COST OPTIMIZATION IN FARM OPERATIONS

Abstract

The farm sector is considered to be a cornerstone of the economy in several countries. It not only contributes to a country's gross domestic product (GDP) but also generates employment. The farm sector helps a country attain food security while giving it opportunities to improve trade balance through higher exports. Higher exports also help bring foreign exchange into the country. Output from the farm sector becomes input for other sectors and helps in the smooth running of those sectors. When done in a sustainable manner, farming can help in reducing emissions and conserve resources. A key aspect that can help a country's farm sector to prosper and function smoothly is optimization of costs. In this backdrop, the current article attempts to explain why cost optimization matters in the farm sector and how it can be accomplished.

CMA Nilay A. Savla
Founder & CEO
Neat Ledgers Inc.
Ontario
nilay.savla@gmail.com

COST OPTIMIZATION AND ITS RELEVANCE IN FARMING

Cost optimization is not just cost cutting. It goes beyond the traditionally understood meaning of cost cutting. In cost optimization, the aim is to reduce avoidable or unnecessary expenses while enhancing efficiency or at least maintaining the existing levels of efficiency. Efficiency differs from effectiveness. Effectiveness focuses on a result (i.e., whether a particular level of effort or resources can give the intended outcome or not) whereas efficiency focuses on accomplishing the same result or outcome (or even better) through lesser effort or lesser resources.

In farming, cost optimization is relevant because it helps in several ways as listed below.

1. **Protection of profit margins**: Market prices often fluctuate and so do input costs, thereby causing profit margins to be lower than expected. Cost optimization helps with not just keeping costs in control but also ensuring that there is no negative impact on efficiency.
2. **Efficiency in operations**: There is a clear linkage between streamlined operations, reduced wastage, better utilization of resources and greater productivity. This is made possible due to cost optimization efforts.
3. **Mitigation of financial risks**: Cost optimization helps to accomplish relatively predictable and stronger financial outcomes. This prepares the farm sector to deal with uncertainties such as weather events and market fluctuations in a much better manner.
4. **Encouraging sustainable practices**: In the pursuit of cost optimization efforts, farms adopt sustainable practices which helps them make much better use of available resources and reduce the negative impact of farming practices on the environment. This also helps accomplish social and environmental responsibilities.

ACCOMPLISHING COST OPTIMIZATION IN FARM OPERATIONS

There are several ways in which cost optimization can be accomplished in farm operations. These ways are listed below but are not specific to any one country. Depending on the unique circumstances prevailing in any specific country, these ways of accomplishing cost optimization may have varying degrees of importance.

1) Optimization of farm machinery and equipment

Some of the ways in which this can be accomplished are discussed below.

- ***Lease versus buy decisions***: Significant increase in repairs and maintenance costs, inability to complete field work, or lack of enough farm equipment can be reasons that trigger a lease versus buy decision. While the availability of tax deductions and the resultant reduction in income tax liability can be a good reason to buy farm machinery and equipment instead of leasing the same, it should be kept in mind that the choice between leasing and buying may not change much in terms of the overall deductions that can be claimed. It may just cause a difference in the timing of deductions and interest costs. This will depend on the prevailing tax laws. Besides tax considerations, it is important to take into consideration the all-in costs associated with leasing and buying. The costs of borrowing may appear the same in both leasing and buying if the rates for leasing and financing are the same but there will be differences in all-in costs due to application fees, registration fees, and other fees. Thus, taking well-informed lease versus buy decisions can help with avoiding unnecessary costs tied to farm machinery and equipment.
- ***Shared machinery and equipment***: Is there is a possibility of sharing machinery and equipment with nearby farms and nothing in the law prohibits it, farms can explore this as an option rather than leasing or buying the machinery and equipment. There is earning potential when one farm lets another farm use its machinery and equipment for a fee. For the farm that is using the machinery and equipment, this fee will translate into a much lower strain on cash resources when compared to a lease or a buy decision.
- ***Scheduled maintenance and servicing***: Farm machinery and equipment should be subjected to regular maintenance and servicing so that the lifespan of these assets can be extended, sudden expensive repairs can be avoided and performance can be kept at optimum levels.

2) Optimization of workforce

Some of the ways of optimizing workforce in farming are discussed below.

