NEA WEEKLY TALK PROGRAM

" Agricultural Engineering for Sustainable Agriculture: Contributions, Challenges & Roadmap for Prosper Nepal "

Speaker

ER. DR. JEET B. CHAND

Senior Agricultural Engineer, *Prime Minister Agriculture Modernization Project, Lalitpur*

Dr Chand is contributing in various roles throughout the country under Ministry of Agriculture & Livestock Development since 2007. Currently, he is the Sr Agricultural Engineer in Prime Minister Agriculture Modernization Project, Khumaltar, Lalitpur. Dr Chand has bachelor degree in Agricultural Engineering (Institute of Engineering Dharan), master and PhD degree from University of South Australia in Water Resources Engineering. Besides professional job, he is the President Nepalese Society of Agricultural Engineering; Subject Committee Member Institute of Engineering & Early Career Researchers Board Member SCIFINITY UAE. Dr Chand has published more than 18 international peer-reviewed articles as a first author in high-impact journals. To recognize his professional contribution, many awards including "Outstanding Australian Alumni Award 2022" & "Outstanding Young Australian Alumni Award 2014" have been awarded from Government of Australia.

Brief Abstract: In the talk show, major focus will be discussed about agricultural engineering services (contributions, challenges and roadmap) particularly under Ministry of Agriculture & Livestock Development, Government of Nepal, to transform Nepalese agriculture from subsistence based to modern, competitive, sustainable & a sustained industry. Agricultural Engineering is the base of industrialization & modernization of agricultural production system and rural economy via mechanization, irrigation & drainage, post harvest & process engineering, soil conservation & watershed management, renewable energy, and on farm environmental sustainability.

ON FRIDAY, 02 MAY 2025 | **START AT 03:30 PM** | **ENGINEER BHAWAN, PULCHOWK, LALITPUR**

Live on NEA Facebook page.

NEPAL ENGINEERS' ASSOCIATION (NEA)

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Prime Minister Agriculture Modernization Project
Project Management Unit
Infrastructure Development Section

Agricultural Engineering for Sustainable Agriculture: Contributions, Challenges & Roadmap for Prosper Nepal

Dr Jeet B Chand
Senior Agricultural Engineer
Prime Minister Agriculture Modernization Project
2 May 2025

Prime Minister Agriculture Modernization Project
Project Management Unit
Infrastructure Development Section

Dr Jeet Chand

Senior Agricultural Engineer, PMAMP
President- Nepalese Society of Agricultural Engineers
Subject Committee Member- Institute of Engineering(2023-2026)
Early Career Researchers Board Member- SCIFINITY,UAE

Professional Expertise & Research Interest:

***Water**

*** Agricultural Mechanization**

***Sustainability**

***Climate-Smart Agricultural Technology**

Publications

SPRINGER NATURE Link Log in

Paddy and Water Environment > Article

Nexus of climate change, irrigation requirement and water balance for paddy production in Chandra Canal Irrigation System, Nepal

Article | Published: 11 November 2024

(2024) Cite this article

Paddy and Water Environment

Aims and scope →

Submit manuscript →

Nilam Thapa & Jeet Chand

International Journal of Sustainable Agricultural Research
2025 Vol. 12, No. 1, pp. 67-80
ISSN(e): 2312-6477
ISSN(p): 2313-0393
DOI: 10.18488/ijsar.v12i1.4166

check for updates

Automation in drip irrigation system: A comprehensive review with mathematical modeling and optimization algorithms

Jeet Chand[1+]
Rupesh Acharya[2]
Roshan Pandey[3]
Milan Paudel[4]
Sanjeeb Bimali[5]

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Open Access

Recent Progress in Materials

LIDSEN Publishing Inc.

Review

Recycled Wastewater Usage: A Comprehensive Review for Sustainability of Water Resources

Jeet Chand [1,*], Shiva Jha [2], Sameer Shrestha [1]

Check for updates

ASCE

Deficit Irrigation on Tomato Production in a Greenhouse Environment: A Review

Jeet Bahadur Chand[1]; Guna Hewa, Ph.D.[2]; Ali Hassanli, Ph.D.[3]; and Baden Myers, Ph.D.[4]

Publications

American Journal of Water Science and Engineering
2023; 9(2): 41-49
http://www.sciencepublishinggroup.com/j/ajwse
doi: 10.11648/j.ajwse.20230902.13
ISSN: 2575-1867 (Print); ISSN: 2575-1875 (Online)

SciencePG
Science Publishing Group

A Review on Challenges, Opportunities and Outlook of Water Sector Privatization for Sustainability and Water Scarcity Management

Jeet Chand[1, *], Farjana Akhter[2], Shiva Kumar Jha[3]

Journal of Hydraulic Structures
J. Hydraul. Struct., 2023; 9(4): 1-14
DOI: 10.22055/jhs.2023.45068.1268

OPEN ACCESS

Dam failure, management and outlook in the light of climate change: a review in case study of the Wivenhoe Dam, Brisbane

Jeet B Chand[1]
Farjana Akhter[2]

RESEARCH ARTICLE

WILEY

Exploration of the cropping pattern based on the irrigation water-energy-food and carbon emission nexus

Jeet B. Chand[1] | Sanjeeb Bimali[2]

IJIRAD

International Journal of Irrigation and Agricultural Development
Agricultural Science and Development
IJIRAD 6(1) [2024] [364 – 372]

IJIRAD
ISSN: 2616-1508
https://www.ijirad.org

Assessment of Technical and Financial Feasibility of the Gadachaur Lift Irrigation System, Bajura Nepal

Jeet Chand[1*], Rupesh Acharya[2], Roshan Pandey[2], Sajit Raj Karki[2], Anupam Subedi[2], Shiva Kumar[3] Jha

