledge and technology.
b) Open border with India and unmanaged market.
c) Lack of quality in produce to compete in international market.
d) All of the above.

6. **What are the major areas of agri-entrepreneurship?**

a) Production, processing and marketization
b) Trade in international market
c) Trade in domestic market.
d) Increasing organic produces.

7. **What factor inspires people into agri-entrepreneurship?**

a) Interest in keeping the existing state of affairs intact.
b) Desire for innovation in agriculture.
c) Search for government subsidy.
d) Fear of technological advancement.

8. **What are the major geographical regions of Nepal?**

a) Forests, basins and riverbeds.
b) Inner Madhesh, dunes and valleys.
c) Hills, basins and gorges.
d) Himalayan, hills and Tarai

9. **What is the geographical region with the possibility of mechanization in agriculture?**

a) Himalayan
b) Tarai
c) Hill
d) Valley

10. **Which region's main produces include Chinu, buckwheat, Uwa and herbs?**

a) Hill
b) Tarai
c) Himalayan
d) All of the above

11. **Which geographical regions of Nepal has the possibility of these produces?**

a) Fruits in the hills.
b) Foodstuff in Tarai.
c) Medicinal herbs in the Himalayan region.
d) All of the above.

12. **Which region of Nepal produces Sunpat?**
a) Hill region
b) Tarai
c) Himalayan
d) All of the above

13. **Which region has the most biodiversity?**
a) Hill
b) Tarai
c) Himalayan
d) All of the above

14. **Which region is important for growing tea?**
a) Eastern Tarai
b) Eastern hill
c) Eastern Himalayan
d) All of the above

15. **What do you mean by indigenous, traditional knowledge?**
a) Local and organic knowledge
b) Environment-friendly knowledge
c) Knowledge developed by indigenous people
d) All of the above

16. **What doesn't fall under indigenous knowledge and practice**
a) Terrace farming in the hills
b) Cultivating trees with big leaves at the water sources
c) Rooftop farming
d) Building ponds

17. **Which of the following doesn't fall under indigenous knowledge?**
a) Using Asuro, Sanai flower and Khirro as manure
b) Preserving seeds in concoction of ash and Neem leaves
c) Preserving cucumber seeds by scattering them on the walls
d) Vetetable farming in poly house

18. **How many types of medicinal herbs are found in Nepal?**
a) 2500
b) 13067
c) 1600
d) 187

19. **Where are medicinal herbs Harro and Barro found?**
a) Himalayan region
b) Tarai
c) Hills
d) All of the above

20. **Which of the following is not a indigenous knowledge?**
a) Making Chhurpi
b) Making jaggery
c) Making pickles, Masyaura and Titaura
d) Making potato chips

21. **What role does traditional knowledge play to increase sustainability in agriculture in Nepal?**
a) It encourages use of chemical fertilizer.
b) It encourages practices of diversity in crops and land conservation.
c) It prioritizes expanding land for agriculture.
d) It neglects water conservation technology.

22. **What doesn't fall under possibilities of agri-entrepreneurship?**
a) Diverse climate
b) Traditional, indigenous knowledge
c) Crops and plans of rare species
d) Subsistence farming

23. **What doesn't fall under possibilities of agriculture in Nepal?**
a) Organic vegetable farming
b) Production of palm oil
c) Production of medicinal herbs
d) Large-scale cultivation of food crops

24. **What produce under Nepal's agri-entrepreneurship has the most possibility of processing?**
a) Fruits
b) Food crops
c) Medicinal herbs
d) Woolen goods

25. **What do grading, packaging and labeling contribute to?**
a) Production
b) Processing
c) Maketing
d) Value addition

26. **What is important for marketization?**
a) Agriculture knowledge
b) Agriculture ICT
c) Online platforms
d) All of the above

27. **What is related to agri-tourism?**
a) Piligrimage
b) Tour of agri farms
c) Mountaineering
d) Trekking

28. **What is not directly connected to agri-entrepreneurship?**
a) Supply of forest products
b) E-commerce
c) Promotion of agri-entrepreneurship
d) Agriculture training institutions

29. **What falls under agri-entrepreneurial mindset?**
a) Innovation
b) Risk-taking ability
c) Value addition
d) All of the above

30. **What is not the quality of an agri-entrepreneur?**
a) Creativity
b) Learning from failure
c) Frustration and migration
d) Consistency and patience

31. **What are the deterrents of agri-entrepreneurship?**
a) High investment
b) Expensive agriculture equipments
c) Comparably less benefit
d) All of the above

32. **What is not among the reasons for youth migration abroad?**
a) Superstitous belief
b) Poverty
c) Illiteracy
d) Unemployment

33. **What is not among the works needed to be done to promote agri-entrepreneural culture and mindset?**
a) Provision of agriculture knowledge and training
b) Raising awareness about agri-entrepreneurial culture and development
c) Development of ICT based on agri-entrepreneurship

Sending youths abroad

34. **What doesn't help in reducing adverse impact of climate on agri-businesses?**
a) Use of weather forecasting mobile app
b) Regular transmission of information via radio and television
c) Mulching
d) Tunnel farming

35. **What are the attractions of agri-entrepreneurship?**
a) Provision of subsidies in agriculture equipments
b) Prioritizing marketization
c) Access to loans
d) All of the above

MODULE 2

Possibilities of agricultural development and plan formulation

Basudev Sharma

Introduction

The agriculture sector has played an important role in Nepal's economy. As much as 50.4 percent of Nepalis depend on agriculture for a living. The sector has also generated employment opportunities and makes up 24.1 percent of the country's GDP. Given the diversity in climate and geography, Nepal also holds possibilities and opportunities for rearing animals of various species alongside agriculture-based occupations. Since tea, coffee, large cardamom, ginger, and other high-value crops produced in Nepal are being exported to foreign markets, the opportunities for the production and market management of such products have widened. Due to the increasing use of modern technologies as well as hybrid and advanced varieties of seeds in agriculture-based occupations, the production of such crops has not only escalated but the post-production loss is also decreasing. Commercial farmers are gaining high profits by producing off-season crops. Meanwhile, the government of Nepal has been organizing various programs to provide subsidies to the farmers in order to stimulate production. In a process to ensure the proper cost of the agricultural yield, the government has been setting the lowest support price for rice, wheat, milk, and sugarcane, alongside arranging agricultural and livestock insurance to reduce the damage caused by natural disasters and subsidizing the insurance fee by 80 percent. The Prime Minister's Agriculture Modernization Project (PMAMP) operated by the resources of the Government of Nepal along with other foreign investment policies on agricultural development has been supporting farmers in advanced technology and market development. Such services can easily be obtained from the offices of the agricultural service providers based at federal, provincial, and local levels. However, these services are not available as per the need. The major reason behind this drawback is the invisibility of the effects of federalism in some areas, as it is still in its implementation phase. One instance of this is the agricultural sector.

The module is believed to further clarify the subjects related to the planning of the agricultural business including the aforementioned topics.

Objectives:

- To provide general information on the agriculture market and its types.
- To inform its stakeholders about the current situation of agriculture in Nepal, its future prospects, as well as opportunities.
- To provide information about the Agricultural Development Projects and subsidies operated by the Government of Nepal.
- To inform the stakeholders about the business plan for agriculture-based business.

Outcomes:

- General information on the agriculture market and its types will be available.
- The stakeholders will be informed about the current situation, future prospects, and opportunities for agriculture in Nepal.
- The information on the Agriculture Development Projects and subsidies operated by the Government of Nepal will be available.
- The stakeholders will be informed about the business plan to run an agriculture-based business.

Lecture 1 :
An analysis of Nepal's agriculture market

Introduction to the market

Any specific place and time where the contact and mediation between buyers and sellers determine the price of the produced goods for it to be bought, sold, or exchanged, is called a market. The Agricultural Market includes vegetables, food crops, and livestock-based yields and goods, and the process of their production to consumption. The production planning, plucking system, grading, storage, product cleaning, transportation, price-determining, handling, selling, consumption system, and sales center-related functions of the agricultural products are incorporated under agricultural marketing. The Agriculture Market helps bridge the gap between the producer and consumer. Generally, the market provides the following opportunities:

- Exchange of goods and services.
- Collection of goods and services.
- The role of a mediator between farmers and traders.
- An easy availability of goods for the consumers.
- Improving the quality of food.
- Mitigation of the post-production loss.

Activities in the agricultural market, the available physical infrastructure, the supply and demand situation of agricultural yields, the status of the value chain of agricultural yield- from its production to consumers, the presence of small-scale farmers, agriculture businesspersons, cooperatives, traders, retailers and exporters in the market, and their commercial efficacy, all can be further analyzed on the basis of the government policies for the development of infrastructure in the promoting of agriculture market.

In this lecture, the analysis of the agricultural market is done solely based on the market kinds.

Market Kinds:

On the grounds of the situation of the agricultural yield business, its operating system, and physical infrastructure, the agricultural market can be divided into 4 major kinds.

1. Wholesale Market:

A market that buys and sells the agricultural yields or commodities in the whole packed goods or the quantity measuring 5 kgs or more is called a wholesale market and the person involved in such business is called a wholesaler. In such kind of market, the business is done in bulk. This market remains a major urban hub for the distribution of goods. Such a market should not be disrupted from its main purpose of the wholesale market even if the retail business is carried out. The large agricultural yield markets across the major cities of the country, like Kathmandu's Kalimati, Birtamod, Dharan, Narayangadh, Pokhara, Butwal, Nepalgunj, Birendranagar, etc. are examples of the wholesale markets.

2. Retail Market:

The marketplace where any quantity of the good is directly sold to the consumer as per their demand is called a Retail Market. The majority of the buyers in such markets are the consumers themselves and the business takes place through the direct involvement of the seller. The retail market is established in a place where the consumers themselves gather, as such places are the nearby markets for the consumers. Gudari markets (traditional small-scale stores that sell an assortment of essentials), grocery stores, roadside stalls, and hawking are examples of retail markets.

3. Weekly Market:

The market especially set in the rural areas, once or twice a week, for the buying and selling of agricultural yields is called *Haat Bajar* or weekly market. Both wholesale and retail business is carried out in such markets. Similarly, it also works as a collection center to collect the yields of the nearby production areas for it to be supplied to the other urban areas. The markets held once a week in various districts of Nepal and the agricultural and livestock markets set up occasionally during festivals or celebrations, are examples of such markets.

4. Collection Center:

Some goods produced in a specific place are collected and managed to be taken to a faraway wholesale market in order to sell and distribute. Such a space where the collection of goods is done for its transfer to an urban wholesale market is called a collection center. These collection centers should be near to the commercial agriculture production market. Either farmers themselves or the traders sell and distribute the agricultural yields collected in the collection centers. If the agricultural yield production pockets are available with no collection facility, a small investment collection center can be made based on the adequacy of the agricultural yield supply. However, these collection centers may stop operating as soon as the bus and truck facility becomes available in the production area. In such cases, the collection center should strategize on collecting the goods and supplying them to other urban areas as well as selling them locally.

Agriculture markets can be categorized in other bases as well.

- Based on the covered area: Local market, regional market, national market, international market, world market
- Based on sales nature: Mixed market, specialized market (goat market, fruits market, etc), supermarket (Bhat-bhateni, bigmart, saleways, etc.)
- Based on Agricultural Yields: Fruits market, vegetable market, fish market, food market, egg market, chicken market
- Based on some conditions: The complete market, where all the necessary conditions for the market are fulfilled, and a partial market where only a few conditions among the necessary ones are fulfilled.
- Based on Competition: Fully competitive market, partially competitive market
- Based on Operating Period: Daily market, weekly market, fortnightly market, monthly market, trade fair (*Maghe Sankranti, Janai Poornima, Chaite Dashain,* 12-year fair, and so on).

An agricultural market is equally important for the producer (farmer), trader, and consumer. For the farmer, selling their self-produced agricultural yield and receiving the appropriate price is necessary while for the trader, the agriculture market is helpful in the promotion of their business as well as sell and distribution of quality agricultural yield. In the same way, for the consumer, the agriculture market is useful for an easy and cost-effective supply of fresh and quality agricultural yields as per their need.

In addition to this, for the goods shipping vehicles, porters, packaged product supply enterprises, cafeterias, and grocery stores situated in the marketplace, the agricultural market has become highly significant as they have been directly or indirectly receiving benefits from the agriculture markets.

Problems faced in Agriculture Market Development:

- Small-scale farmers have less sellable savings which as a result, leads them to sell goods to the local trader at a cheaper price.
- The farmers not only lack an organized storage, but are also compelled to sell the yield to fulfill immediate household needs, and later buy them at higher prices.
- As a consequence of lower production costs in India, the price of agricultural yields in Nepal is determined by the Indian market, as these countries share an open border.
- Because of the difficult geographical situation of Nepal and the delay in the functioning of the road that connects mountains, hills, and terai, there is a hardship in supplying the over-produced goods from one place to the other.
- The policy-makers have given less priority to the development of the Agricultural Market.
- The stakeholders lack a proper understanding of the market system.
- A lack of functional market information services for the farmers and traders to make proper decisions.
- Lesser number of organized markets and inadequate physical infrastructure.
- A lack of physical facilities to systematize the maintenance of agricultural yield.
- An insufficient and unscientific way of grading, packaging, and other market promotion facilities of agricultural yields.

Lecture 2 :
Harvest System for Agricultural Enterprise Development

Introduction:

The population involved in the agricultural sector of Nepal seems to be decreasing gradually. According to the Economic Survey Report 2079/80, in the year 2018, 60.4 percent of the population was engaged in the agricultural sector while the number decreased to 50.4 percent in 2021. Moreover, the contribution of the agricultural sector to gross domestic production is gradually decreasing for the past few years. In FY 2070/71, such contribution grossed 30.3 percent while it reduced to 24.1 percent in FY 2079/80. Growing urbanization and unorganized settlements are the reasons behind the drop in arable land by 12 percent while there is an increment in the population by 0.92 percent. So, it is a challenge to produce more food from the shrinking arable land for the rising population and supply it as per the demand. For this purpose, there must be an increase in the production and systematic harvest using new technologies according to the geographical potential. Despite being an agriculture-dominant country, the current situation of constant import of agricultural products from other countries can only be changed by increasing the use of modern methods for production.

The harvest methods carried out in Nepal to increase production are as follows.

1. Modern Agriculture System

The agricultural technology that elevates the productivity and production of agricultural goods by using advanced technology, skills as well as machinery tools, is called the Modern Agricultural System. The use of various hybrid seeds, a proper amount of chemical fertilizers, safe chemical pesticides, plastic tunnels, drip irrigation, plastic bags, etc. in the production and use of various small and large machinery tools to prepare the land, plant crops, tillage, cut, and harvest falls under the modern agricultural system. Also, the modern agricultural system pays attention to the systematic storage of agricultural yield, its marketing, and export to foreign markets, as well as the construction of structures for irrigation. The use of pesticides and chemical fertilizers for modern technology might invite problems such as decreasing fertility of the soil, and the effects of pesticide residue on humans and animals, which also contaminate the environment itself. Similarly, the beneficial insects may get destroyed because of these pesticides. Besides, there is a possibility that the use of heavy machinery tools can affect the geographical structure and cause natural disasters. However, as a result of molding modern technology into the local environment, the environment can be less exploited and the production can be of better quality.

2. Organic Agriculture System

Organic agriculture refers to agriculture that is done without the use of chemical fertilizers and pesticides. Generally, in organic farming, there is no use of artificial fertilizers, pesticides, hormones, antibiotics, genetically modified organisms (GMO), and so on. Despite hardship to immediately increase agricultural production and productivity, the organic farming system appears to be beneficial due to its healthful production. Karnali Province which declared Jumla an Organic District in 2064 BS, later declared the entire Karnali Province as an Organic Province in 2076, and formulated and implemented related laws, regulations, and procedures. The practical complications apparent in organic agriculture include low production, a requirement for a higher number of laborers, and difficulty in using technology. However, if the certification of skills, and knowledge of biological pesticides, organic fertilizer, and seeds, is done for identification, higher benefits can be obtained from Organic Agriculture.

3. Mixed Cropping System

The technique of planting different varieties of the same crop or distinct crops on the same field at the same time in order to collect the produced goods together is called mixed cropping system. Since the height, texture, and species of the crops planted in the same place vary, they use the air, temperature, location, and photosynthesis separately, leading the environmental sources such as light, carbon dioxide, and land to be utilized more effectively. This has resulted in an increase in production and productivity, reduction of diseases and insects, improvement of the soil environment, etc. to be higher than that of the single crop system. Apart from this, including oil crops in the mixed cropping, there will be an increase in the fertility of the soil which acquires protein-rich food, that ultimately creates a positive impact on the environment.

4. Crop Rotation System

Crop Rotation means the systematic cultivation of crops, belonging to different families one after the other on one particular land. Under this method, the crops of different families are grown as per the season on the limited land available to the farmer, with the yield collected throughout the year. A fitting combination of land, labor, and capital, as well as scientific and productive use of limited resources, can make any agricultural business successful. All traders seek ways to produce more by making the least use of resources. To attain this objective of increasing production while reducing costs, the crop rotation system plays a significant role. There are different harvest cycles for mountains, hills, and plains, depending on their geographical locations. While in the Himalayas, one crop might require a whole year to mature, in the plains, up to three or four harvests can be done in a year.

5. Relay Cropping System

The system of planting a second crop prior to the first harvest is called a Relay Cropping System. In the relay cropping system, any two kinds of crops should be cultivated in the same place, at the same time, and in the same season. In a place like Nepal where most farmers own small plots of land, the relay cropping system becomes immensely useful in terms of food and nutrition security. It improves food security by increasing the production from fragmented land.

6. Terrace Improvement System

Farmers are compelled to cultivate in the steep lands of hilly and the Himalayan regions which makes it important to improve the ditches in such areas. The ditches are formed to reduce the speed of water in steep and moderately steep land. It not only reduces the speed of water but also helps prevent soil erosion and landslides. Besides these, this technology also helps in the conservation of both water and soil. As both the rate and quantity of water flow are reduced due to this technology, there is an enhancement in surface water absorption and recharge rate. Also, there is a significant reduction in soil erosion, which helps maintain the fertility of their soil making it easier to cultivate in the ditches than on slopes.

7. Sloping Land Agriculture Technology (SALT)

Farming traditionally on steep land washes away soil, manure, and other substances, which ultimately leads to no cultivation and soil erosion. This is a technique of planting small plants and oil crops along with agricultural crops to protect the soil of the land, increase agricultural production, and receive more crops, which eventually reduces soil erosion and integrates management for land conservation. This is also referred to as the agroforestry system. In this system, by operating farming, animal husbandry, and forest production, simultaneously, maximum production can be collected from marginal land. For this reason, grass, fruits, animal husbandry, and food crop production is carried out in an integrated manner.

Lecture 3 :
Opportunities and Prospects of Animal Husbandry Business

Background:

Animal Husbandry plays a significant role in Nepal's agricultural system. Besides its contribution to family income and food security, it has substantially helped increase the fertility of the soil alongside obtaining organic fertilizers from it. Although traditionally, Animal Husbandry has been carried out in Nepal since ancient times, the commercial business began only after the 1990s. Currently, in various parts of the country, small and large commercial farms have been established to raise cows, buffaloes, chickens, goats, and fish, and the operating industry for milk and meat produced from them is also being developed. According to the report of the United Nations Food and Agriculture Organization, an adult person requires at least 91 liters of milk, 14 kg of meat, and 48 eggs per annum to remain healthy. However the Ministry of Agriculture and Livestock Development in 2078/79 reported the annual per capita availability of milk, meat, and eggs to be 88 liters, 21 kg, and 46 pieces respectively. Apparently, there is self-sufficiency in meat production which can even be exported while the increment needed in milk and meat production can be taken as an opportunity.

Efforts to Promote Livestock Business

The professional venture of cattle and goat rearing seems to increasingly grab the attention of the youth. Since the youth are returning from foreign employment to get involved in animal husbandry in their own country, the commercialization of agriculture is increasing which is creating a positive impact on employment. Not only has the import of the advanced breed of goat increased but the breed improvement is being done in the country itself. Similarly, artificial insemination in cows, buffaloes, goats, and other animals has been extended to 71 districts in total including 58 districts annually and 13 districts seasonally. For the same cause, 15 buffaloes of the Murrah breed were brought to Nepal and are kept in three animal farms in Pokhara, Lahan, and Nepalgunj, and after 3 years 150,000 doses of semen will be produced from these buffaloes through which at least 100,000 buffaloes can be artificially inseminated for improved breeding, as per the claims of the Ministry of Agriculture and Livestock Development. Productivity can be amplified if the breed of the animal is improved. Seemingly, the breed improvement is done only in 12 percent of the cows and 28 percent of buffaloes in Nepal. The arrangement of supplementary subsidies is also made for the purchase of advanced breeds of livestock, construction of sheds, operation of processing centers, and marketing. In addition, health services for animals can easily be obtained from the

veterinary hospitals in the districts as well as from the animal service branches in the municipalities. For four-legged animals, vaccines against the diseases like PPR, BQ, and classical swine fever are being produced in the country and free vaccination services are being conducted as per the requirement. The veterinary hospital also conducts Mobile Animal Health Camps, time and again to make animal health services more convenient and easier. Thus, such activities not only provide more opportunities but also validate the higher potential of animal husbandry business in Nepal.

