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# Addressing the Critical Gap of Untrained Farm Workforce for Sustainable Agricultural Advancement in Pakistan

**Imperative for  
Systemic  
Training of Farm  
Production  
Managers and  
Machinery  
Operators**



# Executive Summary

## 1. Executive Summary



The future productivity, sustainability, and profitability of Pakistani agriculture are being significantly undermined by a pervasive skills deficit at the operational level. This note highlights the urgent, systemic need to train two critical cadres of farm personnel: Production Managers and Machinery Operators. Their current lack of formal, science-based training leads to substantial economic losses (e.g., 10-20% grain loss during harvesting), inefficient resource use, environmental degradation, and hinders the adoption of modern technologies. Success in agriculture hinges not just on decisions made in offices, but on their precise and knowledgeable execution in the field.

# The Core Challenge: Two Critical Untrained Cadres

## 2. The Core Challenge: Two Critical Untrained Cadres

As evidenced in the attached conversation and detailed training outlines, the agricultural system rests on two operational pillars. The failure to professionally train these pillars is the primary bottleneck to progress.

### A. The Farm Production Manager: The "Brain" of the operation.

- **Current State:** Often relies on outdated, manual practices and ad-hoc advice, frequently influenced by input suppliers rather than farm-specific needs.
- **Required Competency (as per Farm Manager Training Outline):** Must be a holistic decision-maker. This includes understanding PQNK (Paedar Qudratti Nizam Kashatqari) and other production systems, economic thresholds, integrated pest/nutrient management, financial controls, human resource management, and sophisticated land use planning (crop rotation, intercropping, greenhouse management). They are responsible for the entire cycle from soil testing to market selling.

# The Machinery Operator: The "Hands" of the operation

## **B. The Machinery Operator: The "Hands" of the operation.**

- **Current State:** Often merely a driver, lacking technical knowledge of machine functions, fine adjustments, and maintenance. This results in poor field execution, high machinery wear-and-tear, and massive post-harvest losses, as vividly described in the case of combine harvester operation.
- **Required Competency (as per Machinery Operator Training Outline):** Must be a precision technician. Skills range from topography survey and land development to the precise operation and calibration of complex machinery for planting, spraying, and harvesting to minimize losses.

# The PQNK Lens: Integrating Sustainability into Operational Training

## 3. The PQNK Lens: Integrating Sustainability into Operational Training

The Pristine Organic Farming System (PQNK) is not merely a set of practices but a philosophy of regenerative and sustainable agriculture. Training for both managers and operators must be filtered through this lens, emphasizing:

- **Soil as a Living System:** Operations (especially deep plowing, leveling, seedbed prep) must prioritize soil health, structure, and microbiological life.
- **Precision and Minimization:** The goal is to achieve desired outcomes (level fields, established crops, harvested grain) with minimum input waste, minimum soil disturbance, and minimum harvest loss. This requires skilled operators.
- **Systemic Harmony:** Practices like companion cropping, roller crimping, and mulch-based weed management (outlined in both training slides) require deep understanding for effective implementation, moving beyond chemical-dependent monocultures.

# Two Sectors of Farm Operational Work: A Clarification

## 4. Two Sectors of Farm Operational Work: A Clarification

Training must distinctly address two foundational work sectors, both critical for PQNK-aligned outcomes:

1. **Farm Development Work:** This is the infrastructure creation phase. It involves:
  - **Topography Survey & Strategic Design:** Planning based on land contours.
  - **Scientific Land Leveling:** The objective is to create optimally long fields for efficient machinery operation by shifting the minimum amount of soil. This reduces fuel use, preserves topsoil structure, and prevents erosion—a core PQNK principle.
2. **Crop Production Work:** This is the execution and harvesting phase. It demands precision at both ends of the cycle:
  - **Precision Planting & Establishment:** Using calibrated machines (seed drills, planters) for accurate seed placement, optimizing plant population and resource use.
  - **Efficient Harvesting with Minimum Losses:** As highlighted, this is where untrained operators cause catastrophic waste. Proper training in machine calibration (drum speed, sieve setting, fan speed) relative to crop condition is non-negotiable for economic and food security.

# Consequences of Inaction

## 5. Consequences of Inaction

- **Continued High Post-Harvest Losses:** Direct financial loss to farmers and national food security.
- **Failed Technology Adoption:** Repeat of past failures (e.g., cotton harvesting mechanization) due to untrained personnel unable to adapt farm processes or operate new machinery. And now the use of SIPP (Slit Insertion Precision Planter) is an ongoing challenge.
- **Resource Degradation:** Inefficient use of water, fuel, and agrochemicals, leading to higher costs and pollution.
- **Stagnated Competitiveness:** Inability to adopt high-value, sustainable practices (like those in the training outlines) locks farmers into low-margin, commodity-based production.