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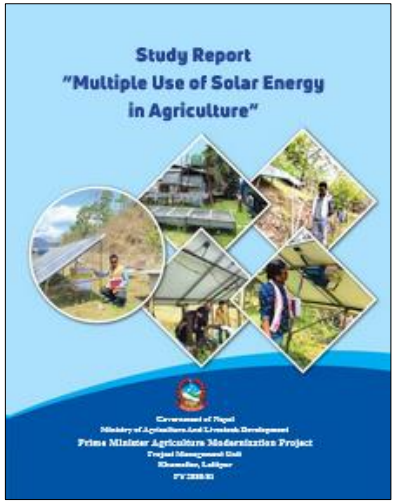

Study Team
अध्ययन टोली

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Nepal Agricultural Research Council
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Khumaltar, Lalitpur

Sameer Shrestha
Agricultural Engineer
Prime Minister Agriculture Modernization Project
Project Management Unit
Khumaltar, Lalitpur

Australian Journal of Crop Science AJCS
AJCS 15(05):716-724 (2021) ISSN:1835-2707
doi: 10.21475/ajcs.21.15.05.p3052

Plant biomass and fruit quality response of greenhouse tomato under varying irrigation level and water quality

Jeet B. Chand*, Guna Hewa, Ali Hassanli, Baden Myers

International Journal of Agriculture, Environment and Bioresearch
Vol. 07, No. 03; 2022
ISSN: 2456-8643

EFFECTS OF WATER STRESS AND QUALITY ON RESIDUAL SOIL MACRONUTRIENTS AND ROOT-ZONE SALINITY FOR TOMATO PRODUCTION IN A PROTECTED CROPPING ENVIRONMENT

Dr Jeet Bahadur Chand[1], Guna Hewa [2], Ali Hassanli [2] and Baden Myers[2]
[1]Government of Nepal, Ministry of Agriculture & Livestock Development, Kathmandu, Nepal
[2]UniSA STEM, Mawson Lakes Campus, University of South Australia, Mawson Lakes, 5095, Australia.

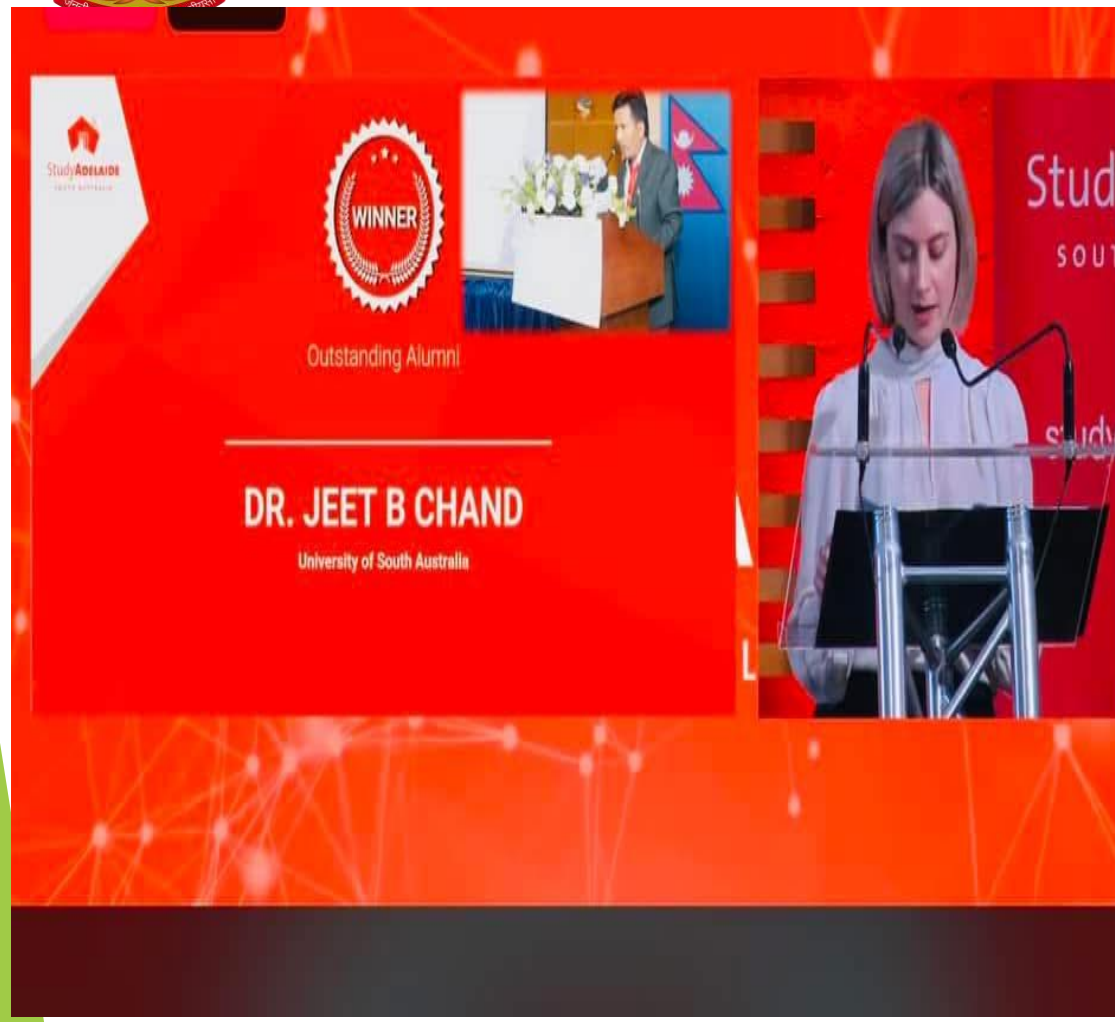
agriculture MDPI

Article

Evaluation of Deficit Irrigation and Water Quality on Production and Water Productivity of Tomato in Greenhouse

Jeet Chand *, Guna Hewa, Ali Hassanli and Baden Myers

International Awards



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Content

Nepalese Agriculture Scenario

Agricultural Engineering (AE)