Challenges and Possibilities of Animal Husbandry

In Nepal, different species of animals can be reared in the mountains, hills, and plains according to geography, and there lies a possibility of getting alternative benefits from them. In the Himalayan region, there is high potential for Yak, Himalayan cow, Sheep, etc. businesses that have unfolded other businesses such as wool, dried yak cheese (Chhurpi*)*, cottage cheese, Pashmina, and Yaktail which can open the door for other possibilities if organized further. On the other hand, in the hilly regions, goat rearing has potential due to better grazing facilities, while in the plains, cows, buffaloes, goats, pigs, chickens, and most other animals have potential. Compared to the mountains and hills, the animal husbandry in the plains is organized, has about 50 percent hybrid and advanced breeds, the production, productivity, and commercialization have grown, and new species of animals and birds are domesticated. This has directly supported the region in food and nutrition security, poverty reduction, and job creation.

To upgrade the market of animal products in the international market, the livestock must be operated according to the standards of the World Trade Organization and the World Animal Health Organization. The infectious epidemic that occasionally affects livestock causes huge economic losses which makes it a challenge to manage it on time. Unless reliable measures are implemented to control these epidemics, the expected investment and market management of the livestock cannot be done. The current challenge is to scientifically operate this business, which occupies a significant place in the country's economy.

Targeting the Madhya Pahadi Lokmarga (Mid-hill Highway) and Hulaki Rajmarga (Postal Highway), the government has launched an integrated milk production program. Similarly, the resource centers for rearing breedable water buffaloes and bulls are in operation. The government also provided subsidies to the farmers under the Shed Improvement Program. Similarly, an 80 percent subsidy on insurance fees is given for animal insurance. And for the grass crops, the government has launched a Commercial Seed Production Program.

Further, the government has launched a livestock rearing program targeting youth and widows, Korali Paadi (buffalo calf of reproductive age) raising program, and has also given maternity diet subsidies to cows and buffaloes. Such programs can benefit the general farmers and unemployed youths.

Lecture 4 :
Government Schemes and Subsidies for Agricultural Development

Background

The Government of Nepal has been conducting various programs and schemes every year on the basis of the potentiality of the area and the need of the farmers across the country for the overall development of the agricultural sector, and through these schemes, the farmers of the respective area also get subsidy support for commercial agricultural production and marketing. Alongside implementing federalism, various subsidy programs are also being implemented in the agricultural sector through all three levels of the government- the federal, provincial, and local.

The programs and schemes conducted by the government for agricultural development are as follows.

1. Prime Minister's Agriculture Modernization Program (PMAMP)

Prime Minister's Agriculture Modernization Project operated from the fiscal year 2073/74 BS for a period of 10 years. This project has a total of four divisions including the pocket development program of a minimum of 10 hectares, block development program of a minimum of 100 hectares, zone development program of a minimum of 500 hectares, and super zone development program of a minimum of 1000 hectares. So far, 16 super zones, 177 zones, 1587 blocks, and 8710 pockets have been established while by the end of this project, 21 super zones, 300 zones, 1500 blocks, and 15000 pockets shall be established. As per the estimation, the cost of this project, which is fully financed by the Government of Nepal without foreign financial aid, will be Rs 130 billion 742 million. The information and services related to this can be obtained from the super zone and zone offices under the project, and also, the agricultural knowledge centers and veterinary hospitals at the district level and agricultural branches at the municipality level.

2. Agricultural Sector Development Program (ASDP)

This program is being implemented with collaborative financial aid from the International Fund for Agricultural Development (IFAD) and Swiss Development Commission for 6 years from 2076 BS in 10 districts of the Karnali Province that includes Surkhet, Humla, Dolpa, Mugu, Kalikot, Jumla, Jajarkot, Rukum, Dailekh, and Salyan. The aim of this program is to minimize poverty and nutrition insecurity in people living in the hills and mountains of Karnali Province and help Nepal in achieving Sustainable Development Goals. This project has been providing subsidies to farmers, traders, businesspersons, and cooperative organizations to institute a value chain of selected high-value agricultural commodities.

3. Rani Jamara Kularia Irrigation Project (RJKIP)

This project aims to provide irrigation facilities to Tikapur and Lamki Chuha Municipality as well as Janaki Rural Municipality of Kailali District through the Rani, Jamara, and Kularia irrigation systems. Along with irrigation, this project has been championing the production, processing, and marketing of agricultural yields for the farmers of that area. Its function is to provide financial support through farmer groups, cooperatives, and water supply departments by setting certain standards for the promotion of agricultural business.

4. Food and Nutrition Security Enhancement Project (FANSEP)

The functioning area of this project, which is financed by the World Bank, includes 16 Rural Municipalities of 8 districts - Gorkha, Dhading, Sindhupalchowk, Dolakha, Dhanusha, Mahottari, and Saptari. Commenced in 2075 BS, this project has an implementation period of five years. This project makes an arrangement to provide subsidies to the farmer's groups involved in agriculture and animal husbandry business in the command area to improve their income by diversifying their products, marketing them, and increasing their value.

5. Nepal Livestock Sector Innovation Project (NLSIP)

Conducted through loan support from the World Bank, this project has been under operation for 5 years from 2075 BS in 289 municipalities within 28 districts of 5 provinces. This project has been providing subsidies to the farmers of the respective areas for animal husbandry business with the aim of increasing productivity in the selected livestock value chain, increasing the value of animal products, and strengthening the animal service sectors of Nepal.

6. Rural Enterprise and Economic Development Project (REED)

Conducted for 5 years from 2077 BS with loan support from the World Bank, this project aims at encouraging rural entrepreneurship by strengthening market access through the development of productive partnerships and market relations between small agricultural producers and buyers of 171 municipalities within 35 districts of 6 provinces.

This project shall help in developing a suitable entrepreneurial environment through necessary supporting services including construction of necessary structures and capacity development. Apart from providing grant supplements to the prominent commercial schemes for the promotion of productive partnerships, this project will help in establishing the demand-based small agricultural market centers, and value chain-related basic infrastructure,as well as the regional markets.

7. Nuts and Fruits in Hilly Areas Project (NAFHA)

Under the concessional loans and grants from the Asian Development Bank and shared grants from the World Agriculture and Food Program and the Government of Nepal, this project, with the objective of expanding fruit crops orchards in the central mountainous region of Nepal, increasing the production of fruits and timber, creating rural employment through the promotion of value chain, increasing the income level of farmers, has been under operation for the fiscal year 2079/80 to 2086/87 BS. This project is being implemented in 100 local bodies within 34 districts of Koshi, Bagmati, Gandaki, Karnali, and Sudurpaschim provinces. For the farmers of the project area, this project will provide financial assistance in nursery management of fruits and timber, as well as production, processing, and marketing of fruits.

8. Agricultural Extension Programme

For the Agricultural Extension Program, the agricultural service provider bodies under the federal, provincial, and local levels allocate a budget to provide subsidies to farmers in various activities within agricultural business promotion through farmer groups, cooperatives, and organized farms. For the commercialization and modernization of agriculture, capacity-building programs for farmers and traders are being conducted alongside giving them subsidies to purchase chemical fertilizers, seeds, fruit plants, machinery, and tools for the construction and marketing of agricultural infrastructure.

The minimum support price of rice and sugarcane is set every year under this. These services can be obtained from the offices under the Department of Agriculture, Agriculture Knowledge Center, and the municipality-based agricultural sections.

9. Livestock Service Programs

Considering the animal husbandry business as a diversification, commercialization, income-generating, and prestigious business, various agencies are conducting Livestock Service Programs. The program includes the distribution of the advanced breed of livestock, animal health services, livestock product processing, and marketing, as well as financial support and capacity-building programs. Further, various provinces and municipalities have also arranged subsidies on the basis of milk sales to encourage milk-producing farmers. These services can be availed from the offices of the Livestock Service Department, District Veterinary Hospital, and Animal Service Expert Center, and also from the municipal branches for animal services.

10. Agriculture, Livestock, and Medicinal Herbs Insurance Program

In the crop and livestock insurance program that was officially launched on 1st Magh 2069 in Nepal, the initial subsidy provided on the insurance fee was 50 percent which later became 75 percent, and currently, the 80 percent subsidy on insurance is provided not only on agricultural crops and livestock but also on medicinal herbs by the grant from the Government of Nepal. In addition, some provinces and local levels have even borne the remaining 20 percent insurance fee to make it more convenient and easy for the farmers although any significant progress is yet to be seen.

Lecture 5:
Developing Business Plan for Agricultural Enterprise

Introduction:

The type of crop, its quality, the time of production, the process of production, the quality of the product, and where to sell and at what price, are the issues carrying significant meaning in the agriculture business. The farmers and entrepreneurs need to understand the market potential, the level of production, possible expenses, capital requirements, legal aspects, possible opportunities, and risks prior to starting any business or enterprise. Any developed plan that covers all these issues is called a Business Plan. For a business or an enterprise, the business plan is considered its road map.

How much to produce, when and where to sell, who will be the target customer, what is the production cost, and how much capital investment is required, are notable issues of a business plan.

Generally, while developing a business plan, the following four sections are included:

1. Marketing Plan

What kind of product to produce, according to the market demand and consumer interest, should be decided by the businessperson. The plan should further include the color, weight, taste of the manufactured goods, its quantity, quality, size, price, and facilities provided to the consumers and merchants. Also, the marketing plan should have a place for the levels and means of sales and distribution of manufactured goods, target markets and consumers, market promotion measures, and strategies for market competition.

2. Production Plan

In the production plan, the method and process of production, the sources of the required raw materials including their cost, required manpower, and other production materials, are mentioned. It prepares a detailed description of the required production materials and their use in the production process. Further, it also includes information on the kind of tools and equipment, the number of manpower, and the material quality required in the production process. Thus, on the basis of the production plan, the entrepreneurs analyze the need for capital investment.

3. Expenditure Plan

The farmer and the entrepreneur need to have a good understanding of the costs incurred at various stages of the production process. The expenditure plan should be made based on the estimated actual cost. The cost plan provides a detailed description of the quantity of the production materials and other overhead costs. In the cost plan, the production cost per unit and other direct and indirect costs as well as fixed and variable costs are calculated. The entrepreneur should calculate the costs of production materials, raw materials, labor costs, and other overhead costs while preparing an Expenditure Plan.

4. Financial Plan

A Financial Plan refers to the accounting of the financial details sought by the entrepreneur from their business operations that are necessary for the attainment of goals and objectives. While making a financial plan, one should mention the required amount of capital for the business, its sources, and the interest rate when taking a loan. Similarly, apart from the investor's assets and liabilities, the required investments in the form of fixed capital and working capital are calculated

in this plan. Also, the profit and loss account, return on investment, investment return period, Break Even Points, etc. are analyzed under it. Besides, the financial plan is formulated in a specified format with a detailed description of every activity and implementation cost and income gained from the sale and distribution of the manufactured goods.

5. Operational Capital

An operational capital is required to run a business successfully. Basically, Operational Capital is necessary for the following affairs.

- To store raw materials
- To store semi-processed goods
- To store consumable goods
- To sell on loan
- Cash (for wages, salaries, and other overhead expenses)

The following can be the possible sources of financial management for the enterprise/business.

- Own savings (cash, bank balance)
- Borrowing money (from relatives and friends)
- Taking a loan by pledging an object
- Taking a loan from moneylenders
- Taking a loan under the Savings and Loan Scheme
- Buying goods on credit
- Grant support
- Taking loans from banks and cooperatives

The sources mentioned above have their own pros and cons. While doing their financial management, the entrepreneur should analyze and decide which source is the most useful for them.

6. Variable Cost

The costs that are incurred only if the production is done, and changes with the change in production volume, are the Variable Costs. The variable costs include seeds, fertilizers, pesticides, labor, fuel, grain, medicine, etc. that are required while doing business. For instance, with the increase in area for vegetable farming, a larger number of labor is required to plant, remove bushes, and sow, as well as harvest which also multiplies the cost of the fertilizer. If there is more use of tractors, the cost of fuel to operate a tractor will also rise. Hence, such expenditure comes under Variable Cost in the agriculture business.

7. Fixed Cost

Fixed Costs are the ones that are incurred irrespective of the functioning of the business. This includes property, insurance, interest, depreciation, wages of the permanent laborers, etc. Some fixed costs are co-related to a specific enterprise. Like, building coops for chicken rearing. However, it is difficult to calculate the cost as a fixed one for certain enterprises. This is because such items can be used in other enterprises as well.

For example, a water pump can be used both in rice and vegetable cultivation. In such cases, calculating the cost of the water pump specifically in vegetable or rice farming can be an issue. Similarly, fixed costs that aren't related to a single enterprise—such as depreciation of the buildings and machines, maintenance, regular labor wages, water, fencing, insurance and rent—are calculated as fixed expenses of the entire farm and should be calculated proportionately for the related enterprise.

8. Financial Analysis

Under the financial analysis, the farmer should keep a financial account of all their agricultural enterprises and yield productions by analyzing the profit that can be earned from the business, the time required for the investment to be raised, the gain from the return on the investment, the time required for the profit to be earned, and the break-even point period of the business. Thus, an account of the returns that can be received is called a financial analysis.

9. Gross Income

Gross income is the value of production from any agricultural enterprise. It refers to the total value of the yield, over a period of a year. The price of such agricultural yield can be easily measured by the farmers, from the amount received by selling the items. Farmers do not sell all the yields they produce. So, apart from the amount received from selling the yield, the gross income also includes the value of the yield consumed by the household, as well as the value of the yield saved for future consumption and sale. The calculation of the gross income is done by multiplying the gross production by the average farm price.

10. Balance Sheet

The details of the assets and liabilities are obtained from the balance sheet. Assets are divided into two types-fixed and current. Generally, fixed assets refer to the annual value after deducting depreciation and allocating funds for pre-operational expenses. Current assets, on the other hand, include raw materials, work in process, consumable items, receivables, possessed cash, etc.

Additionally, the cash reserves accumulated through cash flow are also put under assets. While the amount due for raw materials, salary payments, other business costs, debt, equity, and remaining earnings of the investors based on the profit and loss statement, are liabilities. Liabilities vary according to the size of the business.

11. Cash Flow

Cash Flow means the account of cash that is paid from the business treasury and accumulated in the treasury from the sale of goods and services produced by the business. Through this statement, the businessperson keeps account of the cash spent and incoming cash from sales in their business.

That being so, the businessperson has to arrange additional cash if the outgoing cash is more than the incoming cash in any month. On this basis, the net cash flow statement is prepared. The net cash flow means the difference between the cash coming in and the cash going out of the business.

12. Break Even Point

The break-even point helps to examine the relationship between expense and income while producing goods. It indicates the amount which has equal sales volume and production cost. If the production decreases from the production volume of the break-even point, the loss will increase, and vice-versa, the profit will increase. The profit from the business comes to zero, at this point. Being informed of the break-even point, the businessperson shall easily know about the future profitability of the business. The calculation of the break-even point and other indicators can be done in the following ways.

Break Even Point at the Production Level

=Annual fixed cost/ (Average selling price per unit - average variable cost per unit)

Break Even Point at Sale Level

=Annual fixed cost/ [1-(average variable cost per unit/ average selling price per unit)]

Break Even Point in Percentage

= [Annual fixed cost/ (annual sale - annual variable cost)] X 100

Return on Investment

Return on Investment = (Net Profit/ Cost of investment) X 100

Payback Period

Payback period= initial capital investment/ average annual gain

14. Risk Management

Risks are the elements that can cause direct or indirect loss in the agricultural business. By anticipating any possible risk, the businessperson should strategize to manage and protect it prior to any kind of loss. However, the losses due to natural calamities are not included in this. For example, if the goat dies due to various diseases while doing the goat breeding business, it may cause losses. For its management, livestock insurance can be done, which can get businesspeople compensation if the goat dies.

Evaluation Questionnaires

Mark the right answer with the (✓) symbol.

1. **What do you understand by market?**
a) Place with cities and towns
b) Place where people gather
c) Place where goods are traded
d) Place where festivals take place

2. **What is the main purpose of marketization?**
a) Exchanging goods
b) Producing goods
c) Selling one's product to the right customer
d) Purchasing goods

3. **What is a market that takes place only once a year or on special occasions called?**
a) Haat Bazaar
b) Mela
c) Gudari Bazar
d) Weekly market

4. **What do you understand by business?**
a) To engage in agriculture
b) To rear livestock
c) A job
d) Selling produce and reaping profit

5. **What do you understand by business plan?**
a) Market plan
b) Production plan
c) Financial plan of business
d) Road map of business

6. **What could be included in business plan?**
a) Market plan
b) Production plan
c) Expenses plan
d) All of the above

7. **What should one focus on while making production plan?**
a) Consumer interest
b) Production technique
c) Production expenses
d) Financial book-keeping

8. **Why do you need operation capital?**
a) To store raw material
b) To pay salaries and wages
c) To sell goods on credit
d) All of the above

9. **What do you call expenses incurred on seeds, fertilizers, labour wage and fodder?**
a) Fixed expenses
b) Current expenses
c) Contingent expenses
d) Cash expenses

10. **Expenses on land registration, insurance, interest and permanent employees, etc, are called?**
a) Contingent expenses
b) Current expenses
c) Fixed expenses
d) Cash expenses

11. **What do you call a situation where business makes zero profit?**
a) Break even point
b) Return to investment
c) Zero loan situation
d) Zero expenses situation

12. **What is return to investment period?**
a) Time a business makes profit
b) Time when there is return to initial investment
c) Time when current expenses are low
d) All of the above

13. **Disaster control falls under risk management.**
a) Yes
b) No

14. **Break even point is when a business makes more revenue than investment and gives profit.**
a) Yes
b) No

15. **How many percent of Nepali are engaged in agriculture?**
a) 50.4
b) 60.4
c) 62.4
d) 65.4

16. **What is agriculture's contribution to Nepal's GDP?**
a) 20.7
b) 24.1
c) 30.3
d) 33.1

17. **Organic agriculture system uses genetically developed animals.**
a) Yes
b) No

18. **When was Jumla declared organic district?**
a) 2064 BS
b) 2070
c) 2076
d) 2080

19. **What is mixed crop system?**
a) Process to cultivate one crop after another
b) Process to cultivate multiple crops at a time
c) Process to cultivate one crop before harvesting another
d) Process to cultivate crops in terraces

20. **What do you mean by agriculture forest system?**
a) Process to cultivate inside forest
b) Process to cultivate near forests
c) Process to cultivate foliage trees, fruits and crops at the same time
d) None of the above

21. **What do you call the process where one crop is cultivated before harvesting another?**
a) Crop cycle process
b) Mixed crop process
c) Modern agriculture system
d) Relay crop system

22. **Under which crop system is plastic cover used?**
a) Circular crop process
b) Mixed crop process
c) Modern agriculture system
d) Relay crop system

23. **According to FAO, how much meat is necessary to remain healthy for an adult human in a year?**
a) 12 kg
b) 14 kg
c) 16 kg
d) 18 kg

24. **Which animal does Murrah species belong to?**
a) Cow
b) Pig
c) Goat
d) Buffalo

25. **How much milk does a healthy adult need in a year, according to FAO?**
a) 85 liter
b) 90 liter
c) 91 liter
d) 95 liter

26. **How many zones under the Prime Minister Agriculture Modernization Project have been established so far?**
a) 157
b) 167
c) 177
d) 187

27. **How many superzones do the PMAMP aim to establish?**
a) 17
b) 21
c) 23
d) 25

28. **In how many district is Agriculture Sector Development Program running?**
a) 8
b) 9
c) 10
d) 11

29. **Food and Nutrition Security Enhancement Project has its jurisdiction in how many municipalities?**

a) 16
b) 18
c) 20
d) 22

30. **Nepal Livestock Sector Innovation Project has jurisdiction in how many municipalities?**

a) 259
b) 269
c) 279
d) 289

31. **Rural Entrepreneurship and Economic Development Project (REED) has jurisdiction in how many local units?**

a) 161
b) 171
c) 181
d) 191

32. **Nuts and Fruits in Hilly Areas Project (NAFHA) has jurisdictin in how many local units?**

a) 80
b) 90
c) 100
d) 110

33. **How much percent of agriculture and livestock insurance premium is subsidized by the government?**

a) 50
b) 75
c) 80
d) 90

34. **The local unit-based agriculture department sells hybrid goats in subsidized amount.**

a) True
b) False

35. **Veterinary hospital provides PPR vaccine service.**

a) True
b) False

MODULE 3

Financial management and invesment

Tek Prasad Luintel

Introduction

For any business operation, financial investment, its estimation, resource identification, analysis of whether it would be profitable, and risk analysis are important tasks. Financial management in business is compared to the blood circulatory system of the human body. We will be extensively discussing these subjects in this module.