# Recommendations for Action

## 6. Recommendations for Action

1. **Policy Recognition:** Formalize the roles of "Certified Farm Production Manager" and "Certified Agricultural Machinery Operator" within national agricultural policy and vocational frameworks.
2. **Curriculum Standardization:** Adopt and expand upon the comprehensive subjects outlined in the attached training slides, ensuring they are taught through the PQNK and sustainability lens.
3. **Public-Private Training Initiatives:** Establish dedicated, practical training centers. Mobilize resources from government extensions, agricultural banks, machinery importers/dealers, and private sector agri-services companies.
4. **Linkage to Support Systems:** Tie access to credit, subsidies, or certification schemes (e.g., for organic export) to the employment of trained personnel.
5. **Continuous Learning:** Establish mechanisms for continuous skill upgrades as new technologies and practices emerge.

# Conclusion

## 7. Conclusion

The analogy from the attached conversation is precise: an army cannot win with untrained soldiers, no matter how brilliant the generals. Similarly, Pakistani agriculture cannot achieve its potential for sustainability, resilience, and high productivity without a professionally trained corps of Farm Production Managers (the strategists) and Machinery Operators (the frontline technicians). Investing in their systematic, science-based training is the most critical step towards realizing a prosperous and regenerative (PQNK) agricultural future.

### Attachments:

1. Training Curriculum Outline for Farm Production Managers.
2. Training Curriculum Outline for Farm Machinery Operators.
3. Summary of Expert Conversation on Mechanization and Training Gaps.

## Crop Production Manager Training - PQNK

| Subjects                             | Chapters                            |                                    |                                   |
|--------------------------------------|-------------------------------------|------------------------------------|-----------------------------------|
| Crop production processes            | Traditional                         | Organic                            | Natural - PQNK (Soil-water-plant) |
| Economic thresholds                  | Yields                              | Input                              | Market conditions                 |
| Selection of Crop Rotation           | Cash crops                          | Companion crops                    | Cover crops                       |
| Fruit Forests with Crop Combinations | Designing/spacing/cropping          | Maintenance                        | Harvesting                        |
| Farm machinery                       | Functions                           | Maintenance/storage                | Operation                         |
| Land development                     | Topography/mapping                  | Leveling - Bulk/Laser/deep plowing | Irrigation design/application     |
| PA/PQNK Adaptation                   | Hardpan breaking/raised-bed making  | Amendments/Water wash              | Cover-crops/Mulching              |
| Seedbed prepration                   | Requirement                         | Methods                            | Impliments                        |
| Nursery growing                      | Reasons                             | Types                              | Methods of transplanting          |
| Planting systems and machines        | Broadcast                           | Random seeding                     | Precision/No-Till                 |
| Nutrition management                 | Base dressing - Basal               | Fertigation                        | Foliar applications               |
| Weeding                              | Mechanical                          | Chemical                           | Mulch                             |
| Pest & Disease Management            | Biological                          | Tank filling/mixing/setting        | Operation                         |
| Harvesting                           | Manual                              | Reper                              | Combine                           |
| Transportation - Trailer use         | Prepration                          | Loading/unloading                  | Breaking                          |
| Roller crimping & slitting           | Setting                             | Operation                          | Precision                         |
| Companion cropping/Inter-cropping    | Benefits                            | Seeding                            | Management                        |
| Hay & Silage Making                  | Planting                            | Harvesting                         | Baling/Silage making              |
| Selling - Bulk - Retail              | Cleaning & Grading                  | Drying                             | Packaging                         |
| Human Resource                       | Slection                            | Training                           | Retaining                         |
| Inputs purchase                      | Machinery/Seeds/plants              | Fertilizers/Micro Nutrients        | Agrochemicals/Fuel/Parts          |
| Financial Controls                   | Money management                    | Inventories                        | Record keeping/Data management    |
| Green House & Tunnel Farming         | Setting-up                          | Layout designs                     | Operation                         |
| High Density Orchids                 | Plants/soil/ground cover/Irrigation | Pruning/plant health               | Fruit picking, grading, packing   |