Contribution of AE in Nepal

Challenges in AE Profession

Roadmap

Conclusion

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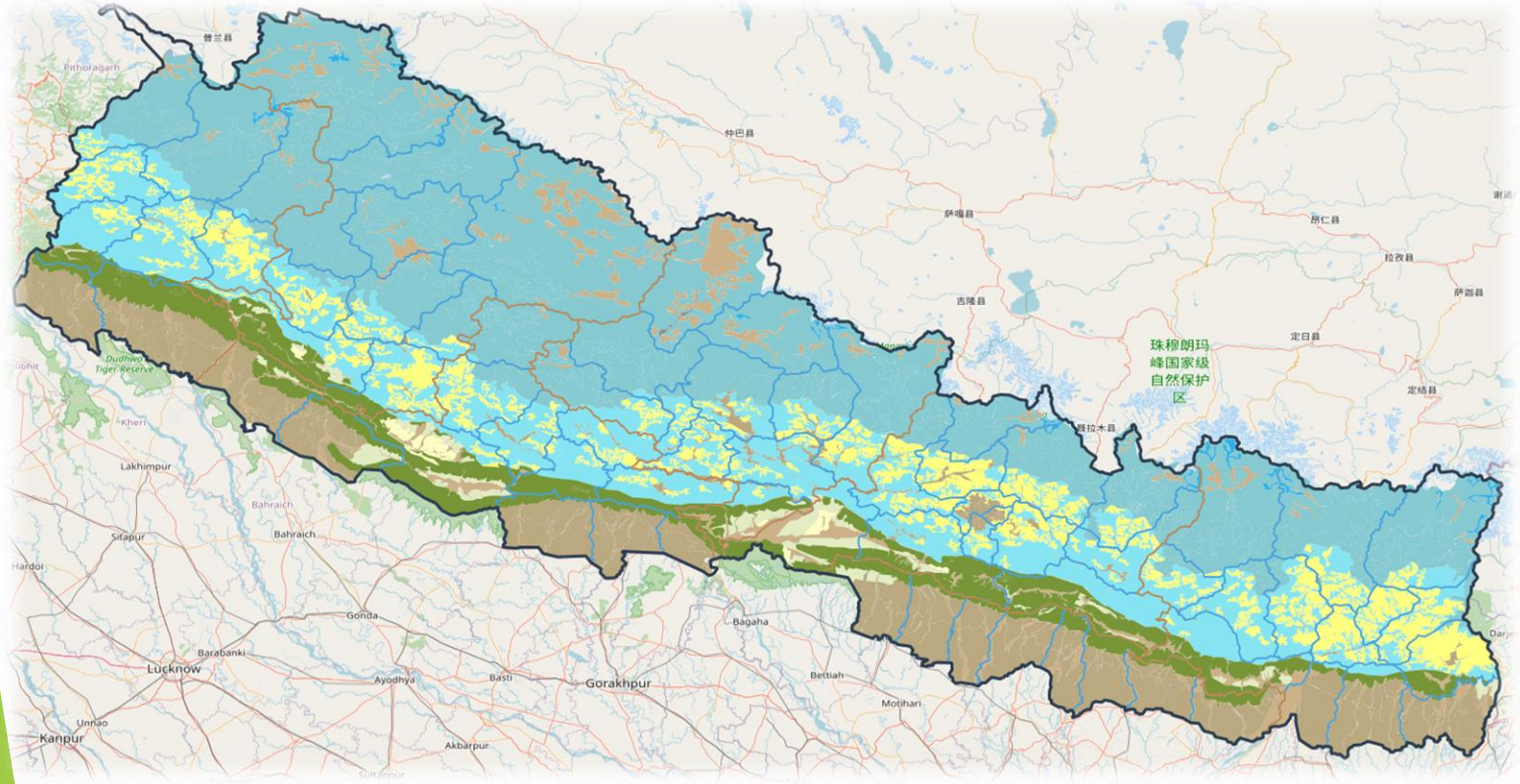
Nepal



- Total arable land: 2.2 million ha
- Irrigable land: 1.77 million ha
- Irrigated land: About 1.55 million
- Year-round irrigation: About 40%
- GDP contribution by Agriculture : 23%
- Land-holding size: 0.79 ha

- Agriculture remains important in driving economic transformation, sustainable livelihoods, & development in developing countries, like Nepal.