Objectives:

- To clarify about financial management and analysis.
- To estimate the required investment for running a business.
- To inform about the resources for the investment.
- To educate about investment analysis.
- To clarify about risk management and its means.

Expected outcomes:

- Participants will be informed about the financial management and analysis for a business.
- They will be able to estimate the investment required for starting a business.
- They will be able to identify the resources for the investment for a business.
- They will be able to analyze the investment for a business.
- They will gain the knowledge of risk management and its means.

Lesson 1 :
Concept of financial management and analysis

Financial management is an important aspect of a business. It is concerned with the ideas such as collection of the financial resources and their effective utilization. The main objectives of financial management are as follows:

- To regularly manage the required amount of money for running a business.
- To create a favorable environment for a satisfactory return of investment for the investment.
- To use the investment safely.
- To build an appropriate capital by effective utilization of the investment.
- To do the work related to account management and tax clearance.
- To prepare financial reports.

Functions of financial management:

1. Estimation of capital requirement: It is necessary to determine the capital requirement for a business operation. The capital requirement depends upon the nature and level of the business. If the business is small, it's appropriate to manage on rent instead of investing on fixed capital purchase.

2. Determination of capital structure: When deciding on the capital structure, factors such as self-investment, loans and their sources, policies of lenders, and government policies etc. should be analyzed. In Nepal, it is seen that banks generally have brought a 60:40 ratio of self-investment and loans into behavior.

3. Selection of resources for required amount: Self-investment and loans are the main sources for the required amount of money/investment for business operations. Loans can be managed from banks, cooperatives or personal sources. For this, analyzing various aspects, it is important to consider where to obtain cheaper funds and how to make the business more sustainable.

4. Investment of acquired funds: Attention should be paid to allocating acquired funds in works where they can generate highest returns. It should be determined while preparing business plans, analyzing markets and price.

5. Distribution of profits: If a business operates in joint investment, profit distribution should align with the shares owned by investors.

6. Cash management: Nowadays, most businesses facilitate direct payments through cheques or digital means. Cash management becomes essential when some payments require cash.

7. Financial control: Financial control is a crucial aspect of business operation. While utilizing the finances, the financial management should be agile, productive, and economical**.**

Financial analysis:

Financial analysis involves studying and analyzing the required amount of money for a business. When operating a business, the factors that require attention—managing expenses wisely, budgeting etc—are calculated. When operating a business, necessary investment, fixed and current expenses, sources of finance, methods of obtaining funds, areas of expenses, obtaining loans, repayment of loans and interests, etc are also analyzed. Financial analysis includes ideas such as in order to make a business productive, effective and financially healthy, the source of funds and amount of money to collect, when to pay interest, and how to effectively allocate and manage in accordance with the priority of expenditure areas.

Objectives of financial analysis:

- To maintain calculation of financial impact
- To decide effective and capable sources
- To calculate profits
- To manage healthy or capable financial plans
- To coordinate financial contributions
- To calculate/analyze financial management capabilities

Maintaining records of the financial impact

Operating a business impacts various aspects or sectors such as farmers, workers, private forms, government agencies or departments etc. The main objective of the financial analysis is to analyze the financial burden imposed on these entities and opportunities for financial consumption. An assessment is made whether they are able to enhance themselves after the implementation of businesses of various aspects involved in the business.

Decision of effective and capable sources

It is necessary to determine which financial sources can be utilized to achieve effectiveness. When deciding on sources and resources, attention should be paid to financial market values, economic development, and the fluctuations in finance. In particular, managers, staying within the framework of the market value, need to analyze different types of challenges and make informed decisions.

Conducting accounting for profits

Various stakeholders are involved in financial investment in a business. These stakeholders require motivation for the financial gains**.** It is assessed whether the income is increased or not with extra efforts. Thus, conducting accounting for profits gained by all stakeholders is an important aspect of financial management.

Managing healthy or capable financial plan

Analyzing various financial activities to create a financial plan is an important task of financial analysis. A financial plan provides investors with a basis for making investments according to the timeline, as well as support in loan and interest payments. Similarly, it assists in deciding on how to obtain necessary financial resources for the business, how much to acquire and when to pay. It should also carefully analyze how inflation and devaluation impact the financial market.

Coordinating financial contributions

When operating a business, it is essential to establish coordination between the contributors in the financial sector by considering the needs and long-term interests of the business. Along with this, it is necessary to establish coordination with raw materials suppliers to facilitate ease in business operations.

Analyzing financial management capabilities

First, a methodology of the financial management of a business should be prepared. It should be simple and agile. Whether or not the financial management is adaptable according to the seriousness of the situation and timing, whether or not it is flexible, whether or not the schedule is appropriate etc should be assessed. The concept of investigation/research and development should be adopted to make financial management capable, effective, productive and sustainable.

Lesson 2 :
Budget management for agricultural entrepreneurs

Capital is necessary for operating agricultural businesses. Particularly, there are two types of capital required: fixed and working capital.

Fixed capital: Fixed capital refers to the permanent and long-term items/assets. It includes land, buildings, machinery, equipment etc. How much to invest in fixed capital, what type of land, building, machinery, equipment and the investment required for them should be determined by considering the market demands and potential future growth in demand.

Fixed expenses: Annual expenses incurred after deducting annual depreciation from the fixed capital and other fixed expenses (**Saalbasali)** fall under the category of fixed expenses. It includes office rent, operating expenses, indirect labor costs (salaries of management, accounting staff, office helpers etc), interest of a long-term loan etc. These are the fixed expenses that are regular in which the increment or decrement in production won't make any difference until a certain production capacity.

For small and medium-sized businesses, it is appropriate to operate by leasing land and buildings instead of purchasing them. In such a case, it is appropriate to put the land and building rent under fixed expenses.

Operating expenses: These are the annual expenses necessary for running a business, such as raw materials, direct labor, fuel etc. Such expenses increase with increment in production and decrease with production decline.

Depreciation: Depreciation refers to the annual expenses or amount that is obtained by subtracting the current time's rest price from the price of the fixed capital (except land) and dividing the result by the amount of time to use.

Working capital: After establishing a business, there is a need to ensure the availability of working capital to sustain its operations. Working capital is needed to buy raw materials, pay wages of workers and salaries and cover utility bills such as water and electricity etc, within a particular production period.

Total capital: The sum of fixed capital required for establishing a business and the working capital required for its operations over a certain period is the total capital.

Total capital need

SN	Fixed capital	Total	Self Investment	Loan
1.	Land			
	Building			
	Machinery			
	Equipment			
	Furniture			
	Previous operation expenses			
2.	Working Capital			
	Percentage			

Following the estimation of total capital needed this way, the topic and amount of loan to be taken from financial institutions and the amount of self investment should be determined.

Business Operation Cycle: In every industry, a business follows its own operational cycle. A business operation cycle includes a series of steps, starting from the purchase of the raw materials, their preparation, followed by partial or complete production of goods and finally, the cash inflow from the sale of the goods. We can consider milk collection and processing as an example.

1. **Milk collection and the transportation to the chilling center - 2 days**
2. **From the chilling center to the factory, including pasteurization and packaging - 2 days**
3. **Storage of pasteurized milk - 1 day**
4. **Cash collection from sales and return to business - 2 days**

Total 7 days

When budgeting for a business, it is essential to analyze various factors such as production targets, required quantity of raw materials, labor force, energy and production volume, revenue from sales, production costs (including depreciation), and profit/loss breakpoints.

It is displayed in the following table.

Total annual production……

SN	Details	Amount (Rs)
1.	Revenue from sales	
2.	Operating cost (To reduce) Raw materials Consumption cost Direct labor Maintenance Office operation cost Indirect labor	
3.	Total operation profit(1-2)	
4.	Depreciation and reducing depreciation of previous operational expenses	
5.	Interest and profit before tax	
6.	Decreasing interest of long-term/ short-term loans	
7.	Profit before tax	
8.	Tax (Only reduce when needed)	
9.	Total profit after tax reduction	

Break even Point: The breakeven point is the stage in a business where the revenue earned from sales equals the annual expenses. At this point, the business neither yields profits nor incurs a loss, but only covers its costs. The breakeven point can be calculated as follows:

Break even Point (Production Units) = Fixed Costs ÷ (Revenue per Unit – Variable Cost per Unit)

Break even Point of Production Capacity = Fixed Costs/(Revenue from Sales at Full Capacity - Current Expenses)

Return on Investment (ROI): It is a crucial indicator for deciding whether to invest in a business or not. It should ideally be higher than prevailing bank interest rates. If the ROU is lower than the prevailing bank interest rates, it is better to reconsider the investment. Higher the ROI, better for investment. While reconsidering, the business owner should calculate the capital goods or expenses goods investment, so that low investments yield high profit.

Return on Investment (ROI) = (Total profit/Total capital required) * 100

Chapter 3 :
Sources of investment for agricultural business operation in Nepal

Financial investment is crucial for operating an agricultural business. Self-investment, loans, and various forms of grants from governmental and non-governmental sectors are the major sources of funding.

There are two sources of loans: formal and informal.

Informal sources of investment

Informal sources of investment include loans (Saapati) obtained from individuals and groups. This type of loan operates on personal trust and informal agreements. In this mode, interest rates and repayment processes are not transparent. Predatory lending practices, colloquially known as meter byaj, is a product of informal financial investment, which has currently appeared as a national problem in Nepal. Interest rates tend to be higher in informal finance/loan compared to formal finance/loan. Partial collateral and personal witness are some means applied and there is no need to present a formal business plan. Obtaining informal loans is simpler and quicker compared to formal loans. However, the benefits of government provisions will not apply to informal loans.

Formal sources of investment in Agriculture Business:

Former sources of investment in agriculture business include commercial banks, financial institutions, and cooperatives. As these sectors are subject to direct government oversight and guidance, the interest rates are fixed and regulated and the repayment process is also transparent. Thus, obtaining loans from formal sectors is more appropriate than from informal sectors. When obtaining formal loans, the borrower needs to present appropriate business plans and different documents/evidence/proofs showing the capacity of repayment.

The Government of Nepal has enacted the Integrated Procedural for Interest subsidy on concessional loan-2075 to manage the concession on loans obtained under formal channels. The provisions and arrangements therein are outlined below.

Types of concessional loans:

- Commercial agriculture and livestock loans up to 100 million rupees,
- Educated youth self-employment loans up to seven hundred thousand rupees,
- Youth projects returned from abroad loans up to one million rupees,
- Women entrepreneurs loans up to 1.5 million rupees,
- Dalit community business development loans up to one million rupees,
- Higher and technical and vocational education loans up to five hundred thousand rupees,
- Youth self-employment loans up to five hundred thousand rupees.

Key provisions of the Procedure:

- Maximum of percent premium can be added in base interest rate
- Not charging any additional service fees other than the loan interest, loan information fee, insurance premium to be paid by the borrower, and loan security fee
- The repayment period of loans provided with interest subsidy will be of maximum five years
- After the procedure is implemented, the borrower obtaining loans will only receive interest subsidy. (Except for loans that got subsidy based on Procedure for Interest Subsidy in Commercial Agriculture and Livestock Loans, 2073)

Interest Subsidy Rates:

The interest subsidy rates determined by banks and financial institution on loans are as follows:

- 6 percent on loans for women entrepreneurs
- 2 percent on commercial agriculture and livestock loans exceeding fifty million rupees
- 5 percent on all other loans

Arrangement regarding collateral:

- For commercial agriculture and livestock loans exceeding one million rupees, commercial project collateral (feasibility of the project).
- For educated youth self-employment loans, the applicant's academic certificate is required.
- Personal collateral (Jamaani) of family members for commercial agriculture and livestock loans up to ten lakh rupees.
- For women entrepreneurial loans, youth self-employment loans and Dalit community business development loans, and youths returning from abroad:
    - Enterprise operated by the borrower,
    - Documents related to the borrower's loan,
    - In case of individual or group witnesses, documents related to it.

Eligible Agricultural Ventures and Business for Agriculture and Livestock loans:

1. Vegetable production, processing and storage,
2. Seed production, processing, and storage,
3. Forestry, flower farming, and horticulture,
4. Animal husbandry,
5. Ostrich, turkey, and duck farming, as well as storage and processing of meat and eggs,
6. Fruit production, processing and storage of produced fruits,
7. Dairy production and processing,
8. Fish farming and storage of fish products,
9. Mushroom production, processing, and storage,
10. Slaughterhouses, meat production, storage and processing,
11. Herbal production, processing, and storage,
12. Storage and processing and production of crops like wheat, barley, tea, coffee, ginger, turmeric, sunflower etc,
13. Bee farming business,
14. Production and processing of crops like maize, millet etc,
15. Organic and inorganic fertilizers,
16. Livestock feed production,
17. Cotton, wool and silk farming and processing,
18. Production and processing of wool from sheep, goats, and yaks.
19. Other agricultural and livestock businesses that are periodically added by the Government of Nepal.
20. Production of agricultural tools, equipment or machinery,
21. Agricultural lime industry,
22. Gardening, nursery establishment and development, producing seeds and seedlings through tissue culture technology,
23. Establishment of high tech greenhouses and production and processing and storage of the crops products inside greenhouses,
24. Establishment and operation of cold storage facilities,
25. Commercial grass cultivation, production and processing,
26. Business of hay and silage production from grass,
27. Organic agricultural production, processing, storage and export,
28. Establishment of modern flour mills by replacing old ones,
29. Production, storage and processing of rice, wheat, maize, barley, millet and Silaam,
30. Cultivation, storage and processing of crops like sugarcane, coffee, tea, Alaichi, ginger, turmeric, potato, sunflower etc,
31. Operation of rice mills in areas where there is a cultivation of winter paddy
32. Poultry farming and hatchery business

Eligibility and conditions for loans

Commercial Agriculture and Livestock Loans:

1. The individual must be at least 18 years old,
2. For group collateral loans of less than one million rupees, documents related to loan Jamaani are required,
3. For loans exceeding one million rupees, it is mandatory for the borrower to be an institution and for loans exceeding ten million rupees, it is mandatory to be a company.
4. In case of the institution or company, there should be a 100 percent ownership of Nepali citizens.
5. Brief proposal for enterprise operation and loan utilization, but a detailed project proposal for loans exceeding one million rupees.

Self employment loans for educated youth:

1. Must have completed at least Bachelor's level education and not exceed 40 years of age,
2. In case of getting education from foreign universities, the borrower must have studied in a university included in the list of universities recognized by Nepal government.
3. Must have completed at least seven days of entrepreneurship or business skill development training from the government entities such as Home and Small Industry Office and Committee, Skill Development Training Centre, Technical Education and Vocational Training Council, or shown the certificate of such trainings after the loan approval but if the borrower has already passed Bachelor's level in technical subjects related to the business, the training is not mandatory.
4. Brief proposal regarding enterprise operation and loan utilization.

Project loans for youth returning from foreign employment:

1. Youths who have returned from abroad working, trained for at least six months in the related field and business either by obtaining the labor permission or not, but individuals with permanent residency in any country are not eligible for such loans.
2. Brief proposal regarding enterprise operation and loan utilization.

Women Entrepreneurship Loan:

1. Available to women who have reached the age of 18 or in case of a group, at least five women crossing 18 from different families,
2. Brief proposal regarding the enterprise operation and loan utilization,
3. For a group, documents related to a group collateral.

Provisions for insurance:

1. Except for the commercial agriculture and livestock loans exceeding a million rupees, it is mandatory to secure all other subsidized loans under Deposit and Loan Security Fund.
2. A 50 percent subsidy on the security fee to be paid while securing the loan.
3. For all subsidized loans, the insurance for the business is mandatory.
4. For businesses taking loans other than agricultural and livestock loans exceeding a million rupees, a 50 percent subsidy on the insurance premium is available.

Actions in case of Loan Default:

- The borrower will be blacklisted in the Credit Information Bureau, Nepal.
- The passport of the borrower will be restricted,
- Notification to relevant authorities for restraining any movable or immovable assets registered under the borrower's name from being sold,
- Freezing of accounts held by the borrower in banks and financial institutions,
- Preventing the borrower from availing social security and other benefits provided by the Government of Nepal.

Lesson 4 :
Methods of Investment Evaluation

The main methods of investment evaluation in business are as follows:

1. Breakeven point
2. Return on Investment
3. Net Present Value
4. Internal Rate of Return
5. Benefit Cost Analysis

1. Breakeven Point: In order to operate a business in a balanced and organized manner, it is necessary to analyze the costs and sales units. The breakeven point indicates the point at which the business neither makes a profit nor incurs a loss. It shows the expenses in a business at one side and the point after which the business turns towards profitability on the other side. The breakeven point highlights the relationship between the cost and profit. The objectives of the breakeven point are as follows:

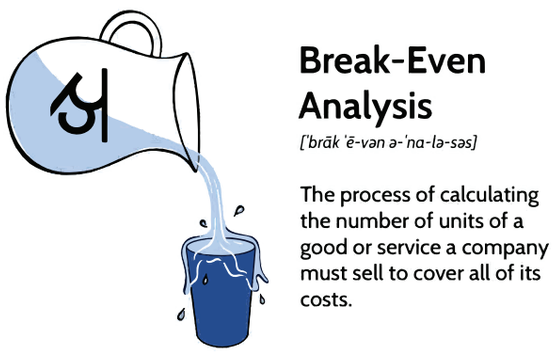
- To illustrate the relationship between profit, cost and outcome
- To estimate profit accurately
- To assist in performance evaluation and control
- To provide information on additional production costs
- To analyze market prices

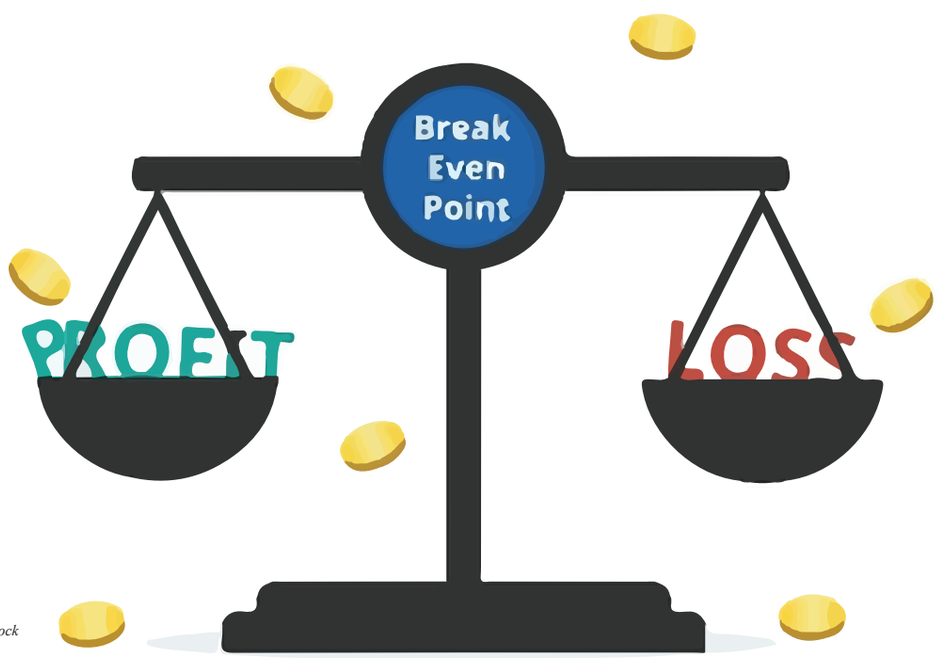
The breakeven point can be calculated using the following formula:

Breakeven point = Fixed Costs/(Selling Price per unit - Variable Cost per Unit)

Limitations of Breakeven Analysis:

1. It is not suitable for long-term planning.
2. It can be challenging to identify and allocate costs accurately.
3. It relies on fixed selling prices.
4. It may not be appropriate for multi-product operations.





© Shutterstock

2. Return on Investment: It is an important indicator that provides information on whether to make or not make an investment in a business. The rate of return that is seen while analyzing the return on investment should exceed the prevalent bank interest rate. If the ROI is lower than the amount obtained through keeping the money in the bank, reconsideration is necessary before making an investment. The higher the ROIm, the more favorable the business is considered for investment. In the process of reconsideration, the business owner should analyze by calculating capital assets and expenses while making a business plan so that the costs reduce and profit's share increase. The formula for calculating ROI is as follows:

*ROI = (Total Profit/Total Investment Capital) * 100*

3. Net Present Value (NPV): When analyzing cash flow, a business is considered favorable only when the calculation shows a positive value for inflow and outflow.