## Tractor-Machinery Operator Training - Facebook/Pedaver

| Subjects                          | Chapters            |                     |                       |
|-----------------------------------|---------------------|---------------------|-----------------------|
| Crop production processes         | Traditional         | Organic             | Natural - PQNK        |
| Tractor                           | Functions           | Maintenance         | Operation             |
| Topography survey                 | Benchmark           | Taking readings     | Mapping soil shifting |
| Land Leveling                     | Bulk soil shifting  | Fine laser leveling | Level testing         |
| Deep plowing                      | Hardpan             | Impliments          | Method of ploughing   |
| Seedbed                           | Requirement         | Methods             | Impliments            |
| Planting systems and machines     | Broadcast           | Random seeding      | Precision/No-Till     |
| Weeds management                  | Mechanical          | Chemical            | Mulch                 |
| Spraying                          | Tank filling/mixing | Machine setting     | Operation             |
| Harvesting                        | Manual              | Reper/Threshing     | Combine               |
| Transportation - Trailer use      | Preparation         | Loading/unloading   | Breaking              |
| Roller crimping & slitting        | Setting             | Operation           | Precision             |
| Companion cropping/Inter-cropping | Benefits            | Seeding             | Management            |
| Hay & Silage Making               | Planting            | Harvesting          | Baling/Silage making  |
| Parking/storage of machines       | Preparation         | Storing/Parking     | Preparing for reuse   |

# Summary of Expert Conversation on Mechanization and Training Gaps

## Summary of Expert Conversation on Mechanization and Training Gaps

Thank you for your message. Harvesting technology is still evolving. At present, on large acreages, cereal crops and oilseeds are harvested using combine harvesters. However, challenges remain. Internationally, cotton harvesting has been mechanized, but in Pakistan this has not yet been successfully adopted. An initiative was taken in 1988, but it failed because changes were required in the cotton production process itself. Row-to-row spacing needed to be increased, plant height had to be controlled (it should not exceed about four feet), and single picking had to be adopted. At that time, farmers were not ready to accept these changes. The time is now approaching when such harvesting technologies will have to be introduced.

Regarding fruits and orchards, harvesting is mechanized only in a few cases—for example, grapes and some other very dense crops. Otherwise, most fruits are still hand-picked. Some fruits are harvested by shaking the trees so that the fruit falls and is then collected.

Sugarcane harvesting, on the other hand, has been quite successful. It was introduced in 1987, and today many sugarcane harvesters are operating successfully, particularly in areas like Rahim Yar Khan.

As for vegetables, except for carrots and crops that mature all at once and are grown directly from seed—such as peas, radish, and potatoes—mechanized harvesting is limited. These crops are being harvested mechanically to some extent. However, vegetables that are harvested gradually, such as muskmelon, watermelon, all types of gourds, and many other vegetables, are still entirely hand-picked.

## Summary of Expert Conversation on Mechanization and Training Gaps

In Pakistan, combine harvesters were introduced around 1983 through institutions such as the Zarai Taraqati Bank. At the initial stage, a significant number of operators were trained, but this training was not continued. Over time, skills were passed informally from one person to another. Today, many of those operating harvesters are essentially drivers, not trained operators. As a result, there are substantial grain losses.

Combine harvesters require very fine and precise adjustments. First, the crop moisture content must be at the correct level. Then the forward speed of the harvester, reel speed, drum speed (RPM), sieve settings to separate broken grain, weed seeds, and impurities, as well as fan speeds, all must be properly managed. Currently, grain losses of approximately 10–20% are occurring because operators are not properly trained. The biggest problem we face is that unless we train two key categories of people, we cannot successfully move agriculture forward.

First, we need trained production managers who can manage production at the farm level. Such professionals are largely unavailable. The current system is mostly manual, outdated, and orthodox. Many are incentivized by input supply companies to apply fertilizers and other inputs forcefully, often without proper reasoning or actual need.

Second, we need well-trained tractor and farm machinery operators. The role of a tractor operator in agriculture is similar to that of a gunman in an army—he is the one who actually implements decisions in the field. If a gunman does not know how to handle or fire a weapon, what results can be expected? Similarly, if a tractor or machinery operator is not properly trained, the outcomes will be poor.

Proper training in these two areas is essential. I have been highlighting this issue to the government and at various forums for a long time, but unfortunately, no one seems willing to engage seriously with it.

*Footnote: PQNK (pronounced 'picnic')—the regenerative & sustainable Pristine Organic Farming System—is grounded in Natural Ecosystem Science. This science employs perennial biodiversity, protects soil with organic mulch, and avoids practices like water inundation, tillage disturbance, and leaving soil bare.*

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