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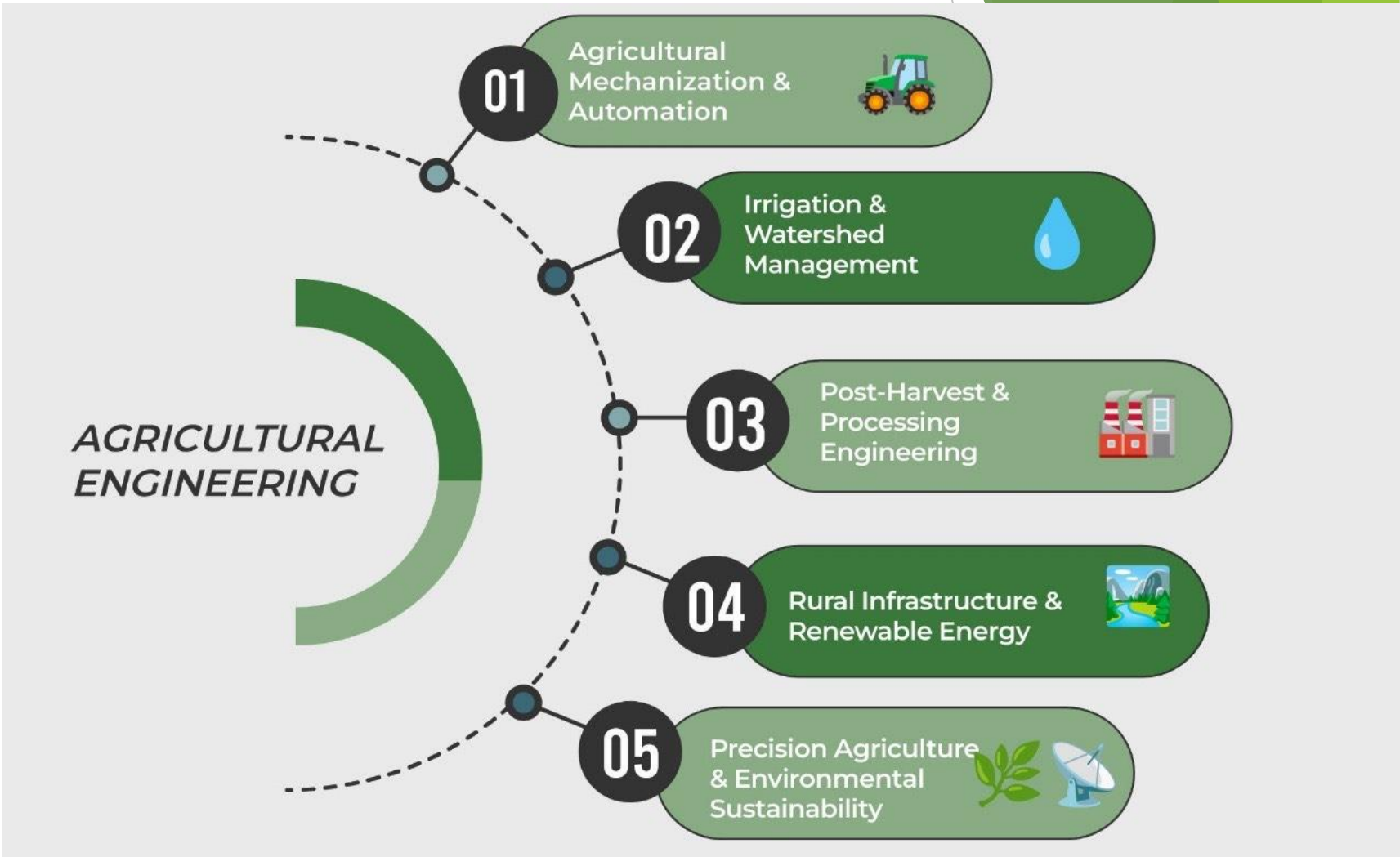
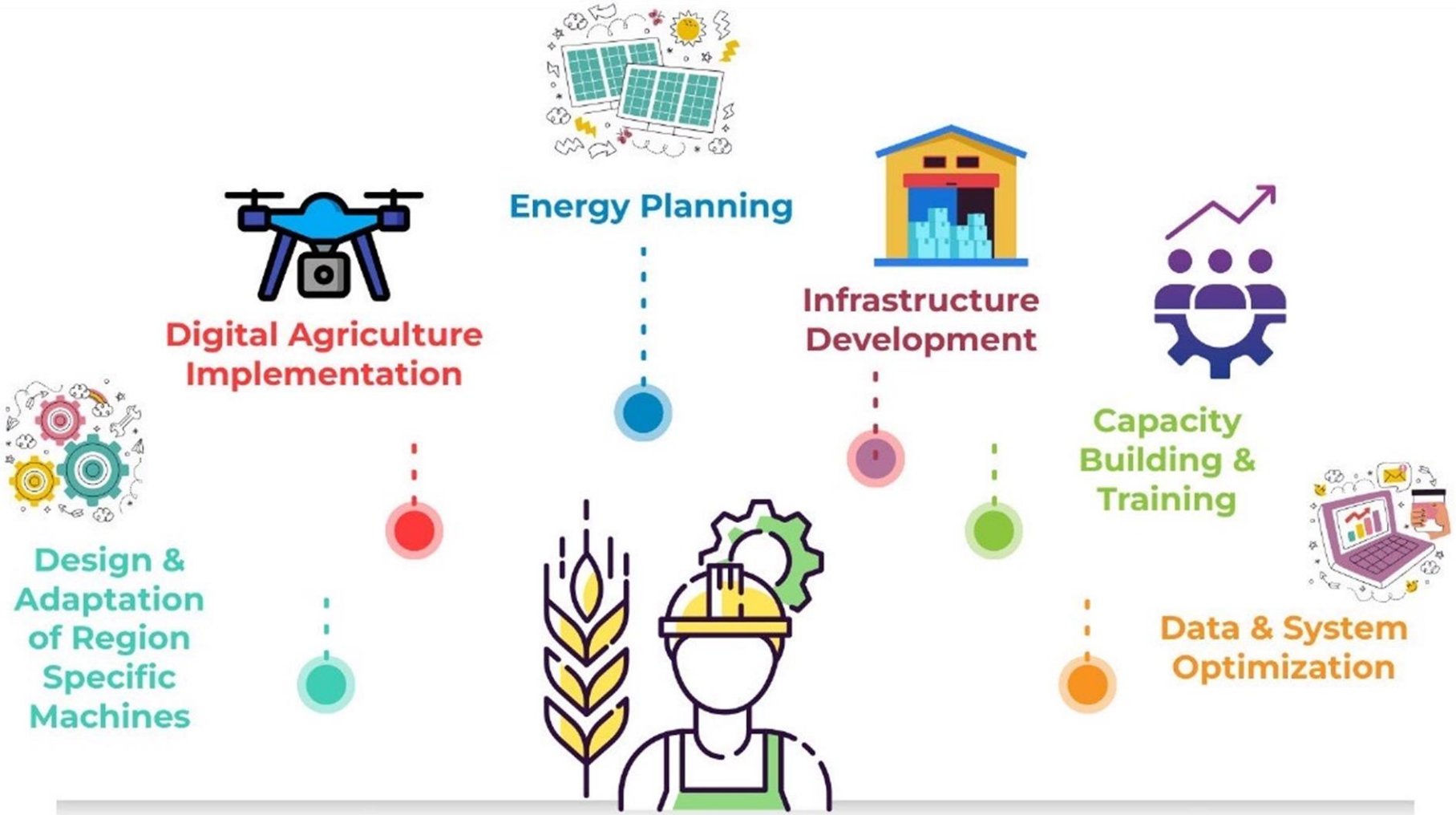
Agricultural Engineering