4. Internal Rate of Return: When calculating the internal rate of return, we should choose the business that gives more return than the return from keeping the money in the bank.

5. Benefit Cost Analysis: The primary goal of benefit cost analysis is to ensure that a business generates high net profits by efficiently utilizing available resources. In benefit cost analysis, both direct benefits and indirect benefits received from the business are evaluated along with costs. A crucial method for determining the value of a business and measuring it is the Benefit Cost Ratio method. This method falls under the category of cash flow analysis. The value of a business is assessed through benefit cost analysis by dividing the present value of benefits by the present value of the cost. The formula for calculating the benefit-cost ratio is as follows:

Benefit Cost Ratio = Present Value of Benefits/Present Value of Costs

Benefit Cost Ratio=PV of Net Positive Cash Flow/ PV of Net Negative Cash Flow

Lesson 5 :
Risk Management and Insurance

Risk refers to the uncertain potential losses that may occur in the future. While entrepreneurs embark on establishing theirs with enthusiasm and optimism, they also encounter risks inherent to the business. Therefore, entrepreneurs are taken as the risk bearers. In the context of agricultural business, risks such as floods, droughts, diseases, pests, excessive rainfall, and hailstorms can occur.

Insurance is taken as a means of risk management. It means devising organized plans to safeguard against potential future losses. Real risk management entails organizing plans to ensure security against potential losses at the lowest cost with appropriate maximum security of workers. In our country, the government has provided licenses for various companies to offer life insurance, based on which these companies charge insurance premiums for businesses evaluated on the basis of their value. The government has forged different acts, laws, and rules for the protection of various businesses in the agricultural sector. The main legal documents prepared by the government are as follows:

- Agriculture, Livestock and Medicinal Herb Insurance Directives 2079
- Agriculture and Livestock-Insurance Directive 2077
- Guidelines for Providing Subsidy on Premiums of Crop and Livestock Insurance, 2070
- Crop and Livestock Insurance Directive, 2069
- Insurance Act, 2049

Areas covered by agricultural insurance: When damage occurs to insured items because of the following reasons, the insurer is obliged to provide compensation according to the rules.

- Damage due to floods, landslides, or drought
- Damage caused by diseases or pests
- Damages caused by frost, snow, or hailstorms
- Damage caused by fire, lightening
- Damage caused by hurricanes, storms, or tornadoes
- Damage caused by excessive rainfall or unpredictable weather patterns
- Damage caused by earthquakes or landslides
- Damage caused by attacks from wild animals
- Damage caused by pesticide use (applicable only to fish and bees)

Situations where claims are not admissible:

- When the insured item has been sold, but ownership of insurance not transferred
- Lost or theft of insured items
- Destruction ordered by government authorities or other legally recognized bodies due to epidemics or other reasons
- Indication mark of the insured item not found in the carcass of a dead animal or if the indication mark is lost, failure to provide timely information to the insurer
- Submission of false information or fraudulent details of the proposal form
- Failure to maintain necessary precautions or arrangements for the insured item.
- Lack of payment of insurance premium or failure to renew
- Agriculture business runs exceeding the standards
- Additional expenses incurred or losses suffered due to the cause of damage to the insured crop or item
- Losses incurred due to the act of insured or family member's consciously or for amusement purposes or due to enmity
- Death caused by illness within fifteen days of issuing the insurance policy for the first time
- Accidents resulting in death occurring beyond a distance of 5 kilometers from the farm or house (this provision does not apply to livestock or bees raised in higher hilly and mountainous districts)
- Losses incurred due to war, invasion of foreign military, civil war, revolution, or insurgency
- Damage caused to the insured items by accidents due to direct or indirect exposure to nuclear radiation or radioactive substances
- Losses incurred due to accidents caused by nuclear weapons or being directly or indirectly involved with them

The process of agricultural insurance:

Submission of a proposal for agricultural insurance

Farmers interested in obtaining agricultural insurance of crops and livestock should submit a proposal through the insurance committee-prepared insurance proposal form to the insurance company directly or through an authorized agent. Then the form is made available to the technical experts for assessment. They assess the insurability of the item through on-site inspections. Along with the proof of insurability, five photos and one-minute clip of the property to be insured must be submitted with the proposal form. If the land is on lease, the lease agreement along with the citizenship, proof of the land, and the vaccination cards for livestock must be provided. The agricultural insurance is done based on both cost and production. The insurance company has issued insurance policies for 30 types of crops and assets so far. Since there is a provision of 80 percent subsidy in case of the insurance policy issued by the Government of Nepal through Insurance Committee, the insurance policy should be issued in a way that the farmers have to pay only 20 percent of the insurance premium and 80 percent will be claimed with the relevant government agency.

Ways to determine insurance premiums

The insurance committee has clearly specified the premium for agricultural insurance in each insurance policy. For most of the crops and livestock, the premium has been set at 5 percent of the insurance amount. However, based on production, the premium for vegetables and ginger is seven percent of the insurance amount while for seasonal indicators it is eight percent. In case of the insurance based on seasonal indicators, an additional one percent insurance premium could be charged for hailstorm protection. For the insurance of poultry, Kalij, since it is of less than a year's period and done on stages, the premium rate is only 1.25 percent. The insurance premium for fish is set at two percent while for pond protection, an insurance premium of one percent can be issued.

Claim-related Procedures:

In the event of a loss on insured crops or assets, if it is mentioned in insurance policy, follow it, or in other cases, the insured must promptly or before the loss of the evidence of damage inform the insurer. The insured must provide necessary documents for the claim, including: completed claim form, original insurance policy/agreement for complete damage, for partial damage photocopy of insurance policy/agreement, Sarjamin Muchulka (name, address, contact number, and signature of at least 5 people), endorsement from the local authority's relevant branch, five photos from various angles showing the damage, and at least one-minute's video clip (recorded by damage evaluator). The insurer should initiate the further process as soon as it receives information of loss/damage. If the insurance amount exceeds five lakhs, the insurer should hire evaluator/appraiser and if it is below five lakhs, the insurer can process themselves. The evaluator must submit a report within fifteen days to the insurer. After the report is prepared, the insurer, by determining the exact damage, should compensate within 35 days. If the insurer/insurance company rejects the claim, fails to pay the claim or misinterprets the compensation, the insured may appeal to the Insurance Committee.

@ Shameer Pk from Pixabay

Evaluation Questionnaires

Mark the right answer with the (✓) symbol.

1. **Generally, banks operate in a self-investment to loan ratio of ?**
- 20:80
- 60:40 ✓
- 70:30
- 50:50

2. **The subject of "secure use of investment" comes under the financial management's objective.**
- True
- False ✓
- Uncertain

3. **How is the profit of a company run under joint investment distributed?**
- Based on business
- Based on investment share ✓
- Based on profit
- Based on loss

4. **Stable capital means…….]**
- Raw material
- Wages
- Land, machinery ✓

5. **Expenses calculated after depreciation are …….**
- Current capital
- Fixed capital
- Fixed expenses ✓
- Current expenses

6. **It is necessary to determine the goal for operating an agricultural business.**
- False
- True ✓

7. **When did agricultural insurance start in Nepal?**
- 2060
- 2067 ✓
- 2070
- 2071

8. **What does total capital mean?**
- Investment
- Profit
- Loss
- Self investment + Loan ✓

9. **Break even point means……..**
- Sales revenue equals annual expenses ✓
- Sales revenue equals loss

10. **Which formula is used to calculate profit on investment?**
- Total loss/Total fixed expenses
- Total profit/Total capital requirement * 100 ✓
- Total profit/Total capital requirement

11. **The main sources of business investment are …**
- Loan
- Self-investment
- Loan and Self-investment ✓
- None of the above

12. **What are the formal sources of loans?**
- Borrowing from a friend
- Loan
- Bank ✓

13. **What is the limit for providing project loans to youth returnees from abroad?**
- 1 lakh
- 3 lakhs
- 6 lakhs
- 10 lakhs ✓

14. **What percentage of subsidy is available on loans for women entrepreneurs?**
- 5
- 6 ✓
- 2
- 8

15. At what age is a person eligible to take agricultural and livestock loans?

- 21
- 25
- 18 ✓
- 20

16. What percentage of subsidy is available for security fee when protecting loans?

- 25
- 50 ✓
- 75
- 80

17. Loan means …….

- Amount in bank account
- Debt ✓
- Cash in hand
- None of the above

18. When is it appropriate to operate a business after analyzing cash flow?

- Positive ✓
- Negative

19. When analyzing profit and cost, when is it appropriate to operate a business?

- Profit to cost ratio = Current value of profit/ Current value of investment ✓
- Profit to cost ratio = Current value of profit / Current value of investment
- Profit to cost ratio = Current value of loan / Current value of investment

20. In profit and cost analysis, the business should be selected if the profit-cost ratio is…

- < 1
- >1 ✓
- < 2
- < 3

21. What percentage of insurance premium does the government take care of in Nepal?

- 50
- 70
- 75
- 80 ✓

22. What percentage of insurance premium is charged based on production?

- 2
- 5
- 10
- 7 ✓

23. When insurance ordinary crops, what percentage of insurance premium is charged?

- 7
- 3
- 5 ✓
- 8

24. A video clip is necessary when claiming insurance.

- True ✓
- False
- Uncertain

25. What percentage of insurance premium is charged for fish insurance?

- 1%
- 2% ✓
- 4%
- 5%

26. How much loan is available for Dalit Community Development Loan in subsidized loans?

- 2 lakhs
- 10 lakhs ✓
- 5 lakhs
- 8 lakhs

27. How much loan is available for commercial agriculture and livestock?

- 1 crore
- 2 crores
- 10 crores ✓
- 8 crores

28. How many years is the repayment time for subsidized loans?

- 1 year
- 2 years
- 10 years
- 5 years ✓

29. What is required as collateral for educated youth self employment loan?

- Project
- Valid educational certificate ✓
- Land documents
- Passport

30. What actions are taken if the subsidized loan is not repaid?

- Passport block
- Put on the blacklist
- Block bank account
- All of the above ✓

31. What are the methods of the investment valuation?

- Break even point
- Return on Investment
- None of these
- Both a and b ✓

32. In which year was the Insurance Act enacted?

- 2040
- 2045
- 2049 ✓
- 2051

33. When claiming insurance, a tag or chips is necessary.

- False
- True ✓

34. What percentage of insurance premium is charged for Pheasant (Kalij) Insurance?

- 2
- 3
- 1 ✓
- 5

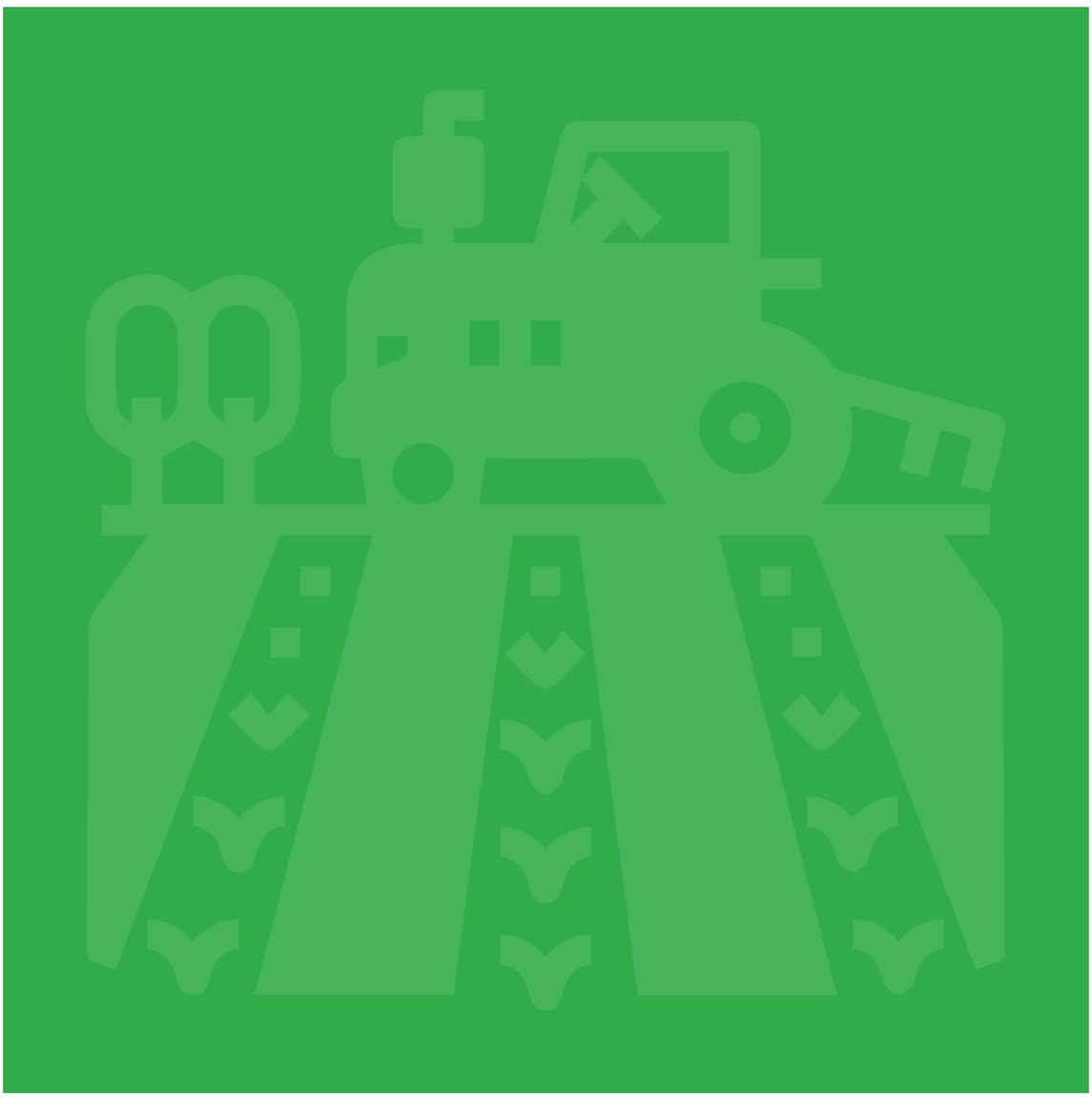
35. What documents are necessary for an insurance claim?

- Claim form
- Recommendation from local authority
- Five photos showing damage
- All of the above ✓

MODULE 4

Agriculture technology and management

Dr. Jit Chand



Introduction

Agritech, or agricultural technology, encompasses a wide range of tools and the subject that aim to improve agricultural production (EOS Data Analytics 2023). Agritech plays an important role to modernize, industrialize and commercialize agriculture. It enhances the productivity and quality of agricultural production. It contributes to price growth, reduces farming costs and facilitates climate change adaptation. Agritech has a huge importance to address the problem of decreasing human resource in the agriculture sector, reduce farming costs, and to establish agriculture as a profitable business. There is a great need to develop agricultural technology that would make agriculture production sustainable environmentally and economically (Delgado et al. 2019).

Though it holds immense possibilities, the agriculture sector hasn't yielded the desired result because of increasing product cost, fragmentation of arable land, climate change, lack of competitive and market-oriented agricultural production, and insufficient supply of production equipment, among others. Due to the failure in recognizing proven technologies that enhance productivity, Nepal has remained unable to take adequate benefits from this sector. The weak use of agricultural technology is one of the major reasons due to which the arable lands have remained barren and youths are leaving the country.

In large, commercial agriculture farms, decisions on water, fertilizers, pesticides and other inputs are no longer taken on an ad-hoc basis. Implementation of smart precision farming is important in the agricultural supply chain. Adaptation and automation of agricultural technology can save a lot of time, money and effort. At a time when people are increasingly discouraged from pursuing agriculture, the utilization of agritech can be a boon. Agritech, automation and modernisation are synonyms to each other.

Learning Objectives

1. To introduce agritech to the participants
2. To inform about use, importance and challenges of agriculture
3. To inform about agricultural mechanization and automation
4. To inform about proven sustainable agricultural practice
5. To introduce participants about agricultural management

Outcome

After completing this module successfully, participants will gain basic knowledge about agritech and agricultural management. In Particular, the participants will get knowledge about the technology related to agricultural engineering such as farm machines, conservation of agricultural resources, mechanization, automation, and detailed agriculture and farm management.

© Freepik.com

Lecture : 1
(Introduction to Agricultural Technology)

This lecture will mainly inform about modernisation in the agriculture sector, proven agricultural technology and its importance and need. Additionally the lecture will also revolve around the work to be done by Nepal in the field of technology. Due to the limitation of time and venue, the lecture will only discuss the technology related to agricultural engineering.

Let's begin.

Argritech is a science which involves a sustainable approach to agriculture and helps to protect the environment by using the latest and advanced technologies. It allows the application of agricultural engineering within the agricultural sector by facilitating access to agricultural machinery and implementing mechanization and automation in production processes. The concept of agricultural technology, also known as "agritech", should be understood as the application of knowledge, science and engineering of agricultural and livestock production systems (Zilberman et al. 2014). This term can also be linked to the simple technologies like tractor, thresher, micro irrigation, fertilizer and pesticide. Similarly, the term also represents advanced technologies like GPS tracking, remote sensor, drone, robot, AI, genetic engineering, biotechnology and nano-technology.

The use of AI in agriculture shows how the agriculture sector has adapted the development of technologies (USDA 2024). These advanced devices and Robotic technologies facilitate reliable monitoring and management of natural resources, such as air and water quality, making them more effective.

According to the UN-FAO, despite the use of about two million tons of pesticides globally, about 30 percent of agricultural production bears loss due to pests and diseases. Technological tools like robots and drones can assist farmers in reducing agrochemical usage by accurately identifying harmful elements in crops beforehand. The market is demanding quality food with less herbicides and pesticides, which can be achieved using robots, drones and technology (King 2017).

The use of technology in agriculture has brought huge changes in land utilization, resource maximization, work accuracy and productivity. The green revolution became successful due to the development of agritech (Rocha et al. 2020). Hence, technological advancement can be placed at the forefront of agri-business expansion.

What are the main effects of technology/technical elements (mechanization and technical assistance) in the agricultural sector?

It would be scientific to answer this question in the following two approaches:

1. The proper utilization of technology enhances agricultural production, leading to increased profitability in agribusiness. This profitability supports the expansion of agricultural activities and land designated to be used for them (Zilberman et al. 2014).
2. The adoption of modern and proven agricultural techniques contributes to the preservation of agricultural areas by enhancing productivity and reclaiming previously unproductive land, while also conserving forest areas (Green et al. 2005).

Studies have proven that a combination of technological capital and land use can increase productivity without significant alterations to natural landscapes, but agricultural technology or equipment should not be considered as obstacles in the process of environmental protection. However, technology must work in full harmony with environmental protection to guarantee food safety.

Importance of agritech

USDA (2024) points out the importance of agricultural technology in the following way:

"Farmers no longer have to equally distribute water, fertilizers and pesticides across fields. Through technology, they can treat each plant differently, using only the required amount."

The main advantages of agri-tech are mentioned below:

1. Higher crop productivity (more efficiency, less input
2. Less use of water, fertilizer and pesticide
3. Reduces environmental and ecological impact
4. Safe conditions and safe food
5. Profitable, attractive and sustainable agribusiness

Some examples of how global agriculture has benefited from advancement in technology (EOS Data Analytics 2023):

1. Using less water, fertilizers, pesticides, and other inputs helps agricultural producers lower costs and maintain higher profits.
2. By preventing or significantly reducing the amount of chemical runoff into waterways, agriculture mitigates its negative impact on the environment.
3. Facilitates communication and coordination among farmers, engineers, or other agricultural workers through the use of mobile devices, apps, or web-based resources
4. Agricultural income can be enhanced by improving product quality and implementing effective quality control measures.
5. By timely identifying nutrient deficiency in plants and recommending water, fertilizer type and quantity

Development of technology in agriculture

EOS Data Analytics (2023) defines the evolution of technology in agriculture as follows:

Technological advancement in agriculture is linked to the growth of urban centers and trade exchange. "However, until the early 20th century, the technological model of agricultural production was largely subsistence-based and characterized by low productivity. This era is known as 'Agriculture 1.0' and is characterized by technology based on plough and animal power."

Agriculture 2.0 began in the late 19th century with the emergence of mechanical machinery such as tractors.

Smart farming, also known as Agriculture 3.0, emerged from the necessity to efficiently manage all inputs in crop production.