- ***Technology adoption***: A lot of manual labour is required in various activities such as seeding, weeding, harvesting, mapping etc. More human effort can lead to more human errors and wastage that could have been avoided in the first place. Robotic systems, while requiring initial investment, can help reduce costs in several ways by reducing dependency on human labour and enhancing precision. For instance, mechanical weeders can be used on an organic farm to plough under weeds or to remove weeds. Robotic harvesters can handle delicate crops with least damage. Seeding and mapping can be performed much efficiently using drones. Thus, the adoption of technology can help free up labour so that they can focus more on data analysis or other such activities in relation to their farms. Technology adoption, however, is not easy because there may be difficulties related to integration of different technologies with the existing farm workflows. There could also be issues of interoperability between different technologies. In some countries, there may be rising concerns of job losses due to the adoption of technology.
- ***Upskilling and training***: While technology adoption can take away certain activities from human labour, it cannot entirely replace manual labourers. Human labour can be trained so that they can help with successful integration of technologies on the farm, acquire different skills and get opportunities to advance their careers within the farm sector. Upskilling of workforce can lead to better decisions, better maintenance of technology and tools, and timely interventions by the workforce. This in turn can help with lower waste, reduced costs, better farm produce and greater efficiencies.
- ***Careful labour planning***: Seasonal and operational considerations should guide labour planning. By focusing on seasonal and operational requirements, farms can avoid overstaffing. This can help reduce costs while ensuring that there is no negative impact on farm productivity.

3) Optimization of inputs

Some of the ways to accomplish this are discussed below.

- ***Precision farming***: Precision farming posits that an entire field cannot be treated as homogenous because there will be differences moisture levels, nutrient needs and soil within the field. It is, therefore, important to identify these different field zones and adjust farm practices to avoid unnecessary costs and attain better productivity. For example, remote sensing and

GPS-guided equipment can be used to determine different field zones and apply only the required or appropriate quantity of fertilizers, pesticides and other inputs. This variable rate application helps to reduce unnecessary costs that would result from overapplication of inputs while ensuring that farm productivity does not suffer. There are various apps available that use machine learning to monitor infestations by pests and guide farm workers in effective pest management. Some apps come integrated with satellite technology and help farm workers to remotely monitor crop health, thereby reducing the time and costs incurred in making physical visits to the fields.

> Farms can optimize overall costs through optimizing costs of labour, inputs, farm machinery and equipment, and supply chain and logistics

- ***Crop choices***: Crops should be selected based on parameters such as being disease-resistant, optimum input-to-output ratios, suitability for local conditions, among others. This can help with avoiding the purchase of inputs that have no relevance to certain crop varieties which will not be chosen by the farmer.

4) Optimization of supply chain and logistics

Supply chain and logistics optimization can be accomplished in the following manner.

- ***Transportation considerations***: Farmers can use route optimization software to determine optimal paths based on fuel station availability, traffic conditions, road conditions, etc. Load efficiency can be improved by consolidating shipments. Robust relationships with logistics partners that provide backhaul opportunities can help in optimizing transportation costs.
- ***Storage solutions***: Until their harvest gets sold, farmers need to have reliable storage solutions. While metal bins may rust, wood bins may rot, plastic bins will neither rust nor rot. Besides, plastic bins can be tough and durable enough to withstand extreme weather while storing both dry and moist products. Warehouses are also suitable options for storage as they are equipped to keep the produce fresh for longer periods through temperature control. Cooperative storage facilities involve several farmers collaborating to use large storage units. This can help reduce the cost of storage for each individual farmer while increasing operational efficiency. Technology can also be leveraged to reduce electricity costs and manage inventories better. Solar-powered cooling systems maintain optimal temperatures and are less expensive than cooling systems that depend on electricity. Several apps specialize in inventory management and provide real-time data related to storage conditions and inventory levels while analyzing market trends to suggest optimal selling windows.
- ***Relationships with suppliers***: Robust relationships with suppliers help in negotiating favourable terms and lower prices. It becomes easier to ensure bulk supplies or enter into longer-term agreements when relationships with suppliers are strong. This in turn helps with optimizing costs and inputs for the farm.

CONCLUSION

Optimization of labour, inputs, farm machinery and equipment, and supply chain and logistics can help in reducing wasteful expenditures and enhancing efficiencies in farm operations. However, there are challenges that accompany the optimization journey in the short-term, such as initial cash outlays, technology integration issues, workforce changes, etc. If these challenges are overcome and the optimization journey is pursued, the benefits to farmers will manifest in several ways along the journey. MA

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