- If you like formation of nexus in food, technology & nature, consider a career in agricultural engineering.
- AE = Application & management of engineering principles in agriculture, rural development & environmental sustainability




Energy Planning
Digital Agriculture Implementation
Infrastructure Development
Capacity Building & Training
Design & Adaptation of Region Specific Machines
Data & System Optimization
AGRICULTURAL ENGINEER

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AE Contribution: Sustainable Agriculture

- Agricultural mechanization & automation
- Resources conservation technologies
- Climate-smart agriculture/ Protected Agriculture/ Greenhouses
- Precision Agriculture
- Agricultural infrastructures development & management
- Post-harvest & processing engineering
- Agri-Environmental sustainability

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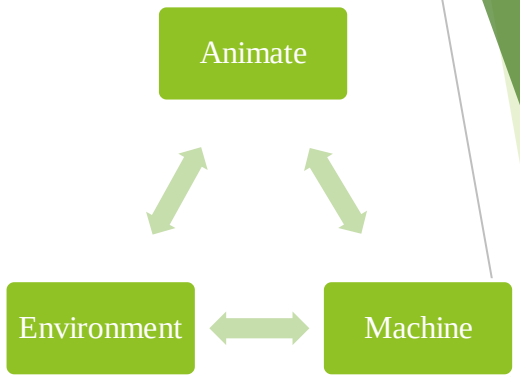
Agricultural Mechanization

Use of farm power & machineries in agriculture to:

- ✓ increase land, labor, resources & crop productivity
- ✓ reduce the cost of production & animate drudgery
- ✓ farming business "Profitable & Sustained Industry"



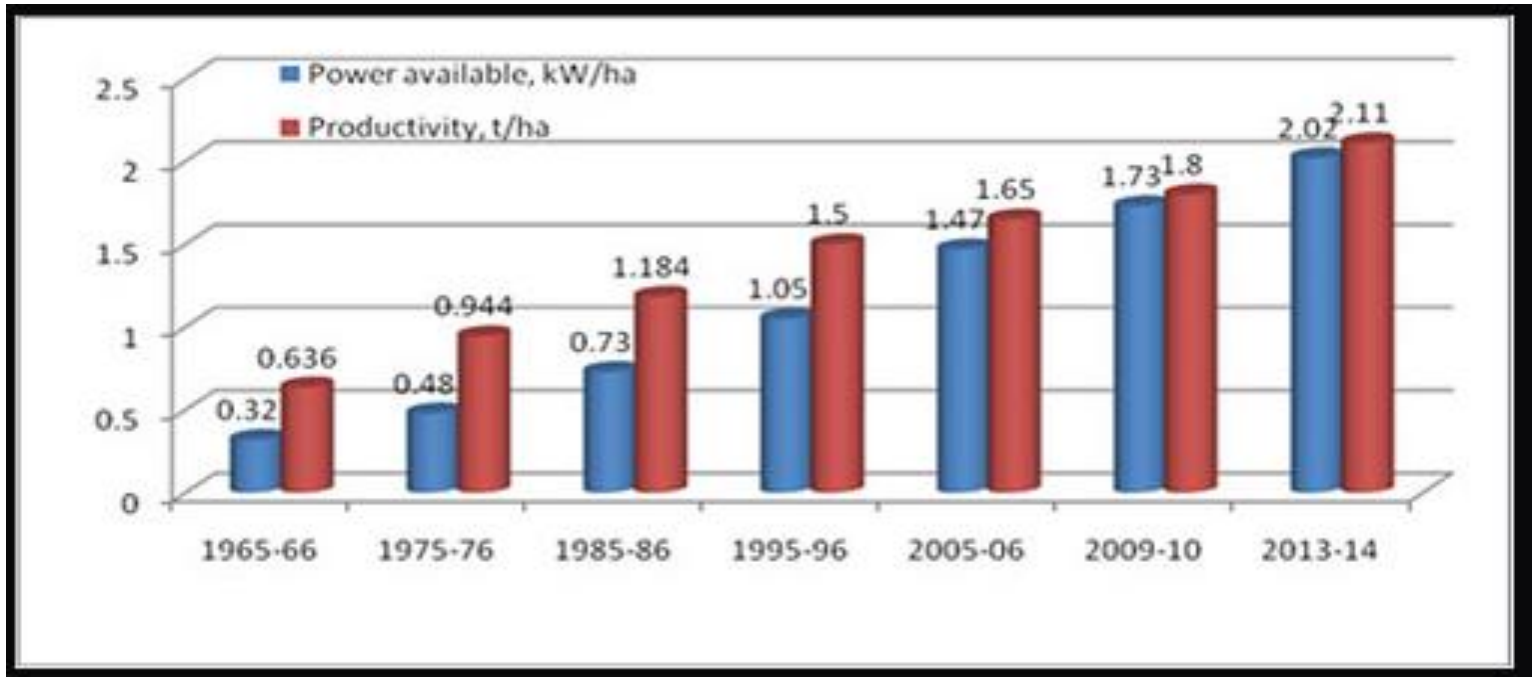
आउँदा दिनहरूमा जलवायु परिवर्तन र कृषि मजदुरको अभावका कारण कृषिमा यान्त्रीकरणको आवश्यकता अझ बढी महत्त्वपूर्ण र अपरिहार्य बन्ने छ।

ekantipur.com
कृषिकर्ममा यान्त्रीकरणमा जोड

Status w. r. t. Energy use in Agriculture

SN	Country	Energy Use (Kw/ha)
1	Highly mechanized countries (Japan, US, Australia)	8-10
2	India (National Average)	2.5
	Punjab	5.0
3	China	5.0
4	Bangladesh	1.9
5	Nepal (National average)	0.8
	(PMAMP intervention area)	1.45

Correlation between Farm Power & Productivity



Source (Singh 2018)

It implies:

1. Power use & agricultural productivity has proportional relationship.

2. High scope of increasing productivity in Nepal with the use of improved AM.

Efficiency @ CHCs- PMAMP

Types of CHC	MOE	Remarks
Individual	47%	Results are statistically insignificant.
Cooperatives	46%	
Groups	44%	

Source (CIMMYT, 2022)

It implies:

1. The MOE in CHSs is below 50% - high scope to increase.

2. Investment in operational & capacity development of CHC is required to improve MOE & make them profitable & sustainable.