Technologies such as autonomous machines, sensor-equipped robots, Internet of Things (IoT), drones and satellites are part of the new agricultural era called Agriculture 4.0, also known as Connected Agriculture.

Agriculture 5.0, or digital farming technology 5.0, or simply, "digital agriculture", is a 5G technology. It is currently undergoing rapid development and promises to enhance global access to the latest agritech advancements.

© Drift Shutterbug https.www.pexels.com

What should Nepal do in the agritech sector?

Nepal, an agricultural country, possesses fertile land suitable for farming and agriculture. Agritech plays a crucial role in bolstering Nepal's economy by aiding in adapting to changing environmental conditions and enhancing agricultural production. The major issue contributing to low productivity in the agricultural sector is the reliance on traditional techniques. So far, if we look at the statistics of agricultural technology development, the adoption of technology in Nepal's agricultural sector remains very limited.

Nepal's agricultural sector has the advantage of geographical, natural and biological diversity. Abundant water resources, land, forests, and favorable climate are notable examples. However, the key to agricultural success lies in leveraging modern technology and enhancing coordination between research institutions, academia, extension services, and the private sector.

Nepali farmers are in great need of accurate information, knowledge, and technological innovations. Research centers and educational institutions should collaborate effectively and cohesively to address the challenges of social and economic transformation, while also respecting the regional and cultural diversity of the country. Public policy, loans, training and appropriate technologies are important factors to transform subsistence agriculture into a sustainable industry.

For this, Nepal should immediately do these significant works:

1. Basic research and development in physical sciences, information technology and agricultural science/engineering
2. Development of suitable agricultural machines, sensors and systems based on topography
3. Practical application of technology from the laboratory to the field.
4. Regular training of farmers on the use of technology
5. Institutionalization of engineering services (from planning to implementation stages)

Lecture 2 :
Precision Agriculture

This lecture provides insights into agricultural techniques concerning farm machinery, resource conservation, and engineering required for crop production in Precision Farming. Specifically, this lecture includes process machinery and plant technologies, along with methods and techniques aimed at optimizing their performance in terms of energy efficiency, environmental impact, and economic viability.

What is precision agriculture ?

Addressing the basic food requirements of a rapidly growing population within limited resources poses a significant challenge for human civilization(Mumtaz et al. 2017). To overcome this challenge advanced technologies are being developed in the agricultural sector to increase productivity (Shafi et al 2019). Precision agriculture is one such technology, which works through the Internet of Things (IoT), sensors and remote sensing (Sishodia et al. 2020). Precision agriculture is a new concept adopted globally to increase production, reduce labor time and ensure efficient management of fertilizers and irrigation.

The main feature of precision agriculture/ smart agriculture is its control.

Modern and proven technologies such as GIS, IoT, Big Data Analysis, and Artificial Intelligence (AI) are helpful in making scientific decisions regarding crop management, with the aim of increasing production. Precision agriculture utilizes these technologies to optimize agricultural inputs while reducing resource wastage. The availability of high-resolution satellite images has further enhanced the use of remote sensing in precision agriculture, leading to positive improvements in crop quality production (Delgado et al., 2019). Precision agriculture includes a management strategy that leverages information, communication and data analysis technologies in the decision-making process (in terms of water, fertilizers, pesticides, seeds, fuel, labor, etc) (Kirby et al. 2017).

The terms information-based management farming, targeted farming, variable rate farming techniques, and grid farming are synonymous with precision agriculture (Koch et al. 2004).

Mechanism/ ideology of precision farming

Shafi et al (2019); Mumtaz et al (2017) and Sishodia et al (2020) define the mechanism of precision agriculture in the following ways:

"There are many parameters in the agricultural system. Precision agriculture enables farmers to understand exactly what crops need, where they need it, and how much they need for healthy growth. This involves collecting information about different aspects of the farm, such as soil nutrients, presence of insects and weeds, plant chlorophyll content, and weather conditions. For instance, the greenness of a plant, which indicates its chlorophyll levels, helps determine the necessary nutrient amounts. This data is then combined with information about the plant and soil characteristics, along with weather forecasts, to apply nutrients accordingly. Providing timely and accurate agricultural information to farmers and ensuring that recommendations are implemented is key to improving incomes."

The most important drivers of precision farming is Wireless Sensor Network (WSN), The most important driver of precision agriculture is the Wireless Sensor Network (WSN), which is a network of multiple wireless nodes connected together to monitor physical parameters of the environment. Each wireless node consists of a radio transceiver, a microcontroller, sensor(s), antennas, and other circuits (Wang et al. 2006).

Considering these concerns, this lecture aims to impart knowledge about the technologies, current practices, communication tools, sensors, and platforms utilized for monitoring and analyzing data sources in precision agriculture.

Use of Wireless Sensor Network (WSN) in agriculture

Presently, many countries, especially the developed ones, are highly using wireless sensors. Several technologies, such as greenhouse farming, smart irrigation, fertigation, and laser land leveling, are also being used in Nepal. Commercial and large-scale farmers in Nepal are adopting precision farming techniques from land preparation to storage. However, this adoption rate remains low relative to the total population engaged in agriculture.

Now let's discuss some technologies.

Laser Land Leveler: Uses and utilities

National Agricultural Research Centre (NARC) explains the use and importance of laser land levelers in agriculture as follows (Jha 2023)

"A notable feature of the laser land leveler is its

ability to cover large fields at once. In this machine, the ground is fully leveled using a bucket attached to a tractor guided by a laser beam. Operating a laser land leveler requires a tractor with a capacity of 50-60 horsepower (HP)."

Advantages

1. It takes a less time to irrigate
2. Saves 38 percent of water and 10 percent of time
3. Water and fertilizers will be distributed equally in the fields
4. Crop area will increase up to 3.5%
5. Production will increase up to 50 percent

Greenhouse Farming

A greenhouse is a structure built for growing crops, vegetables, fruits, flowers and other agricultural produce in a controlled environment. In greenhouse farming, climatic parameters such as temperature and humidity can be controlled based on the crop's requirements, and fully automated fertigation is also possible within this system.

Types of greenhouse farming can be high-tech greenhouses, tunnels and net-houses among others. In such farming soil-based and soil-less technologies such as hydroponics, aeroponics can be applied. By using simple plastic greenhouse technology, farmers can earn huge profits throughout the year. Greenhouses consistently deliver higher crop quality, yield, and productivity compared to traditional open fields (Chand et al., 2021).

Advantages:

1. By using hi-tech greenhouse tunnels and net house technology, vegetables, herbs, fruits and flowers can be produced throughout the year even during the off-season.
2. Over time, this technology can reduce production costs while simultaneously enhancing both production volume and the quality of products.
3. Production can be obtained for a long time from a single investment
4. Disease and pest outbreaks are low.

Automation Irrigation System

Automatic irrigation is a technology that regulates water usage by determining where, how much, and when it is required. One of the key components of smart irrigation is to prevent water leakage, overuse, and similar issues (Shafi et al., 2019).

Irrigation systems can be automated by using Soil Moisture Sensors in the field. In this system, the irrigation system automatically activates or deactivates as required, depending on the water level in the crop's root-zone, eliminating the need for human intervention (Harishankar et al., 2014).

Studies have shown that automatic irrigation can lead to approximately 25% water savings.

Sensor placement plays a crucial role in collecting accurate data. The most suitable point to place the sensor is a distance of 11 cm from the plant (Chand et al. 2021).

Smart Fertigation System

There is a big problem in the availability of chemical fertilizers in Nepal. To enhance crop productivity and preserve soil fertility, it is crucial to supply the correct amount of fertilizer at the right time.

Drip fertigation is currently becoming popular in commercial agricultural farms. Smart fertigation can save about 25% of fertilizer and water which is important for sustainable agriculture (He et al. 2011).

Major challenges of smart/precision agriculture

Major challenges of precision agriculture sf (Shafi et al. 2019; Chand et al. 2023):

1. Expensive hardware costs
2. Sensor accuracy due to weather variations
3. Internet network and data management
4. Farmer literacy, technical knowledge, reluctance to adopt new technology
5. Interoperability of devices may be hindered by varying digital standards.

Conclusion and way forward

Precision agriculture is a modern practice, which uses the latest technologies, such as WSN, IoT, cloud computing, artificial intelligence and machine learning, to increase crop productivity. Much of the research done so far shows that precision agriculture practices have a substantial effect on both sustainability and productivity. However, there are many challenges involved in the development and operational phase of these systems. To attract the youth to agriculture, Nepal should prioritize investment in precision agriculture to the fullest extent possible.

Conclusion and way forward: Precision agriculture is a modern practice, which uses latest technologies like WSN, IoT, cloud computing, artificial intelligence and machine learning to increase crop productivity. Until recently Most of the research conducted shows that practices based on precision agriculture have a great impact on sustainability and productivity. However, many challenges are involved in the development and operational phase of these systems. Nepal should invest in precision agriculture as much as possible to attract the youth to agriculture.

Lecture 3 :
Agriculture mechanization

This lecture discusses various aspects of agricultural mechanization with particular reference to Nepal.

Agriculture mechanization

Agricultural mechanization has broad meaning, which encompasses the production, distribution and use of various types of tools, machinery and equipment for agricultural land development, planting, harvesting and post-harvest engineering (Emami et al. 2018). Agriculture mechanization has a major impact on agricultural labor demand/supply, agricultural profitability, and changes in the rural landscape. It can also be defined as the appropriate use of agricultural engineering technology to increase land/labor productivity.

The objectives of agriculture mechanization are as follows:

- To increase land and labor productivity
- To reduce production costs
- To optimize product quality
- Animate (animal + human) to reduce difficulty
- To protect the environment
- Promoting agricultural exports while encouraging the prudent utilization of natural resources and agricultural inputs.
- Overall, to make agribusiness profitable

History of agriculture mechanization in Nepal

Nepal has a 100-year written history of agricultural mechanization. Krishna Bahadur Thapa of Biratnagar imported a single cylinder tractor in 1924 AD (Biggs and Justice 2015; Poudel et al. 2022). The chronology of agricultural mechanization history can be summarized as follows:

- 1959 - Agricultural Implements Research Unit, Ranighat, Birgunj
- 1964 - Birgunj Agricultural Implement Factory (privatized in 1996 and demolished in 2000)
- 1991- National Agricultural Research Council, NARC
- 2000 - Bachelor's in Agricultural Engineering - IOE, Dharan
- 2004- Directorate of Agricultural Engineering under Department of Agriculture
- 2013- Nepal Agricultural Machinery Entrepreneurs› Association (NAMEA) (NAMEA)
- 2014 - Agricultural Mechanization Promotion Policy, 2071
- 2020- National Agricultural Machinery Testing and Research Center NARC, Nawalpur

Major policies and strategies related to agricultural mechanization in Nepal

1. Agricultural Mechanization Promotion Policy, 2071 BS
2. Agricultural Development Strategy (ADS), 2072 BS
3. National Agricultural Policy, 2061 BS

Types of agriculture mechanization

Based on function or operation, there are mainly three categories of agricultural mechanization in Nepal:

1. Human power: Sickle, club, spade, plow etc
2. Animal power: Bull, buffalo, yak etc
3. Mechanical power: Tractor, thresher, combine, power Tiller, drone, rotavator, cultivator, combine, rice transplanter etc.

© liu xiaozhong from Pixabay

Condition of agriculture mechanization in Nepal

The Nepal Agricultural Research Council (1991) stated that the level of mechanization in Nepal varies according to geographical diversity. For example, Terai 60%, Mid Hill: 15% and Mountain: 5%.

The study shows that in the last 2 decades, there has been significant progress in the import of agricultural machinery, mainly from the private sector. Also, the attraction of Nepali farmers towards modern and large machines shows that land compaction is the first minimum condition. Additionally, the increasing interest of Nepali farmers in modern and large-scale machinery underscores the significance of land compaction as a fundamental prerequisite.

Efforts have been made by the Nepal government to meet the demands of farmers by distributing medium and large modern machines through the Custom Hiring Center (CHC). Every year in Nepal, about 13 billion is invested in the import of agricultural machinery and approximately 1 billion is annually invested as a subsidy.

Average energy use per hectare in Nepal's agriculture

Figure 1 shows the use of energy in agricultural systems of some countries. The application of improved agricultural mechanization has high potential to enhance productivity in Nepal Compared to developed countries, the use of energy in the agriculture system of Nepal is significantly less. Studies and research have proven that the relationship between energy use in agriculture and food crop productivity is proportional. This implies that the use of more energy in agriculture means higher productivity….

There is a high potential to increase productivity in Nepal through the use of improved agricultural mechanization.

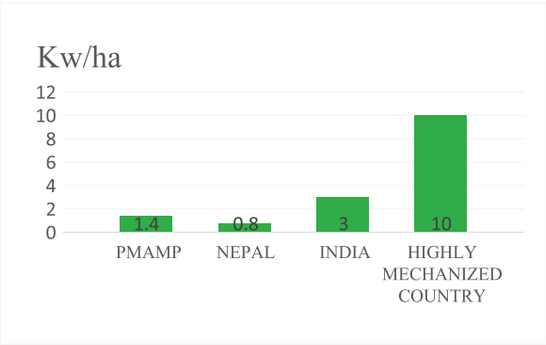


Figure 1: Average energy use per hectare (Source: PMAMP 2023)

State of agricultural mechanization in Nepal based on efficiency

Table 1: Kastam Hiring Center and Machine Operating Efficiency (Source: PMAMP 2023)

Custom Hiring Centre (CHC)	Machine Operational Efficiency (MOE)
Personal	47%
Cooperative	46%
Farmers group	44%

In developed nations where modern agricultural systems are adopted, machine operational efficiency is around 90%. Table 1 shows that if structural, managerial and operational elements can be managed properly, there is a great potential to increase wMOE in Nepal.

Impact of agricultural mechanization on reducing production costs

The Food and Agriculture Organization of the United Nations (FAO 2008) and the United Nations Industrial Development Organization (UNIDO 2008) concluded that the goal of agricultural mechanization is to reduce labor and production costs, while enhancing agricultural profitability.

Table 2: Impact of Agricultural Mechanization on Reducing Production Costs (Source: PMAMP 2023)

Activities	Traditional(NRs./ha)	Mechanization (Nrs/ha)	Reference materials
Rice planting	22,000	5,500	PMAMP, Chitwan
Rice harvesting	20,000	5,300	PMAMP, Sunsari
Corn sowing	8,000	3,000	PMAMP, Dang
Wheat sowing	9,000	3,000	PMAMP, Kailali

This table proves that the production cost in major crops can be reduced by up to 80% through appropriate use of agricultural mechanization.

Major Challenges of agricultural mechanization in Nepal

1. **Technical**: Fragmented land and small land holding size
2. **Institutional**: Human resource management (compared to requirement, small recruitment of agricultural engineering staff)
3. **Infrastructure**: Inadequate agricultural machinery industries and Insufficient repair service center
4. Disappearance of traditional and indigenous human resources in agricultural machinery
5. Quality of agricultural machine
6. Lack of effective coordination between education-research-extension
7. Government's policy (prioritizing import of agricultural machinery over domestication)

Strategies to be adopted to reach industrialization through mechanization of agriculture

a) Scientific use of land (collective farming/ leasefarming/contract farming/chakla vandi farming)
b) Amendment of Agricultural Mechanization Policy.
c) Institutional structure for the sustainability of agricultural mechanization (mandatory appointment of an agricultural engineer in each municipality, eg: Belaka Municipality in Udayapur)
d) 10 year special project related to agricultural mechanization as in India
e) Establish Custom Hiring Centers for machinery according to the needs of each ward and operate agricultural mechanization service centers.

Conclusion: The main problems for effective and sustainable operation of the agricultural mechanization program are underutilization of qualified technical human resources, lack of machinery maintenance and supply centers and shortage of spare parts etc. In the coming days, it is necessary to move forward by minimizing these problems. There is an immediate need for appropriate agricultural mechanization in Nepal based on geographical, socio-economic level and area size. Despite many limitations in Nepal's agricultural mechanization sector, a significant positive difference has been observed due to the easy import policy, subsidy mechanism and other promotional programs/activities of government/non-government organizations. A revised agricultural mechanization policy should address the limitations, challenges and constraints described in this lecture. In future there should be the effective implementation of the policy by building an appropriate organizational structure of the agricultural engineering service in the three-level government.

Mechanization is the only alternative for boosting agricultural exports, cutting imports, tackling labor shortages, and making agriculture profitable by lowering costs and improving efficiency. Implementing a custom hiring model and promoting the modernization of agricultural machinery banks can be crucial steps. It is imperative for the state to prioritize sustainable agricultural mechanization over the next decade to pursue modernization effectively.

Lecture 4 :
Sustainable agriculture through technology

Agriculture, the engine of economic growth for many nations, provides humankind's most basic needs: food and fiber (Gillespie et al., 2017). Technological changes of the last century such as the Green Revolution have changed the landscape of agriculture . New technologies and approaches must be able to meet the future demand of food, while reducing the negative impacts of agriculture on the environment (Sishodia et al. 2020).

By the year 2050, the demand for food and agricultural products is projected to increase by more than 70 percent (Chand et al. 2021). Given the limited availability of arable land, a significant portion of this increased demand will be met by the appropriate and efficient use of agricultural intensification, fertilizers, pesticides, water and other inputs (Hendricks et al. 2019). According to EOS Data Analytics (2023), agricultural technology, also known as "Agritech": encompasses a broad range of principles and tools that enhance agricultural production. These include farm machines, robotics, computers, satellites, drones, mobile devices, and software.

This lecture discusses how technologies contribute to sustaining the agricultural profession. Basically conservation agriculture and resource conservation techniques are reviewed here.

Let's begin.

What is conservation agriculture?

According to FAO, Conservation agriculture is a concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment. CA is based on enhancing natural biological processes above and below the ground. Interventions such as mechanical soil tillage are reduced to an absolute minimum, and the use of external inputs such as agrochemicals and nutrients of mineral or organic origin are applied at an optimum level and in a way and quantity that does not interfere with, or disrupt, the biological processes. Conservation agriculture is a scientific practice of protecting natural resources by using efficient technology and protecting the environment by increasing production/productivity.

The conservation agriculture system appears to be an attractive option for achieving sustainable and intensive crop production within agro-ecology. However, there is a need for a broader evaluation of these techniques across different production systems, as conservation agriculture is relatively new in the field of agriculture (Ramesh et al., 2017).

According to FAO (2024), conservation agriculture has 4 basic principles:

1. Minimum Mechanical Soil Disturbance: The disturbed area should be less than 25% of the total crop area.
2. Soil cover: Ground cover should be more than 30%.
3. Crop Rotation: A rotation should include at least three different crops (crop diversification in relationships, sequences, and rotations).
4. Controlled vehicle traffic, which mitigates soil compaction.

Objectives of conservation agriculture (Patel et al. 2013; Ramesh et al. 2017)

1. To conserve, improve and effectively utilize natural resources.
2. To integrate the management of available soil, water and biological resources with external input.
3. Contribute to the growth and sustainability of agricultural production while promoting environmental protection.

Major forms of conservation agriculture

- Practice minimal, or low tillage
- Crop and pasture rotation
- Contour farming) and Strip cropping
- Cover and green manure
- Integrated soil, water and crop management
- Agricultural Forestry
- Stubble Mulching
- Integrated Nutrition/Pest Management
- Irrigation management

Advantages of conservation agriculture

Conservation agriculture has many advantages. Direct benefits to farmers include reduced farm costs through savings in labor, time, power, fuel and improved utilization efficiency. Even more importantly, conservation agriculture practices reduce resource depletion (Patel et al., 2013).

Gradual decomposition of surface residues improves soil organic matter status, biological activity, diversity, and contributes to overall soil quality improvement (Ramesh et al., 2017).

Resource Conservation Technologies (RCT)

Conservation agriculture and resource conservation techniques are almost the same. RCTs are those practices applied in agriculture that enhance resource or input-use efficiency. For example, new species that use nitrogen more efficiently can be considered RCTs. Practices that save fuel and improve plot-level water productivity (reduce tillage practices, land leveling) can also be considered RCTs.

Minimal or zero plowing practices help separate organic carbon in soil, which is important for a sustainable ecosystem (Franzlubbers 2008).

The rate of carbon separation depends on the features of plants, rotation, type of plowing and its frequency, and the type of fertilizer and pesticides used in land, among other things.

Different practices employed in crop production, farm management techniques, and the utilization of agricultural inputs emit significant quantities of carbon dioxide into the atmosphere (Lal, 2004). In fact, Carbon Dioxide emissions in agriculture originate from three sources: machinery use, application of fertilizers and pesticides and oxidized SOC after soil disturbance (West & Marland 2002). More intensive land use involves more fuel, farm machinery and agrochemicals. Their production, packaging, transportation and use require significant energy resources that increase greenhouse gas emissions (Maraseni and Cockfield 2011). Therefore, planners and farmers should be aware of optimization of resources and profit maximization for agricultural sustainability.

Major machines used in Resource Conservation Technologies

Seed drill/ Seed cum fertilizer drill, Zero seed cum fertilizer drill, Happy Seeder, Super Seeder, Micro irrigation system, Pneumatic Planter, Laser Land Leveler, Drum Seeder etc.

Key challenges of conservation agriculture and RCT

1. Managing crop residues during farming operations can pose challenges, often hindering agricultural conservation efforts.
2. Farmers who adopt conservation agriculture or RCTs practices may initially incur additional costs.
3. Challenges in managing weeds (extra cost for herbicides)
4. A challenge to update knowledge related to agricultural machinery of conservation agriculture
5. Reluctance of farmers towards new technologies and cropping methods

Conclusion : The discussion above highlights the significant environmental impact of agriculture, emphasizing the crucial role of implementing scientific resource conservation techniques in environmental protection. These technologies increase soil carbon sinks, reduce greenhouse gas emissions, and maintain high levels of agricultural productivity. Conservation agriculture effectively preserves a maximum amount of organic carbon in the soil surface layer. This carbon sequestration enhances soil health, consequently leading to improved efficiency in agricultural input utilization (Patel et al., 2013). In this way, by sequestering carbon in soil and biota, we can mitigate climate change and make agriculture sustainable and nature friendly. The excessive and/or poor utilization of natural resources such as soil and water, along with the indiscriminate use of fertilizers and pesticides in agricultural production, not only results in economic losses but also exacerbates the leakage of water and nutrients from agriculture, thereby contributing to environmental degradation (Hendricks et al., 2019). To establish an economically and environmentally sustainable production system, it is imperative to develop technologies aimed at enhancing crop production through increased efficiency in input utilization while concurrently minimizing environmental losses (Delgado et al., 2019).

Lecture 5 :
Farm Management

Agricultural business is developing differently in the modern world. It prioritizes the use of agricultural technologies to increase crop production through good planning and agile management (EOS Data Analytics 2023). Modern technologies such as machinery, satellite imaging, specialized farming software, and more have been proven to significantly enhance the sustainability and profitability of agriculture while streamlining farm management practices. In Lecture 5, we discuss various aspects of agricultural farm management. In particular, farmstead planning, irrigation management, agricultural machinery management, data management, risk management etc. are reviewed here.

Farm management is the integrated management of crop production, processing structure, market guarantee, energy, physical infrastructure, available natural resources etc. Agricultural technology, mechanization and modernization are synonyms of each other which contribute significantly to farm management.

In fact, farm management is an integrated system, where all the activities of the farm are well managed and maximum utilization of resources is achieved with minimum cost and high profit.

Let's begin.

Objectives of farm management

1. Increasing profit
2. Sustainable agriculture
3. Resource optimization
4. Risk Management
5. Improving agricultural livelihoods

Farmstead Planning

Farmstead planning is the proper arrangement of the farm by selecting the best location for crops, farm houses, animal houses, pump houses, irrigation, drainage, production and processing structures, etc.It requires careful consideration of the land's suitability (Michael & Ojha, 2015).

Over the past few decades there have been revolutionary changes in agricultural practices and farm management. The use of advanced technology in agribusiness has been credited with success in farm management and increased crop productivity.

Technology aims to make agricultural work more efficient and convenient. Every year, new agricultural innovations and sometimes, ground-breaking technologies are innovated.

As agribusiness continues to modernize and grow, it is important for agricultural and technical managers to be up-to-date with the latest technological standards for farm management.

Scientific planning of the farmstead saves the resources used in agriculture to a great extent, making the agricultural work easy, systematic, profitable and scientific.

Irrigation Management

Scientific irrigation management addresses essential questions regarding the timing, quantity, and optimal methods for supplying water to a farm. Water is a precious, scarce and important natural resource. As much as possible, surface and groundwater should be used jointly to increase irrigation productivity in the field. This strategy balances irrigation and farming ecosystems throughout the year.

Enhancing profitability in agriculture can be achieved by minimizing water loss through the adoption of non-conventional irrigation methods. Nowadays, the following non-conventional, modern and efficient irrigation methods are popular in commercial agricultural farms.

Drip Irrigation:

Drip irrigation is a method of irrigation, which helps in conveying water and fertilizer through pipes to the roots of plants. This system can be applied to various crops such as vegetable crops, flower crops, fruit crops, grain crops, and others. The distribution uniformity, application efficiency, and statistical accuracy of this technique all surpass 90% (Chand et al., 2023).

Advantages (Chand et al. 2023; Kisan Agriculture 2023; Michael 2004)

1. Helps to achieve high water utilization efficiency.
2. Fertilizers and nutrients are provided to plants in equal amounts to avoid degradation.
3. A large area of land can be irrigated with less water.
4. As the water reaches only the roots of the plant, the rest of the land remains dry, this method minimizes water wastage, prevents unnecessary weed growth in the surrounding area, promotes efficient fertilizer utilization, and lowers labor costs.
5. Due to less weeding, disease and pest outbreaks are reduced.

Sprinkler Irrigation

Sprinkler irrigation is a system in which water is irrigated as if it had fallen naturally, which is especially used in open ground vegetable crops, winter cereals, cardamom crops and tea plantations.

Advantages (Chand et al. 2023; Kisan Agriculture 2023; Michael 2004):

1. This irrigation system is versatile, capable of irrigating land regardless of its surface characteristics, including steep, even, or rough terrain.
2. Since sprinklers are available with different discharge capacities, any size of land can be irrigated.
3. This irrigation system reduces labor cost.
4. Fertilizers, nutrients and chemicals can be applied to the crop in an easy way.

Fogger Irrigation

Fogger irrigation is used in various settings such as greenhouses, nurseries, mushroom farms, cowsheds, etc., where it serves for heating purposes and as sprinklers in nursery houses, effectively watering small plants.

Advantages (Kisan Agriculture 2023)

1. Reduces the temperature inside the greenhouse, increasing the humidity.
2. Reduces human resources as well as helps spread pesticides evenly inside the greenhouse.
4. This system ensures that small plants receive the necessary and uniform amounts of water and nutrients within the nursery environment, reducing the risk of plant loss.
4. Even in mushroom farms, it is easier to administer medicine and lowers wages.

Sustainable Management of Agricultural Machines and Farm Energy (Custom Hiring Center).

Agricultural machines should be kept in separate clean sheds. A maintenance and repair schedule must be followed. Support for mechanization is further provided through the operation of Custom Hiring Centers (CHCs), offering a range of small and large machinery tailored to specific crop requirements.

Recommended Strategies for Sustainable Management of Custom Hiring Center:

1. Training facility for operators and mechanics for agricultural machinery
2. Management training
3. Growing customer base: Advertisements, which inform farmers about machine availability
4. Attractive salary and performance incentives for operators and managers

Industrialization through organized machine use

1. Although approximately 60% of the country's population relies on the agricultural sector for employment and livelihood, its contribution to the total GDP is only 24%. Due to a lack of attractiveness in agriculture and excessive labor burden, about 2,000 youths are compelled to migrate abroad daily, and 33% of arable land has become barren.
2. Increasing the production and productivity of the agricultural sector, attracting youth to agriculture, diversifying into commodities by reducing excessive labor burden, and enhancing the productivity of water, land, and human resources are essential steps toward advancing agricultural modernization/industrialization, representing the globally accepted option.
3. One of the key indicators to measure the development of any country is energy consumption. Similarly, a global indicator of modernization and industrialization in agricultural development is "energy use per hectare." Developed nations such as the US, Australia, and Japan use 8-10 kW/ha of energy per hectare. In India, the average is 2.5 kW/ha, and in Nepal, it is 0.8 kW/ha. Due to this, Nepali farmers are facing increasing production costs, making it difficult to compete with international agricultural products. Additionally, this data indicates that Nepal's agricultural sector has significant potential to increase productivity by maximizing energy use.

Farm Data Management

Agriculture is a complex science, consisting of many operational units and branches. Sensors in agricultural farms continuously generate varied data, which require considerable resources to store, process and analyze. To ensure the integrity of the data, data security measures need to be in place. New softwares are being developed these days. Technical human resources with good knowledge of technology and software can help in data management. Correct handling of data makes any farm productive and profitable.

Farm Risk Management

Climate change (uncertainty in weather patterns), market fluctuations, disease/pest infestations, government policies, and epidemics are among the factors contributing to increased risk in agriculture. However, by integrating precision farming techniques, resource conservation methods, modern machinery, software, and effective farm management principles, these risks can be mitigated to some extent. Implementing a robust risk management strategy involves selecting the optimal approach from available options to minimize financial impacts stemming from such uncertainties.

Evaluation Questionnaires

Mark the right answer with the (✓) symbol.

1. What are the main benefits of agriculture technology?
- Lesser use of water, fertilizer, and pesticides
- High crop productivity
- Profitable, attractive and sustainable agriculture business
- All of the above

2. What era recognizes precision or smart farming as a form of agriculture?
- Agriculture 1.0
- Agriculture 3.0
- Agriculture 4.0
- Agriculture 5.0

3. The main problem behind reduction in productivity in the agricultural sector is attributed to ……

4. Agriculture 2.0 introduced the concept of mechanical machinery such as tractors in the late 19th century. True or False?

5. Managed farming based on information, farming based on goal, adaptive rate farming techniques, and grid farming are used synonymously with….

6. The primary characteristic of a ……..is its ability to till even the largest field efficiently.

7. What is the required capacity of a tractor to operate a laser land leveler?
- 10-15 HP
- 20-30 HP
- 50-60 HP
- 30-40 HP

8. Diseases and pests are often prevalent in high-tech greenhouses. True or False?

9. The most suitable distance for placing sensors in an automated irrigation system is ……. centimeters.

10. When was the Agricultural Engineering Division, NARC established?
- 2000
- 1964
- 2004
- 1991

11. According to FAO (2024), among the basic principles of agriculture, the affected area should be …….% lesser than cultivable land.

12. What is the full form of RCT?
- Resource Control Technique
- Resource Conservation Techniques
- Resource Conservation Technologies
- Resource Control Technologies

13. In crop rotation, at least …….different crops should be included.

14. Control traffic systems increase compaction of soil.
- True
- False

15. Match the following:
- Agriculture 1.0 — Tractor
- Agriculture 3.0 — Harrow/Animal Draft
- Agriculture 2.0 — Drone and Satellite
- Agriculture 4.0 — Smart Farming

16. Agriculture 2.0 introduced …….like mechanical machinery at the end of the 19th century.

17. The most important driver of precise agriculture is …….

18. ……..farming allows for production of vegetables, fruits, and flower even in off season.

19. According to statistics, approximately ……..% water savings can be achieved through automated irrigation.

20. Mechanization in agriculture helps to reduce production costs.

- True
- False

21. The agricultural mechanization enhancement policy was implemented in the year …….

22. The Nepali government has been trying to address the farmers' concerns by distributing modern medium and large machinery through…

23. The average energy usage in Nepal is approximately …..per hectare.

24. Drip irrigation is a method of irrigation where sledge …….and …….will reach to the root of the plants through pipes.

25. A primary indicator used to measure the development of any country is the use of ……..

26. Precision agriculture is a technology that operates through the Internet of Things, sensors and remote sensing.

- True
- False

27. The main characteristic of precision agriculture/smart agriculture is its …..

28. A greenhouse refers to the structure constructed for cultivating crops, vegetables, fruits, flowers and other agricultural products in a ……environment.

29. Greenhouse farming reduces the incidence of diseases and pests.

- True
- False

30. Approximately, …..water savings can be achieved through automated irrigation.

31. Compared to developed nations, there is significantly higher use of energy in agriculture in Nepal.

- True
- False

32. There is a …….relation between energy use in agriculture and food and crops production.

33. By the year 2050, the demand for food and agricultural products is projected to increase by ……percent.

34. Conservation agriculture saves the maximum …….at the soil surface.

35. Carbon emission in soil improves soil health which helps in enhancing input utilization efficiency in agriculture.

- True
- False

Answers

1. 4
2. 2
3. Traditional agriculture
4. True
5. Smart Agriculture
6. Laser Land Leveler
7. 3
8. False
9. 11
10. 4
11. 25
12. 3
13. 3
14. False
15. Match
16. Tractor
17. Wireless Sensor Network
18. Greenhous
19. 25 percent
20. True
21. 2071
22. CHC
23. 0.8
24. Water and manures
25. Energy
26. True
27. Control
28. Engineered
29. True
30. 25 percent
31. False
32. Proportional
33. 70
34. Organic carbon
35. True

MODULE 5

Legal Provisions and network, and certification

Pushpa Bhusal

Introduction

Before initiating business operations, it is crucial to obtain a comprehensive understanding of relevant national and international laws such as: policies, acts, regulations, guidelines, and criteria pertaining to the specific business domain and the procedures for business registration. Understanding the requisite standards for quality production, as well as provisions concerning contracts and regional networks associated with the business, is essential. These topics will be elucidated within the framework of this module.

Objectives

Acquire comprehensive understanding of laws, policies, and regulations essential for the operation of agricultural business.

Grasp the concept of agricultural and intellectual property rights.

Gain insight into contract farming and its agreements.

Understand organic certification and its quality standards.

Familiarize with the process of building a long-term agricultural business network.

Projected outcome

Acquisition of comprehensive knowledge pertaining to laws, policies, and regulations necessary for the operation of agricultural businesses.

Attainment of clarity regarding the concept of agricultural and intellectual property rights.

Proficiency in understanding contract farming and its associated agreements.

Clear comprehension of organic authentication processes and adherence to quality standards.

Establishment of clarity regarding the long-term agricultural business network.

Lesson 1 :
Legal provisions essential for operation of agricultural business in Nepal

Knowledge about the necessary legal framework governing agricultural operations in Nepal is imperative for business entities. It is essential for business persons to possess comprehensive knowledge of all applicable laws. Since it is impossible for a manager or businessman to fully comprehend these laws, they should engage the assistance of legal practitioners. In the conduct of agricultural business activities in Nepal, strict adherence to the following legal provisions is a must.

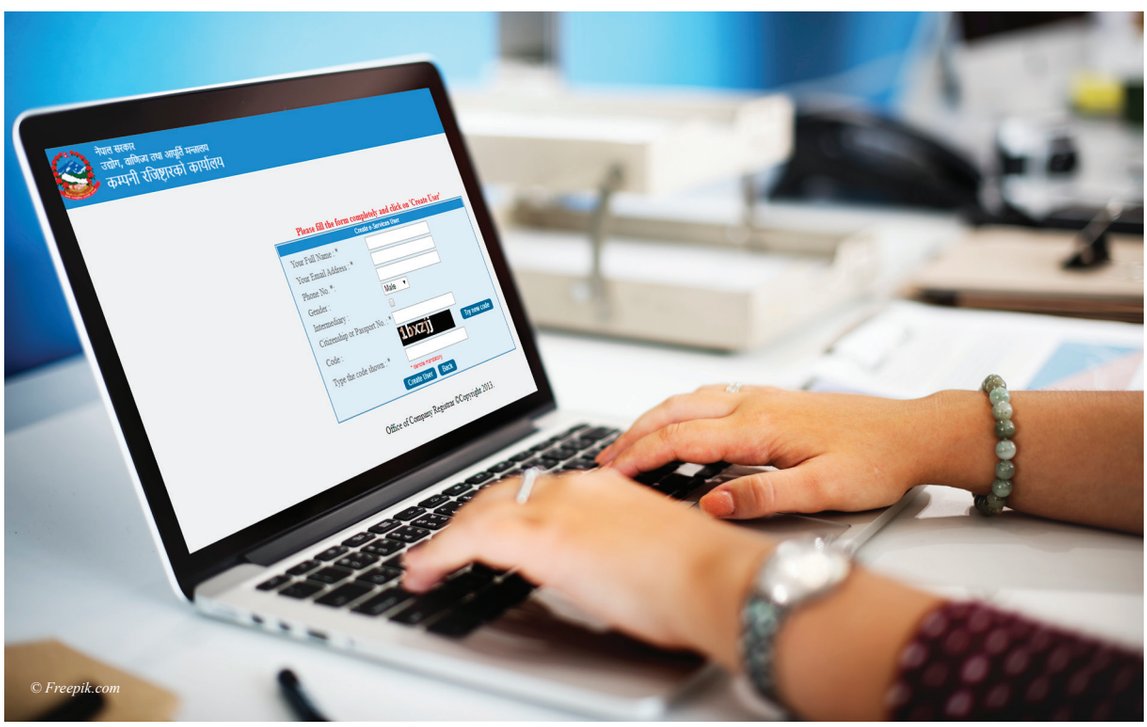
1. Business Registration and Regulation
2. Employment Laws
3. Contract Enforcement and Dispute Resolution
4. Legal Assistance

Business Registration and Regulation

In Nepal, the establishment of a business necessitates its registration, a mandatory prerequisite. The determination of the appropriate registration venue is contingent upon the structure and form of the business entity. In the pertinent legal frameworks, key institutions for business registration include the Cottage and Small Industry Office and the Office of the Company Registrar. Prior to setting up a business, it is imperative to solicit and secure approval from regional authorities. For instance, enterprises engaging in activities related to the promotion of tourism are mandated to obtain a license from the Tourism Board as a prerequisite for business operation.

Employment laws

A business person or an industrialist should possess knowledge of the provisions outlined in the labor laws of Nepal. These provisions include prohibiting the exploitation of child labor, refraining from engaging laborers in work prior to formal agreement establishment, ensuring laborers are compensated at or above the minimum wage mandated by the Government of Nepal, providing laborers with all entitled facilities, and maintaining a favorable working environment conducive to laborer well-being, etc.



© Freepik.com

Contract Enforcement and Dispute Resolution

Following the execution of a legal contract, both contracting parties are obligated to comply with the liabilities as delineated within the contract. In the event of a breach by either party, the dispute resolution process should be initiated in accordance with applicable laws.

Legal Assistance

It is imperative to take legal advice paying attention to the laws of Nepal with utmost seriousness. To ensure compliance, the appointment of a legal advisor is indispensable. Generally, the following procedures should be undertaken prior to registering an agricultural business in Nepal.

Registration process of agricultural firm

To effectively manage a business within the agricultural sector, a firm should be registered. While there is a notable interest among individuals to enter the agricultural industry, many are unaware of the requirement to register their firm or they may mistakenly perceive their activities as farming rather than industrial operations. Only a minority of agricultural businesspersons have completed the registration process due to a lack of understanding regarding the registration procedures.

Documents necessary for registration of an agricultural firm include:

A copy of the Nepali citizenship certificate .

An application disclosing the plot number of the land where the firm is being established, accompanied by a copy of the landowner's certificate.

Two copies of passport-size photographs of the firm owner(s) submitted to relevant departments.

If the firm owner does not possess land ownership, a copy of the land lease agreement or deed of consent. (An original copy of agreement is required for registration at the Small and Cottage Industry Office.)

For animal husbandry firms, a deed containing the consent of neighboring landowners in all directions, i.e. east, west, north, and south, of the land where the firm is located.

Agricultural project (should disclose total capital investment)

Other documents sought by relevant offices or departments, such as statutes, operator, or partnership agreements.

The small-scale firm should be registered at the relevant local levels or wards as stipulated by the Local Government Operation Act of 2074, prior to registration at the Inland Revenue Office (tax office). However, certain municipalities facilitate the registration of firms with a capital of up to 5 lakh rupees and recommend firms with capital exceeding this threshold for registration at the Cottage and Small Industry Office. Also, some banks prioritize businesses registered at the Cottage Industry Office for loan purposes. In such circumstances, it may be necessary for the firm to undergo registration at both the Cottage Industry Office and the Tax Office.

If a firm intends to engage in activities such as establishing branches at multiple locations, conducting larger transactions, engaging in import and export activities, trading, processing, purchasing and sales, obtaining approval for the operation of firm for wild animals in the future, and branding the firm's products, it should be registered at the Office of the Company Registrar, clarifying the firm's objectives.

The registered business should be listed with the municipality's Agriculture and Livestock Service Branch as well as the District's Agriculture and Livestock Service offices. If an agricultural firm is registered under the name of a woman, certain discounts and benefits from the government may be enjoyed.

The registration fees for agricultural firms vary from municipality to municipality and depend on the capital of the firm. Generally, registration fees range from Rs 1000 to Rs 3000. No fees are charged at the tax office for obtaining a PAN number. When registering an agricultural firm at the Office of the Company Registrar, a fee ranging from Rs 1000 to Rs 30,000 will be charged, depending on the capital of the firm.

Benefits of registering a firm

Eligibility for grants and assistance from banks and financial institutions.

Facilitates the procurement of insurance policies.

Eases the process of business expansion.

Legally registers the business and associates it with the tax system.