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प्रविधिले कृषिमा आकर्षण

महिलामैत्री औजारहरूको विकास, विस्तार र अनुदान तथा कृषिसम्बन्धी तालिममा प्राथमिकता दिएसँगै उपकरण प्रयोग गर्ने युवतीहरूको संख्या बढेको छ। लुम्बिनी प्रदेशमा मात्र वार्षिक १० हजार बढी यस्ता उपकरण वितरण हुने गरेका छन् ।

Source: Kantipur Daily- 2080

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प्रविधिमैत्री किसान, धान रोपाइँ र थ्रेसिङ सँगसँगै

धनगढी । कैलालीको कैलारी गाउँपालिका ६ का प्रभात कुमार चौधरी

'प्रविधिको प्रयोगले लागत घटाउँछ । प्रविधिको प्रयोगमा मौसम प्रतिकूलताको खासै प्रभाव रहन्न । मेसिन नभएको भए यो असारमा सँगै धान काट्न र थ्रेसिङ गर्नु, त्यसपछि अर्को धान बाली रोप्नु सम्भव नै थिएन नि ।'

त्यस्तै तिलक चौधरीले १ बिघामा ३० क्वीन्टल चैते धान फलाएका छन् । जसमा उनको २० देखि २५ हजार रुपैयाँ खर्च आएको थियो । चार महिनाको अवधिमा एक बिघा जमिनमा धान खेतीबाट ७५ हजारसम्म खुद मुनाफा लिन उनी सफल भएका छन् ।

Source: Ratopati

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Private Sector in AM

AM Policy, 2071 has considered that private sector will lead the AM program.

In 2070 BS, Nepal Agricultural Machineries Entrepreneurs Association (NAMEA) was established.

In collaboration with GoN, NAMEA has been organized 5 AgriMech Expo.

Contribution of AM- Summary

Saving in Water, Seed & Fertilizer: 15-20%

- ✓ Saving in time: 20-50%
- ✓ Reduction in Manual Labor: 20-30%
- ✓ Reduction in input production cost: 10-60%
- ✓ Increase in overall farm productivity: 10-15%
- ✓ Yet to Finalize: Animate Drudgery, Quality & Accuracy

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Resources Conservation Technology

Conservation/ Minimum/ Zero Tillage

- Land preparation and sowing cost: 1/3 of traditional practice.
- Saving:100 lit of diesel/ha in land preparation
- Saving: at least 25 % of irrigation water
- Improve: nutrient use efficiency 20%
- Better yield: 20% more than traditional

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AE---Climate-Smart / Protected Facility / Greenhouses

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Precision Agriculture

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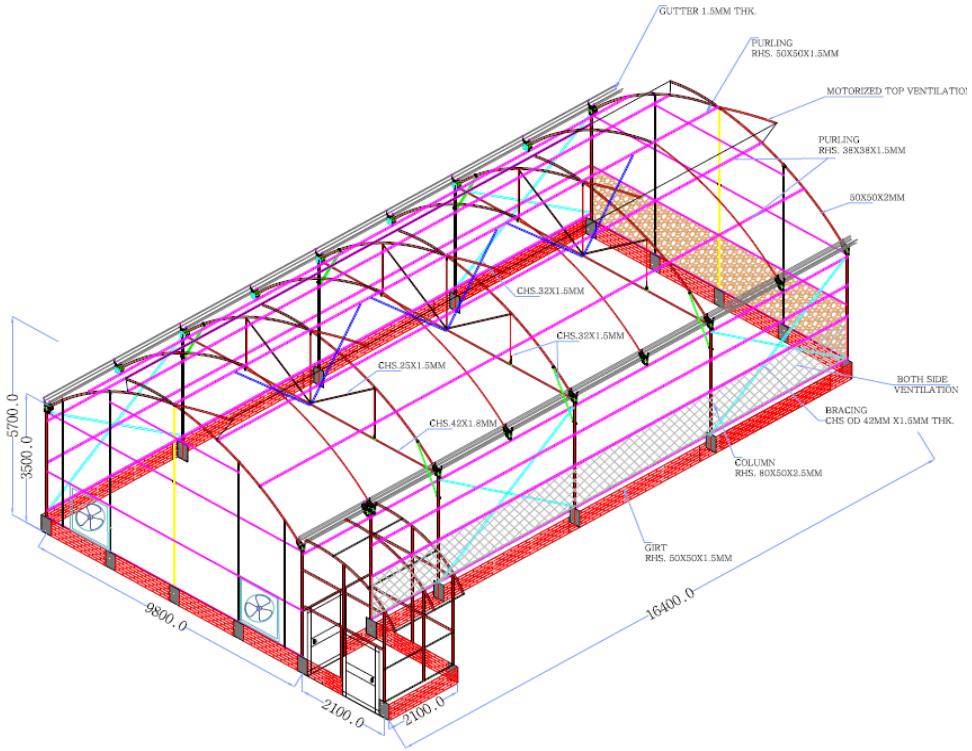
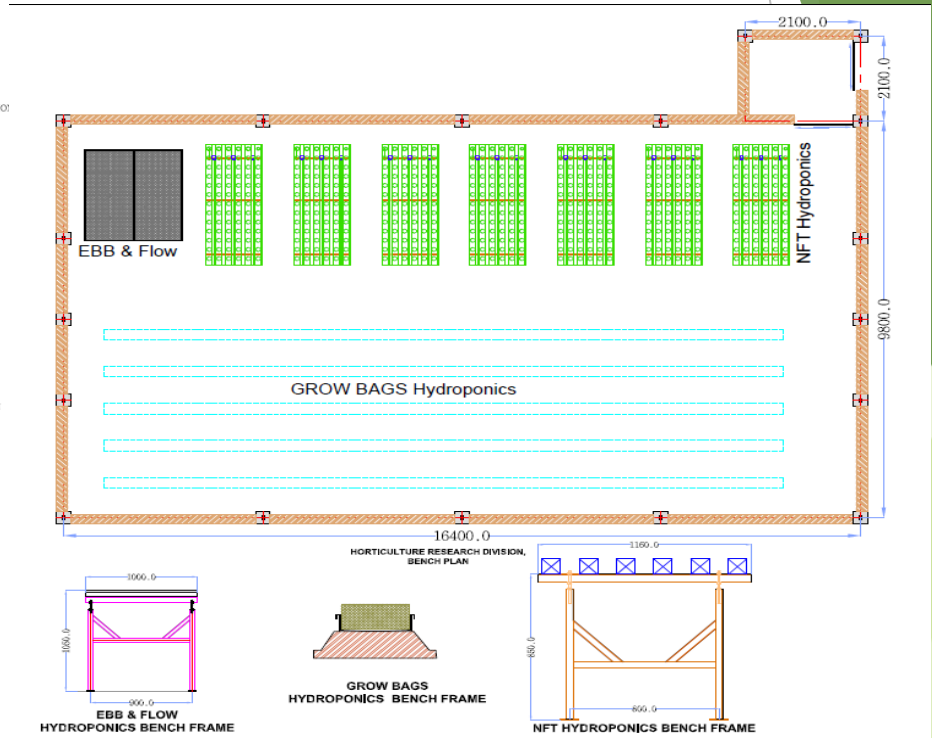
HYDROPONIC Production