Enables participation in competitions for agricultural loans, insurance, and grants, increasing minimum qualifications or accessibility.

Access to agricultural crops and livestock seed/ breed at discounted rates from governmental and non-governmental departments, as well as access to fertilizers and production materials.

Operation of the business with confidence through the establishment of coordination and understanding with various firms and companies established domestically and internationally.

Lesson 2 :
Intellectual property rights in agriculture

The intellectual property is enshrined as a fundamental right under the Right Relating To Property in Article 25 of the Constitution of Nepal. To engage in global initiatives concerning the safeguarding of intellectual property, Nepal acceded to membership of the World Intellectual Property Organization -WIPO in 1997 AD. Likewise, subsequent to joining the World Trade Organization - WTO in 2004, Nepal has actively supported the Agreement on Trade-Related Aspects of Intellectual Property Rights - TRIPS, an integral component of the WTO framework. In Nepal, the Seeds Act 2045 (1988) has established the National Seed Board, incorporating a sui generis protection system which grants ownership rights of new seed varieties to the breeder of new plant species. The Seeds (Second Amendment) Act 2079 (2022), Clause 18A, has enacted such provisions to legally safeguard the rights of farmers.

Clause 18A. Farmers' rights:

(1) Farmers shall possess the right of ownership concerning the selection, protection, and distribution of local seeds, breeds, or agricultural crop species traditionally utilized and adopted.

(2) In Nepal, any group of farmers may, in conformity with extant laws, register for collective ownership of locally cultivated seeds, species, or agricultural crop species traditionally utilized and adopted collectively.

The following provisions concerning agriculture has been enacted in the National Intellectual Property Policy 2073 (2017)

Copyright, patent, design, trademark, geographical indication, protection of new plant species, intellectual property rights related to genetic sources and identification of biodiversity, as well as encouragement, shall be ensured.

Laws essential for safeguarding the fundamental and noble abstract properties vested in new plant species as intellectual property shall be established.

A mechanism for identifying new plant species, excluding genetically modified organisms, as intellectual property, shall be devised. Legal provisions for accessing, utilizing, and safeguarding biodiversity and traditional knowledge shall be formulated to prevent the biopiracy of plant species.

A provision shall be crafted to ensure the fair allocation of benefits derived from the rights and commercial exploitation to the parties associated with intellectual property acquired through commercial studies, research, and implementation conducted utilizing the biodiversity and genetic resources of a specific geographical area.

Conserve Nepal's local livestock and biodiversity and develop a system to positively impact the financial gains and livelihoods of farmers through the identification and sustainable utilization of genetic resources.

Nepal is obligated to adhere to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). Being an underdeveloped country, Nepal was granted a transition period for the implementation of TRIPS until 2013 AD. This agreement mandates Nepal to conserve its plant species either through an effective fundamental system in agriculture, patents, or a combination thereof. Nepal has expressed its commitment to the World Trade Organization (WTO) to establish provisions for the protection of plant species through a fundamental system.

The Plant Protection Act of Nepal should be implemented in a manner that serves the interests of farmers. To achieve this goal, requisite organizational and scientific infrastructures must be established. Nepal should consistently participate in global agricultural discussions to comply with decisions made at the Doha meeting and to fully support the rights of the farmers community.

Intellectual property rights pertaining to newly developed plant species entail exclusive control over a new species of plant created by any individuals. This necessitates obtaining approval from the authorized entity for any intention to utilize protected seeds, repeated use, exchange, sell, or distribute them. This right inherits the practice traditionally used by a farmer in themselves.

The TRIPS provision regarding the protection of plant species has established intellectual property rights to incentivize efforts related to plant breeding. However, it does not adequately address the rights of farmers.

For the sake of documentation and accessibility of genetic resources and traditional knowledge, consent obtained after the rightful owners of the resources and knowledge are able to archive them and discern the quality of all information derived from parties associated with accessibility shall be deemed as prior informed consent. In instances where individuals derive benefits from the commercial utilization of a country's resources and knowledge, a portion of these benefits should be allocated to the true owners of said resources and knowledge. The biodiversity treaty regards the involvement of resource and knowledge owners as essential for the equitable distribution of benefits.

For the purpose of safeguarding the biological and genetic resources existing worldwide and facilitating their sustainable utilization, the biological treaty or Convention on Biological Diversity, established in 1992 AD, has formulated a principle that grants sovereign rights over a country's biological and genetic resources to that respective country.

The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) issued in 2001 AD includes special provisions aimed at facilitating multidimensional access and equitable distribution of benefits pertaining to the mandatory 64 crop species essential for food security. The farmers' rights enshrined within the treaty for these 64 crops encompass: firstly- the rights to stored sell, exchange, reuse, and conserve seeds; secondly, the rights to participate in the formulation of policies concerning national-level agricultural genetic resources; thirdly, the rights to equitable participation in benefits derived from the utilization of relevant agricultural genetic resources; and fourthly, the right to safeguard the traditional knowledge of farmers associated with the respective agricultural genetic resources. Traditional practices have played a crucial role in conserving biodiversity, including biological and genetic origins, as well as preserving traditional knowledge regarding their utilization.

Nepal's agricultural sector has not yet reached a stage where it can effectively utilize seeds protected by intellectual property rights. In Nepal, many seed farmers manage locally produced seeds distributing them among themselves. Instead of patents related to international treaties concerning plant genetic resources, Nepal should develop its own Plant Species Protection Act tailored to national interests and significance, and subsequently implement it.

Nepal has already become a member of the World Trade Organization. Therefore, it is obligated to adhere to the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). Nepal must enact various laws to implement the provisions of this agreement. Upon joining the WTO, Nepal has pledged to establish mechanisms to safeguard plant species through its own system. The Government of Nepal, along with relevant stakeholders, should conduct further research and advocate for the interests of Nepali farmers and national interests regarding the demands raised by developing and underdeveloped countries during the Doha Round negotiations under the amended provisions of TRIPS.

Lesson 3 :
Contract farming and agreement

A system of starting farming after establishing an understanding between a buyer and farmers is called contract farming. Contract farming can be defined as agricultural production carried out according to an agreement between a buyer and farmers. Under this arrangement, specific conditions regarding the value, quality, and quantity of agricultural production are outlined in the agreement. In turn, the buyer commits to purchasing the agricultural products at a predetermined value specified in the agreement within a defined timeframe. Additionally, the buyer receives the agricultural products meeting the quality standards agreed upon with the farmers. This framework provides a convenient market for agricultural products produced by small-scale farmers, while simultaneously enabling buyers to procure the necessary agricultural products according to their requirements. As the value and quality standards of agricultural products are pre-established, contract farming helps mitigate negotiations over product valuation.

To modernize subsistence agriculture technology and foster self-reliance and dependability in Nepal, it has been recognized as imperative to utilize barren lands for contract farming. Following Nepal's transition to federalism, certain municipalities and provinces have introduced legal frameworks pertaining to contract farming to promote its adoption. However, despite these efforts, only a minority of farmers in Nepal have formulated commercial plans and engaged in contract farming thus far. Encouraging contract farming on a broader scale seems essential for enhancing competitiveness and commercialization within the agricultural sector.

The guidelines of acts such as the Contract Act 2056 (2000), Partnership Act 2014 (1958), Companies Act 2063 (2014), and Arbitration Act 2055 (1999)lack clear direction in favor of the agricultural sector in Nepal. While contract farming for products such as coffee, ginger, milk, sugarcane, and jute has been undertaken in certain areas, various challenges persist. These challenges include farmers selling their products in other markets, consumer reluctance to purchase the products, delayed payments, and failure to maintain agreed-upon quantity and quality standards. Although some of these issues can be addressed through existing legislation, they have not proven entirely effective, underscoring the need for a dedicated contract farming act. Notably, contract farming in the production of vegetable seeds, crop seeds, ginger, and coffee has demonstrated significant success in Nepal.

Benefits to farmers from contract farming

Assistance in production materials and services: Purchasers provide technological services and quality inputs such as fertilizers, seeds, and pesticides to farmers, ensuring efficient production practices.

Access to loans: Farmers often face cash shortages for purchasing materials and paying machinery labor. Purchasers may offer cash advances, which can be deducted later when buying agricultural products, easing financial burdens.

Availability of suitable technology: Farmers require access to modern technology to meet contract requirements for quality production. Purchasers facilitate training opportunities and provide technicians to support farmers in adopting new technologies.

Skill transfer: Contract farming necessitates farmers to maintain records of use of production materials, products, which will develop their skill in data management.

Assured market and price: Contract agreements provide farmers with a guaranteed market and predetermined prices for their produce. With market and price concerns alleviated, farmers can focus on maximizing production and ensuring product quality.

Disadvantage to farmers

Risk: Farmers may be required to cultivate crops or produce goods with which they lack prior experience, while still meeting specified quality standards. This introduces the risk of lower-than-expected yields or reduced product quality, potentially leading to buyers rejecting the products.

Challenges in adopting new technology: Implementing new technologies often requires additional investment and technical knowledge. If farmers struggle to adapt to new technology or lack the resources to invest in it, it can increase the risk of lower production.

Loan pressure: Farmers who rely heavily on loans from purchasers may feel the burden of loans and experience pressure to comply with the conditions set by the lenders.

Benefits to traders

Agreed quantity and availability of quality agricultural products: The presence of numerous small-scale farmers in Nepal has led to a diverse range of agricultural production. When traders require products in substantial quantities, procuring them from hundreds of individual farmers can be challenging. Contract farming enables traders to obtain a large quantity of products from a single source or farmer, ensurin quality in the products acquired.

Lower capital investment: While producing at own, a large area of land and a fixed capital is required. Compared to independent production, contract farming typically requires less capital investment for traders. They can acquire products from farmers based on demand.

Risk distribution: In cases where production may be affected by factors such as low yields or exposed to destruction, the risk will be shared as farmers also have investment in the inputs.

Promotion of agricultural materials: Traders can promote the use of specific agricultural inputs, such as poultry diets and medicines, by providing them to contract farmers. In return, traders secure a steady supply of products, such as poultry, resulting in mutual benefits for both parties.

Promotion of agricultural materials: Broiler poultry farming serves as an example here. Traders provide farmers with essential inputs such as chicken diets, medicines, and technical support necessary for efficient poultry rearing. In return, traders purchase the poultry products from the contracted farmers. This model offers double benefits to the traders.

Main points to be included in the contract farming

Name and address of contracting parties
Objective of agreement
Production area/location
Liabilities of contracting parties
Price and conditions of payment
Model of availability of production materials
Disclosure of role of a third party, if any
If the activities undertaken do not comply with the conditions of the agreement, remedies to address the grievances of aggrieved party
Timeframe, renewal, condition for termination of agreement
Conflict resolution
Signatures of contracting parties (including witnesses)

Lesson 4 :
Organic certification and quality standard

In Nepal, the process of organic certification and certification of good agricultural practices is regulated to ensure certification of agricultural products. Various methods, including both single and multiple certification approaches, are employed for organic certification. Certification entails a written assurance by a third-party entity affirming that prescribed standards for organic agriculture have been upheld throughout the production, processing, and distribution of agricultural products. The procedural framework for organic certification in Nepal is delineated as follows:

Farmers, farmer groups, and processors seeking certification must submit an application to a certification body, accompanied by a program plan.

↓

Upon evaluation of the program plan, the certification body responds to the application within 60 days, either requesting revision or inviting the applicant to complete a certification form.

↓

Upon completion of the certification form by the applicant, an association between the applicant and the certification body is established.

↓

The certification body appoints an organic inspector to oversee the certification process.

↓

The applicant submits reports, including laboratory examination results necessary for certification, to the certification body.

↓

An organic inspector conducts inspections (crop cultivation, farming practices, transportation, and processing units).

↓

The organic inspector submits an inspection report (along with laboratory examination results necessary for certification), to the certification body.

↓

The certification body reviews the inspection report and laboratory examination results and approves them if they meet organic standards.

↓

The certification body decides to certify products that meet the approved standards.

↓

For recertification, the applicant must submit an annual update record along with the applicable certification fee.

↓

The certification body reviews the inspection report and laboratory examination results and approves them if they meet organic standards.

↓

The certification body decides to certify products that meet the approved standards.

For recertification, the applicant must submit an annual update record along with the applicable certification fee.

Organic farming standard

Organic farming standards refer to the criteria set forth for the production of agricultural goods in compliance with international regulations, established by a nation for either domestic use or international trade. The primary standards for organic farming outlined in the Directory Related to Technical Standards For Organic Agricultural Production and Processing System 2064 (2008) (Amendment 2065 (2008)) are as follows:

Organic farming land

A minimum intermediate zone of four meters if a road separates organic and chemical farming areas, and a minimum of five meters in all other circumstances.

Should not have used chemical fertilizer, production increasing agents, and pesticides usage on the land.

Machines, tools, and equipment that have come into contact with chemicals should be cleaned before their use in the organic farm.

Conversion period

During the first year of conversion, the certification body must conduct inspections periodically for at least one year after the farm has transitioned to an organic system.

Certification can only be granted after thorough inspection of products from the second and third years of the conversion period.

In cases where sufficient evidence is provided (such as laboratory reports confirming the absence of pesticide effects in soil and products, along with records of production and processing methods), indicating three years of consistent organic production and processing, certification can be granted before the completion of the entire conversion period.

Any certification body accredited according to applicable laws may adjust the conversion period based on inspection reports concerning the history of organic farm land and production methods, provided such modifications do not compromise the objectives of this standard. However, products with less than one year of conversion period cannot be considered organic. For land that has remained barren for more than three years, community forests, products collected from forest areas, and areas designated for animal and bee feeding, the conversion period begins from the date the certification plan is approved.

Crop production

Farmers should employ local species and seeds that have obtained organic certification for crop cultivation.

In regions newly adopting organic farming practices, chemicals and seeds treated with pesticides may be used only within the timeframe specified by certification bodies.

Seeds of genetically modified organisms produced through genetic engineering and living modified organisms are prohibited from use.

Fodder and grains provided to livestock must be sourced from organic production methods.

Management of soil, water and compost pit

Soil quality enhancement must not involve the use of chemical fertilizers.

Only matured compost, decomposed for a minimum of 90 days, or digestate from biogas, should be mixed into the soil 30 days before crop harvest. Immature compost or digestate should not be utilized unless mixed into the soil at least 120 days before harvest.

If necessary to use composted chicken manure, prior approval from a certification body is required. Such manure should undergo complete fermentation using beneficial bacteria before application.

Mandatory inclusion of legumes in the crop ecosystem before and after the main crop is required.

Crop residue burning is prohibited, except in cases of agricultural burning necessary for disease control or disposal of plant, thorns, and bushes in barren agricultural areas.

Pest disease and weed management

Utilization of factory-produced soap, chemically produced washing powder, and chemical pesticides for pest and weed control.

Adoption of plant-derived powder pesticides, minerals, ash, light, glue, and trap pit methods for pest and weed management.

Restriction of tobacco and tobacco-derived pesticides solely for insect control in soil-dwelling insects. These substances are prohibited in root crops such as potatoes and sweet potatoes.

The use of straw produced through inorganic methods is prohibited in mushroom production.

Crop/seed harvest

Organic and non-organic products must be harvested separately to prevent mixing.

Organic products should be appropriately packaged and labeled to ensure safe delivery to consumers.

Chemicals must not be used in containers or storage areas where organic products are kept.

Chemicals should not be employed to ripen or enhance the color of fruits, crops, and vegetables.

Processing, packaging, storage and preservation

Processors must obtain a license from the relevant department of the Government of Nepal to engage in the processing of organic agricultural products.

Areas, machinery, tools, and utensils used in the production and processing of non-organic products must be thoroughly cleaned before processing organic products.

The primary raw materials must be free from chemical contamination and certified organic products.

Water used in processing should be pure and without bacteria/chemicals. In the circumstances where there is more than 50 percent of water in the processed materials, water should be used from the source or company meeting the Nepal Government's standards. The certification body may request a laboratory examination report for water q quality. In such cases, necessary examinations should be conducted at Nepal Government accredited laboratories before submitting it.

Chemicals and additives unapproved by certification bodies are not permitted for use in processing.

Proper labeling of processed organic products is necessary during storage.

Only materials approved by certification bodies should be used to clean storage equipment and furniture.

Vacuum or carbon dioxide packaging is permissible, but radiation is prohibited.

Temperature measuring equipment, along with cooling machines (refrigerators) and ice, conforming to standards determined by the Government of Nepal, can be used for the storage of organic products.

Specific standards for animal husbandry, fishery, and beekeeping have also been outlined in this standard.

Lesson 5:
Network building for sustainable agricultural business operation

Building a network for sustainable agricultural business operations needs coordination and interaction among various departments involved in the supply of production materials, services, transportation, and sales. Establishing effective network management among the involved departments enhances business operations and promotes sustainability. A multi-stakeholder approach is deemed suitable for this purpose. Networks should be established at the community, municipality, province, and national levels. Regular discussions and interactions and conclusions made within the network benefit business operations. The structure of the network varies depending on the stakeholders involved in the production and delivery of goods and services. Attention to the following points during network development aids in achieving sustainable and institutional objectives:

1. Formulation of network's statute and its registration
2. Determination of network's goal and need.
3. Mapping and identification of stakeholders.
4. Trust building and regular contact.
5. Utilizing available resources and opportunities in the interest of the network.
6. Regular examination and learning.

Formulation of network's statute and registration

In order for an organization to become official and legal, it should formulate its statute and register at the concerned governmental body. The structure of the statue is formulated in the format prescribed by the concerned office. Generally, a statute should include the following topics.

- Brief name and preliminary
- Definition
- Organizational stamp and emblem
- Objectives of organization
- Works to be done to achieve the objectives of the organization
- Classification of membership
- Eligibility to obtain membership
- Appointment of members and conditions for non-eligibility
- Expiration of membership
- Formation of General Assembly
- Duties, responsibilities and Rights of General Assembly
- Format of formation of working committee and its rights
- Duties, responsibilities and rights of working committee
- Duties, responsibilities and rights of office bearers of working committee
- Quorum
- Financial management
- Operation of account
- Methods to use fund amount
- Account of organization and auditing
- Provisions related to election
- Provisions related to statute amendment
- Employee management
- Provisions related to delegation of authority
- Dissolution of organization
- Protection

Determination of network's goal and need

Prior to the establishment of a network, it is imperative to elucidate the objectives of network construction, delineate its goals, and forecast anticipated accomplishments. This process entails identifying the specific challenges encountered by agricultural enterprises that the network aims to address, as well as identifying opportunities for exploitation. It is essential to ascertain the key stakeholders requisite for participation within the network, delineating their respective roles therein. For instance, while Nepal has numerous agricultural business organizations and federations, it appears that not all indispensable stakeholders have not been engaged within the value chain.

Mapping and identification of stakeholders

The framework of the agricultural business network is inherently dynamic, depending upon factors such as production, geographical location, and investors. Consequently, the stakeholders affiliated with these networks are subject to variation based on the nature of work, culture and choice. Stakeholder inclusion within the value chain is contingent upon their respective roles and responsibilities. It can be identified through surveys, interviews, workshops, interactive sessions, and digital platforms. In constructing a network, adherence to principles of diversity, inclusivity, representation, and necessity is paramount.

Establishment of trust and regular contact

The establishment of an agricultural business network constitutes an ongoing endeavor. Consistent communication, coordination, and the cultivation of a trusting environment is a must. The initiations of programs within the network should be rooted in a shared communal vision, ethics, and values, which require frequent interaction. For that, it is imperative to ensure clarity regarding the roles, responsibilities, expectations, and desires of each member. Various channels such as the publication of newsletters, utilization of social media platforms, organization of seminars, and convening of meetings can be used to disseminate information about business to members, fostering a sense of accountability and enthusiasm towards the network's objectives.

Using the available resources and opportunities in the interest of the network

Merely building an agricultural business network is insufficient. Diverse programs should be organized to ensure its effective functioning. An annual program should be prepared, aligning with the resources at hand to achieve the network's goals and objectives. These programs should be implemented in the best interest of the network. To enhance the effectiveness of the network, fostering connections with similar networks is essential, facilitating the exchange of experiences for the expansion of the network's reach and capabilities. Online platforms play a pivotal role in broadening accessibility to information, investment searches, and training opportunities.

Regular examination and learning.

The associations within agricultural businesses change regularly. Based on the dynamic environment, it is imperative to adapt to new innovations, address emerging needs, seize opportunities, and confront challenges as they arise. Thus, the principle of learning through examination is embraced. Regular monitoring and analysis of the effectiveness of the network's goals, programs, and the performance of its members are essential. The work success, influence, and sustainability of the network hinge upon its ability to achieve its objectives. Network meetings should prioritize discussions on the accomplishments and shortcomings of the network.