- **Installed Hydroponic laboratories at NARC- National Horticultural Research Center.**

  Plants are grown in water-based nutrient solution. This method reduces water usage and allows precise control over nutrient delivery.

- **Design: Er. Dr. Shiva Kumar Jha (Scientist- Agricultural Engineering)**

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Functionally Correct Agricultural Infrastructures Design & Estimate

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Rustic Store

Potato Tissue Culture Lab

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Animal Shelters

Aquaculture Engineering

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Latest AGRITECHs

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RAINOUT SHELTER

- shelter operates automatic on raining to cover crop & protect from rain.
- It is world most advance technology developed at three research station of NARC
- Design: Er Dr Shiva K Jha

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Post-harvest engineering

बेसार प्रशोधन उद्योग सुनसरी

Post-harvest & Processing Engineering- Examples (PMAMP)

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Challenges & Recommended Solution:

Challenge:

1. Weak Institutional Arrangement for AE in MoALD

Solution:

Strengthening of Agricultural Engineering Extension / Research

Ministry of Agriculture and Livestock Development

↓

National Agricultural Engineering Centre

↓

Directorate of Agricultural Engineering (Province wise)

↓

Agricultural Engineering Post in DAKC/ DADO/LSKC

↓

Agricultural Engineering post in each Municipality

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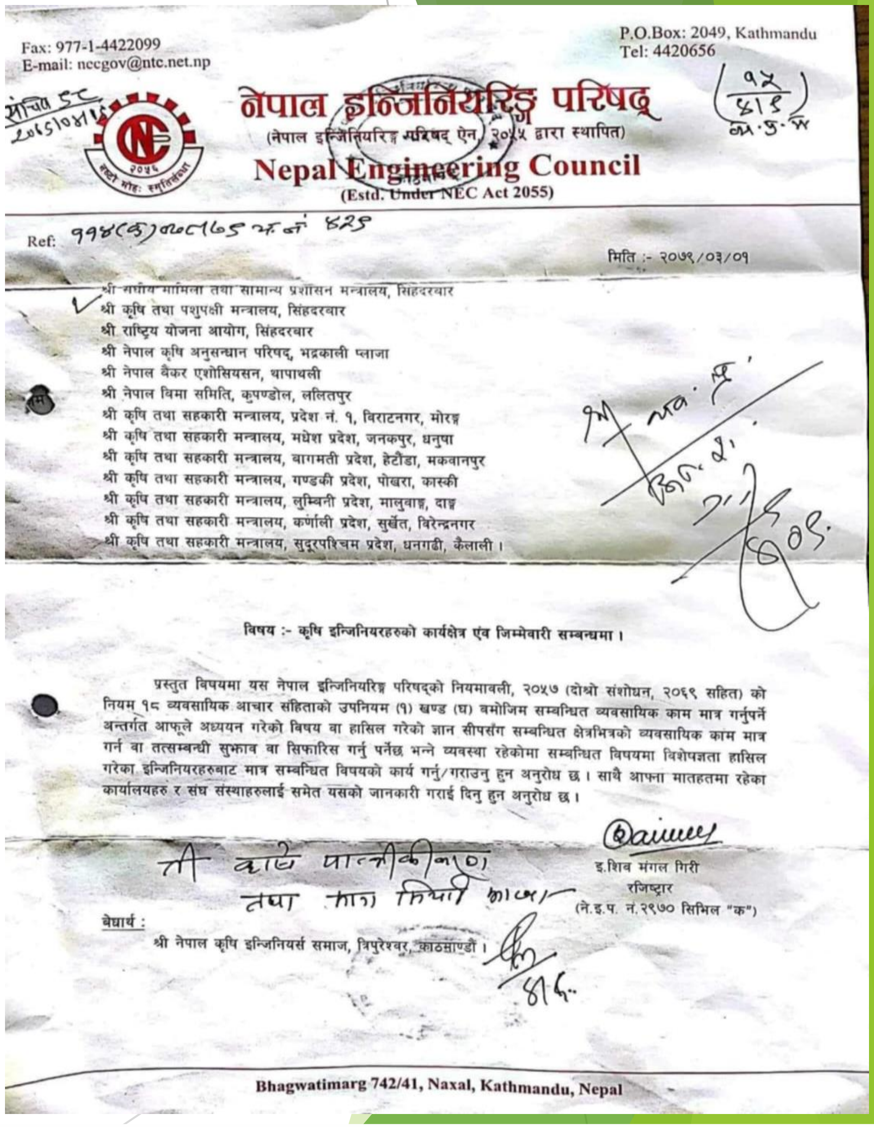
Challenge Continued……………….

Challenge 2:
Absence of clear-cut, defined & specific ToR, Roles & Responsibilities

Recommended Solution:
Defined ToR by Nepal Engineering Council for Agricultural Engineering Profession under Ministry of Agriculture & Livestock Development, (Taking Help of NEA)

Challenge 3:
Valuation of agricultural infrastructures by other professionals in banking purposes

Recommended Solution:
Defined ToR by Nepal Engineering Council for Agricultural Engineering Profession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नेपाल इन्जिनियरिङ परिषद्
(नेपाल इन्जिनियरिङ परिषद् ऐन, २०५५ द्वारा स्थापित)
Nepal Engineering Council
(Estd. Under NEC Act 2055)

Ref:

मिति :- २०७९/०३/०१

श्री संघीय मामिला तथा सामान्य प्रशासन मन्त्रालय, सिंहदरबार
श्री कृषि तथा पशुपक्षी मन्त्रालय, सिंहदरबार
श्री राष्ट्रिय योजना आयोग, सिंहदरबार
श्री नेपाल कृषि अनुसन्धान परिषद्, भद्रकाली प्लाजा
श्री नेपाल बैंकर एशोसियसन, थापाथली
श्री नेपाल विमा समिति, कुपण्डोल, ललितपुर
श्री कृषि तथा सहकारी मन्त्रालय, प्रदेश नं. १, विराटनगर, मोरङ्ग
श्री कृषि तथा सहकारी मन्त्रालय, मधेश प्रदेश, जनकपुर, धनुषा
श्री कृषि तथा सहकारी मन्त्रालय, बागमती प्रदेश, हेटौंडा, मकवानपुर
श्री कृषि तथा सहकारी मन्त्रालय, गण्डकी प्रदेश, पोखरा, कास्की
श्री कृषि तथा सहकारी मन्त्रालय, लुम्बिनी प्रदेश, मालुवाङ्ग, दाङ्ग
श्री कृषि तथा सहकारी मन्त्रालय, कर्णाली प्रदेश, सुर्खेत, विरेन्द्रनगर
श्री कृषि तथा सहकारी मन्त्रालय, सुदूरपश्चिम प्रदेश, धनगढी, कैलाली ।

विषय :- कृषि इन्जिनियरहरुको कार्यक्षेत्र एंव जिम्मेवारी सम्बन्धमा ।

प्रस्तुत विषयमा यस नेपाल इन्जिनियरिङ्ग परिषद्को नियमावली, २०५७ (दोश्रो संशोधन, २०६९ सहित) को नियम १८ व्यवसायिक आचार संहिताको उपनियम (१) खण्ड (घ) बमोजिम सम्बन्धित व्यवसायिक काम मात्र गर्नुपर्ने अन्तर्गत आफूले अध्ययन गरेको विषय वा हासिल गरेको ज्ञान सीपसँग सम्बन्धित क्षेत्रभित्रको व्यवसायिक काम मात्र गर्न वा तत्सम्बन्धी सुझाव वा सिफारिस गर्नु पर्नेछ भन्ने व्यवस्था रहेकोमा सम्बन्धित विषयमा विशेषज्ञता हासिल गरेका इन्जिनियरहरुबाट मात्र सम्बन्धित विषयको कार्य गर्नु/गराउनु हुन अनुरोध छ । साथै आफ्ना मातहतमा रहेका कार्यालयहरु र संघ संस्थाहरुलाई समेत यसको जानकारी गराई दिनु हुन अनुरोध छ ।

इ.शिव मंगल गिरी
रजिष्ट्रार
(ने.इ.प. नं.२९७० सिभिल "क")

बोधार्थ :
श्री नेपाल कृषि इन्जिनियर्स समाज, त्रिपुरेश्वर, काठमाण्डौं ।

Bhagwatimarg 742/41, Naxal, Kathmandu, Nepal

Government of India Initiatives in AM

Making AM sustainable, a special 'Sub Mission on Agricultural Mechanization (SMAM)' introduced in 2014 with IRs. 4557 crore.

Objectives:

1. HRD in AM
2. Quality Control of Agricultural Machines
3. Incentives in Purchase of Agricultural Machines & Setting up of CHCs

Result:

a. 13 Lakh new machines & 28000 CHC
b. The farm power availability from 2.02 kw/ha (2016-17) to 2.49 kw/ha in (2022-2023).
c. Phenomenal expansion of cropped area, cropping intensity and overall productivity.

Roadmap: Agricultural Industrialization via Agricultural Mechanization

AGRICULTURAL INDUSTRILIZATION THROUGH MECHANIZATION

Conclusion

1. Agricultural Engineering is the base of modern agriculture. Land consolidation & then mechanized agriculture in service provider model is the pre-requisite of prosper Nepal.

2. Design, estimation & development of agricultural infrastructures should come under AE profession by rule (Defined ToR, Professional Code of Conduct- NEC Rule)

3. Institutional reform in AE services is urgent need. Launching a special 10-years mega project (PAIM) in 3P model.

4. “Nothing Goes Right if Agriculture Goes Wrong”. Agriculture can’t go right if engineering goes wrong.

Prime Minister Agriculture Modernization Project
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Thank You

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