Evaluation Questionnaires

Mark the right answer with the (✓) symbol.

1. **What legal considerations should be kept in mind for operating an agricultural business in Nepal?**
- Business registration
- Employment laws
- Contract Implementation
- All of the above ✓

2. **Main office to register agricultural business**
- Agriculture Development Office
- District Administration Office
- Municipality and Cottage and Small Industry Office ✓
- None of the above

3. **Considerations employers should be aware of before employing labor to work**
- Things employers should know before employing a labor to work
- Should provide with specified remuneration
- Should be use minors in work
- Both ✓

4. **How much money does a municipality charge while registering an agricultural business?**
- Rs 5000
- Rs 200
- Between Rs 1000 to 3000 ✓
- Rs 500

5. **What is the fee for PAN registration?**
- Rs 500
- Rs 1000
- None ✓
- Rs 300

6. **When did Nepal obtain membership of the World Trade Organization?**
- 2005 AD
- 2007 AD
- 2004 AD ✓
- 2000 AD

7. **When did Nepal join the World Intellectual Property Organization?**
- 1990 AD
- 1997 AD ✓
- 1995 AD
- 1991 AD

8. **When was the Seeds Act formulated in Nepal?**
- 2040 BS
- 2047 BS ✓
- 2049 BS
- 2064 BS

9. **When was national intellectual property policy devised?**
- 2073 BS ✓
- 2080 BS
- 2070 BS
- 2062 BS

10. **What does intellectual property rights mean?**
- Traditional knowledge
- Training
- Technology or species developed by own ✓
- Protection of intelligence

11. **When was the Biodiversity Treaty enacted?**
- 2000 AD
- 1992 AD ✓
- 1995 AD
- 2004 AD

12. **…… is pre agreed in contract farming.**
- Value
- Quantity
- Quality
- All of the above ✓

13. **When was the Contract Act enacted in Nepal?**
- 2056 BS
- 2076 BS
- 2075 BS
- 2072 BS

14. When was the Companies Act formulated in Nepal?

- 2065 BS
- 2063 BS ✓
- 2057 BS
- 2052 BS

15. When was the Technical Standard for Organic Agricultural Products formulated in Nepal?

- 2064 BS ✓
- 2063 BS
- 2062 BS
- 2061 BS

16. What should be the buffer zone between organic and chemical farming?

- 5 meter ✓
- 3 meter
- 10 meter
- 20 meter

17. Generally, what is the conversion period for organic certification?

- 1 year
- 2 years ✓
- 3 years
- 4 years

18. Use of genetically modified organisms and living modified organisms is …….in organic farming.

- Allowed
- Not allowed ✓

19. When was the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) enacted?

- 2001 AD ✓
- 2004 AD
- 2007 AD
- 2010 AD

20. When was the Arbitration Act enforced in Nepal?

- 2022 BS
- 2042 BS
- 2055 BS ✓
- 2067 BS

21. It is …..to register a business in a regional office.

- Necessary ✓
- Not necessary

22. What should a business or entrepreneur do after termination of a contract?

- Should improve the ongoing business activities
- Initiate legal process
- Should visit legal support office of municipality
- Should initiate effort of conflict management ✓

23. Why is it essential for a business person to prepare a project plan?

- To estimate project investment
- To register firm
- Both of the above ✓
- None of the above

24. ……..has formulated a principle that grants sovereign rights over a country's biological and genetic resources to that respective country.

- Biological Diversity Treaty ✓
- World Trade Organization
- World Intellectual Property Rights
- All of the above

25. The Biological Diversity Treaty considers ……as distribution of benefits.

- Participation of source and owner ✓
- Conservation of biological entities
- Participation of producers and consumers
- None of the above

26. Advantages of contract farming

- Access to loan
- Transfer of skills
- Assured marked and value
- All of the above ✓

27. Who grants organic certification?

- Farmers
- Business persons
- Certification bodies ✓
- All of the above

28. Does organic farming allow use of chemical fertilizers or pesticides?

- Yes
- No ✓

29. The use of straw produced through inorganic methods is prohibited in mushroom production.

- Yes
- No ✓

30. What one of the following should be understood while operating a business?

- Act
- Rules
- Tax system
- All of the above ✓

31. A continuous……is essential for the effective functioning of the agricultural business network.

- Interaction
- Evaluation
- Monitoring
- All of the above ✓

32. Chemicals and additives unapproved by certification bodies are not permitted for use in organic agricultural production.

- Yes ✓
- No

33. Documents required for registration of an agriculture firm

- Citizenship certificate
- Statute
- Both of the above ✓

34. Which Article of the Constitution of Nepal enshrines intellectual property as a fundamental right under the Right Relating To Property?

- Article 20
- Article 25 ✓
- Article 27
- Article 28

35. The ……farming could be a good alternative for the utilization of barren land.

- Verbal contract (Adhiya)
- Tender
- Contract ✓
- All of the above

MODULE 1

References

Bhattarai, S. (2013). *The Robustness of Agribusiness Supply Chains from a Smallholder Perspective: Case Studies in Nepal.* Christchurch, New Zeland. Retrieved from https://researcharchive.lincoln.ac.nz/bitstream/handle/10182/6001/bhattarai_phd.pdf?sequence=3

CBS. (2024). Retrieved from https://censusnepal.cbs.gov.np/results/downloads/national

FAO. (2024). Nepal At a Glance .

Infopedia, N. (2023). AGRICULTURE Cash Crops Of Nepal – Main Crops. *Nepali Infopedia*. Retrieved from https://nepaliinfopedia.com/cash-crops-of-nepal-main-crops/#:~:text=Cash%20Crops%20Of%20Nepal%201%201.%20Staple%20Crops%3A,Sericulture%20...%208%208.%20Oilseeds%20...%20More%20items

IUCN. (2004). *National Register of Medicinal & Aromatic Plants .* Kathmandu : IUCN.

Johnson, M., & In R. Ellen, P. P. (1992). *Lore: Capturing Traditional Environmental Knowledge "Indigenous environmental knowledge and its transformationsM Creticial anthropological perspectives (pp. 319 –331).* AAmsterdam: Harwood Academic.

Medicine, N. L. (2021). *Selection of medicinal plants for traditional medicines in Nepal.* National Library of Medicine . Retrieved Published online 2021 Oct 16. doi: 10.1186/s13002-021-00486-5, from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8520218/

MoALD. (2019). *Krishi Diary.* Lalitpur, Nepal : Agriculture Information and Communication Centere .

Nepal, G. o. (2022). *STATISTICAL INFORMATION .* Kathmandu : Ministry of Agriculture & Livestock Development.

Omer, A., Arvidson, M., Griffith, J., Hutchison, C., & Lee, K. (2018). *Agricultural Entrepreneurship: for Nepali Youth.* University of Wisconsin Madison.

Parsain, S. (2024, Feburary 14). The Kathmandu Post. *Nepal's agricultural goods imports soar to Rs325 billion despite Covid disruption*, p. 1. Retrieved from https://kathmandupost.com/money/2021/07/28/nepal-s-agri-imports-soar-to-rs325-billion-despite-covid-disruption#:~:text=Nepal%20started%20importing%20cereals%2010%20years%20ago%2C%20according,came%20to%20Rs16%20billion%20and%20Rs12%20billion%20respectively

Rani, E. R., Naveen Kumar, S., & Arun Kumar, K. (2018). Agri-Entrepreneurship Development in India: Opportunities and Challenges. In 2nd International Conference on Advances in Business Management and Information Science (ICABMIS-2018). *In 2nd International Conference on Advances in Business Management and Information Science (ICABMIS-2018).*

Warren, D. (1991). Using Indigenous Knowledge for Agricultural Development . *World Bank Discussion Paper-127.* Washington, D.C.

WB. (2024). Retrieved from https://tradingeconomics.com/nepal/agricultural-land-percent-of-land-area-wb-data.html#:~:text=Agricultural%20land%20%28%25%20of%20land%20area%29%20in%20Nepal,of%20development%20indicators%2C%20compiled%20from%20officially%20recognized%20sources.

Adhikari, R (2079 BS). Hamro Paramparagat Gyan Bhitra Digo ra Maulik Bikasko Abhyas. Sambahak journal 21,14.

Rayoa N. R. (2076 BS) Fifteenth Plan (Fiscal year 2076-77, 2080-81) Kathmandu, Nepal: Nepal government, National Planning Commission, Singhadurbar, Kathmandu

Additional references

(PDF) Agricultural Entrepreneurship: Exploring Opportunities, Challenges, and Impacts (researchgate.net)

(PDF) Indigenous Technical Knowledge (ITK) for Sustainable Agriculture in India (researchgate.net)

Agricultural entrepreneurship: opportunities for Nepali youth – La Follette School of Public Affairs – UW–Madison (wisc.edu)

coursera - Search (bing.com)

harvard school of economics - Search (bing.com)

Home | Department of Economics (ox.ac.uk)

https://researcharchive.lincoln.ac.nz/bitstream/handle/10182/6001/bhattarai_phd.pdf?sequence=3

https://researcharchive.lincoln.ac.nz/bitstream/handle/10182/6001/bhattarai_phd.pdf?sequence=3

Indigenous Technical Knowledge (ITK) - Basic Agricultural Study (agriculturistmusa.com)

london school of economics - Search (bing.com)

shikshya.org - Search (bing.com)

Traditional knowledge practices of North East India for sustainable agriculture (phytojournal.com)

MODULE 2

References

- https://www.mof.gov.np/uploads/document/file/1687415151_Economic%20Survey%207980.pdf
- https://www.casaprogramme.com/wp-content/uploads/CASA-Rapid-Market-Assessment-May-2020.pdf
- https://openjicareport.jica.go.jp/pdf/11643913_01.pdf
- https://caidmp.gov.np/downloadsfiles/vegetable-book-(1)-1696484473.pdf
- https://libird.org/wp-content/uploads/2022/04/Value_Chain_Development_Training_Manual.pdf
- https://nepaleconomicforum.org/impediments-in-the-agriculture-sector-of-nepal/
- http://doanepal.gov.np/actfile/Guideline%20Nepali%20layout%20ctp%2012%20feb_nep_1582010574.pdf
- http://jnkvv.org/PDF/10042020083748concept%20of%20ag%20markeing_EgEcon530.pdf
- https://www.researchgate.net/publication/268361500_Sustainability_of_Maize_Based_Cropping_Pattern_in_the_Mid-hills_of_Nepal
- https://api.giwms.gov.np/storage/36/posts/1694342682_66.pdf
- https://api.giwms.gov.np/storage/36/posts/1695554836_3.pdf
- https://asha.gov.np/wp-content/uploads/2019/06/Sangalo-book-Final_2076_final.pdf
- https://gorkha.akc.gov.np/sites/default/files/2022-06/%E0%A4%AA%E0%A5%8D%E0%A4%B0%E0%A4%BE%E0%A4%99%E0%A5%8D%E0%A4%97%E0%A4%BE%E0%A4%B0%E0%A5%80%E0%A4%95%20%E0%A4%96%E0%A5%87%E0%A4%A4%E0%A5%80_1594216055.pdf
- https://pmamp.gov.np/
- https://www.asdp.gov.np/site/np/page-view/11
- https://aciu.rjkip.gov.np/ne/%e0%a4%aa%e0%a4%b0%e0%a4%bf%e0%a4%af%e0%a5%8b%e0%a4%9c%e0%a4%a8%e0%a4%be-%e0%a4%b5%e0%a4%bf%e0%a4%b5%e0%a4%b0%e0%a4%a3/
- https://fansep.moald.gov.np/ne/
- https://ncfd.gov.np/node/392
- https://reed.moald.gov.np/progressfiles/Annual-Progress-Book-Fiscal-Year-2078-79-1703229678.pdf
- https://moald.gov.np/wp-content/uploads/2023/08/Statistical-Information-on-Nepalese-Agriculture-2078-79-2021-22.pdf
- Market development and management, training directive, consumers committee and development centre and Nepal Agriculture Association, Hariharbhawan, Lalitpur, 2053 BS
- Market-oriented agriculture production plan, training directive, small markets infrastructure development project, Hariharbhawan, Lalitpur, 2057
- Agriculture market plan, training directive, part-1, United Nation's Food and Agriculture Organization, Agriculture Market and Market Management Capacity Promotion Project, Hariharbhawan, 2065
- Agriculture farming plan and preparation, training manual, part-6, FAO, Agriculture Market and Market Management Capacity Promotion Project, Hariharbhawan, 2065

MODULE 3

References

- Aryal, B. (2062 BS). Project Analysis and Management, Gyan Kunj Prakashan Kathmandu Nepal.
- https://managementstudyguide.com/financial-intermediaries.htm
- Integrated Procedural for Interest subsidy on concessional loan- 2075 (with third amendment 2075)
- Agriculture, Livestock and Medicinal Herb Insurance Directives 2079
- Agriculture and livestock directive, 2077
- Crops and Livestock Insurance Subsidy Directive 2070
- Crops and Livestock Insurance Directive 2069
- Insurance Act 2049

MODULE 4

References

- Awokuse, T.O.; Xie, R. Does agriculture really matter for economic growth in developing countries? Can. J. Agric. Econ. 2015, 63, 77–99.
- Biggs, S & Justice, S 2015, Rural and agricultural mechanization: a history of the small engines in selected Asian countries, International Food Policy Research Institute, IFPRI Discussion Paper 01443, Washington DC.
- Chand, J; Bimali, S 2023. Exploration of the cropping pattern based on the irrigation water–energy–food and carbon emission nexus, Irrigation and Drainage. 1-17.
- Chand, J.B., Hewa, G., Hassanli, A. and Myers, B., 2021. Deficit irrigation on tomato production in a greenhouse environment: A review. *Journal of Irrigation and Drainage Engineering, 147*(2), p.04020041.
- Delgado, J.; Short, N.M.; Roberts, D.P.; Vandenberg, B. Big data analysis for sustainable agriculture. *FSUFS* **2019**, *3*, 54.
- EOS Data Analytics 2023. Agricultural technologies and advanced way of farming. Avaible at: https://eos.com/blog/agricultural-technology/.
- Emami, M, Almassi, M, Bakhoda, H & Kalantari, I 2018, Agricultural mechanization, a key to food security in developing countries: strategies formulating for Iran, Agriculture & Food Security, vol. 7, pp. 1-12.
- FAO and UNIDO 2008, Agricultural mechanization in Africa, Time for action: planning investment for enhanced agricultural productivity. Rome.
- FAO 2024. Conservation Agriculture. Available at: Conservation Agriculture | Food and Agriculture Organization of the United Nations (fao.org).
- Fonteh, MF, 2010, Agricultural mechanization in Mali and Ghana: strategies, experiences and lessons for sustained impacts. Rome: FAO.
- Gauchan, D & Shrestha, S 2017, agricultural and rural mechanization in Nepal: status, issues and options for future, Institute for Inclusive Finance and Development, Dhaka, pp. 97-118.
- Gillespie, S.; Van den Bold, M. Agriculture, food systems, and nutrition: Meeting the challenge. Glob. Chall. 2017, 1, 1600002.
- Green, R.E., Cornell, S.J., Scharlemann, J.P.W., & Balmford, A. (2005). Farming and the fate of wild nature. *Science*, 307(5709), 550–555.
- Harishankar, S.; Kumar, R.S.; Sudharsan, K.; Vignesh, U.; Viveknath, T. Solar powered smart irrigation system. *Adv. Electr. Comput. Eng.* **2014**, *4*, 341–346.
- Haruna, IM & Junior JA 2013, Mechanization practice: a tool for agricultural development in nigeria: a case study of Ifelodun local government area of Kwara State, International Journal of Basic Applied Science, vol. 2, pp. 98–106.
- He, J.; Wang, J.; He, D.; Dong, J.; Wang, Y. The design and implementation of an integrated optimal fertilization decision support system. *Math. Comput. Model.* **2011**, *54*, 1167–1174.
- Hendricks, G.S.; Shukla, S.; Roka, F.M.; Sishodia, R.P.; Obreza, T.A.; Hochmuth, G.J.; Colee, J. Economic and environmental consequences of overfertilization under extreme weather conditions. J. Soil Water Conserv. 2019, 74, 160–171.
- King, A. Technology: The Future of Agriculture. *Nature* **544**, S21–S23 (2017). https://doi.org/10.1038/544S21a.
- Kirby, M.; Mainuddin, M.; Khaliq, T.; Cheema, M. Agricultural production, water use and food availability in Pakistan: Historical trends, and projections to 2050. *Agric. Water Manag.* **2017**, *179*, 34–46.
- Kisan Agriculture Pvt Ltd 2023. Irrigation and protected horticulture technologies in Nepal.
- Koch, B.; Khosla, R.; Frasier, W.M.; Westfall, D.G.; Inman, D. Economic feasibility of variable-rate nitrogen application utilizing site-specific management zones. *Agron. J.* **2004**, *96*, 1572–1580.
- Maraseni, TN; , G.; Maroulis, J. 2010. An assessment of greenhouse gas emissions from the Australian vegetables industry. Journal of Environmental Science and Health. 45: 578–88.
- Micaheal, AM 2004. Irrigation Theory and Practices. Vikas Publications, New delhi, India.
- Michael, AM & Ojha, TP 2015. Principles of Agricultural Engineering Volume 1. Jain Brothers, New Delhi, India.
- Mumtaz, R.; Baig, S.; Fatima, I. 2017. Analysis of meteorological variations on wheat yield and its estimation using remotely sensed data. A case study of selected districts of Punjab Province, Pakistan (2001–14). *Ital. J. Agron.*, *12*.
- Patel, GT; BANDYOPADHYAY, KK; Singh, DK 2013. Impact of conservation agriculture and resource conservation technologies on carbon sequestration–a review. Indian Journal of Agricultural Sciences 83 (1): 3–13.
- Paudel, GP, Timsina, KP, Karki, S, Adhikari, S, Babu, TSA & Krupnik, TJ 2022, Slow adoption of mechanical rice transplanters in Nepal's cereal-based cropping systems: reasons and recommendations for change, Cereal Systems

Initiative for South Asia (CSISA).
- Ramesh, R; Negi, SC; Rana, SS 2017. Resource conservation technologies (RCTs)-needs and future prospects: a review. Agricultural Reviews, 37 (4), 257-267.
- Rocha, A; Gonçalves, E & Almeida, E. 2019. Agricultural technology adoption and land use: evidence for Brazilian municipalities. Journal of Land Use Science. 14:4-6, 320-346, DOI: 10.1080/1747423X.2019.1707312.
- Schmitz, A & Moss CB 2015, Mechanized agriculture: machine adoption, farm size, and labor displacement, Agriculture & Biological Forum, vol. 18, pp. 278–96.
- Sishodia, R.P.; Shukla, S.; Graham, W.D.; Wani, S.P.; Jones, J.W.; Heaney, J. Current, and future groundwater withdrawals: Effects, management and energy policy options for a semi-arid Indian watershed. *Adv. Water Resour.* 2017, *110*, 459–475.
- Sishodia et al. 2020, Applications of Remote Sensing in Precision Agriculture: A Review. *Remote Sensing*, *12*(19), 3136; https://doi.org/10.3390/rs12193136
- Shafi et al. 2019. Precision Agriculture Techniques and Practices: From Considerations to Applications. *Sensors*, *19*(17), 3796; https://doi.org/10.3390/s19173796.
- Takeshima, H 2017, Overview of the evolution of agricultural mechanization in Nepal, International Food Policy Research Institute, IFPRI Discussion Paper 01662.
- USDA 2024. Agriculture Technology. Available at: https://www.nifa.usda.gov/topics/agriculture-technology.
- Wang, N.; Zhang, N.; Wang, M. Wireless sensors in agriculture and food industry—Recent development and future perspective. Comput. Electron. Agric. 2006, 50, 1–14.
- Zilberman, D., Khanna, M., Kaplan, S., & Kim, E. (2014). Technology adoption and land use. In J.M. Duke & J. Wu (Eds.), Oxford handbook of land economics (pp. 207–261). Oxford: Oxford University Press.

MODULE 5

References

Constitution of Nepal
Seeds Act 2047 (1988) and Seeds Regulations 2069 (2013)
Directory Related to National Technical Standard for Organic Agriculture Production and Processing System 2064 (2065) (Amendment 2008)
Seeds (Second Amendment) Act 2079 (2022)
National Intellectual Property Policy 2073 (2017)· https://www.linkedin.com/advice/0/whats-best-way-build-agribusiness-innovation-network, retrieved at 2/22/2024.
https://www.fao.org/3/i2858e/i2858e.pdf retrieved at 2/23/2024.
https://www.fao.org/3/i7581e/i7581e.pdf retrieved at 2/23/2024.
https://.nkp.gov.np
https://khatapana.com/blogs/111/full-guide-on-starting-a-business-in-nepal retrieved at 2/23/2024.