

Setting Up a Greenhouse: A Case of Investment Decision

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Abstract

Ram Singh Jat received an approval from authorities to erect a greenhouse (shade net) on his farmland in November 2015. The approval made him eligible for a subsidy meant for erecting a greenhouse of 2,016 square meters. He had been trying since 2013 to avail of the subsidy for setting up a greenhouse (shade net). He had visited various greenhouses at different places in and out of Rajasthan and also attended a training program on techniques for farming in greenhouses. All these assured him that greenhouse technology helped in protected cultivation which results in higher productivity and hence better profits. Now that the time had come to install the greenhouse, he began thinking about financially evaluating the project.

Keywords: Investment decision, capital budgeting, protected cultivation, green house installation, India.

Introduction

Ram Singh Jat was always concerned about the crop damage caused by extreme summers and winters prevalent in his area. Rajasthan's climatic conditions of extreme weather made him anxious since he started farming. In August 2011, he saw his friend Vimal (an insurance officer) using a laptop for searching information from internet. This gave him an idea to search ways for protecting crops from extreme weather conditions. He was acquainted with computers as his children were learning the same in school. So he bought a computer in September 2011. In November 2011, while searching on the net, he came to know about "Green House Technology for Protected Cultivation".

Ram Singh Jat

Ram Singh Jat was born in 1970 in Chomu, District Jaipur, Rajasthan. His parents were farmers. He completed his schooling from the village and graduated in Maths from Rajasthan University. After completing his graduation in 1992, he joined Western India Company Ltd as an apprentice in Engineering department and worked till 1994. In 1994, he shifted to his village and took up agriculture to support his old father as his elder brothers had separated and his younger brother was still studying.

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Initial Years in Farming

Major crops of the region were wheat, barley, chickpea (chana) and mustard in rabi season (October to March) and groundnut, pearl millet (bajara) and gaur in kharif season (April to September). Jat grew either of these depending on the weather and price forecast. He had 4 hectares of land (1 hectare = 10,000 square meters) but productivity was very low resulting in low income. There are numerous reasons for low productivity in this region which include water scarcity, extreme weather conditions, electricity shortage, etc. This prompted him to motivate his younger brother S.S. Jat to study Agriculture Science.

In October 1998, Ram Singh Jat adopted sprinklers for irrigation. He was the first person to adopt this technology in his village. Sprinklers required less water for irrigation and also saved men hours resulting in cost savings. This resulted in increased productivity and income. This further motivated him to adopt newer technologies in agriculture. In February 2005, he adopted drip irrigation system. This was recommended by his younger brother S.S. Jat who was working as an Agriculture Scientist in Jaipur. He had sent a representative of Kisan Irrigation Ltd (a Mumbai based company with an office in Jaipur) to him. The adoption of drip irrigation helped him to further reduce water usage and wastage of fertilizers, which occurred due to run off or leaching. This technology also saved labor costs as fertilizers were given through drip and not spread manually. This further increased farm productivity and his income.

Installation of Greenhouse

Since the idea of greenhouse came to Ram Singh Jat in 2011, he started exploring the possibilities of installing greenhouse on his farmland. In early 2012, he came to know that greenhouses were recently set up in Rajasthan with subsidy from government. Since these were very new, reliable information could not be gathered about feasibility and productivity of greenhouses. In the meantime, he came to know that there are a lot of greenhouses functioning in Talegaon, 39 kilometers from Pune in Maharashtra. He visited these greenhouses which varied in size and type (polyhouse, shade net, etc). Major crops grown were cucumber, color capsicum, rose, etc. He spent entire 1 day with farmers (operating greenhouses) gathering information about the technology and impact on productivity. Having realized the benefits of using a greenhouse, Jat underwent a training program of 3 days conducted at Jaipur Centre of International Horticulture Institute of Training in June 2012. In November 2012, he also visited Centre of Excellence for pomegranate (anar) at Rajhans farm, Dhindhol, Bassi, Jaipur, which had already a number of installed and functioning greenhouses. With all these visits, he was confident of increased productivity under greenhouse cultivation and opted for a shade net with the intent of growing horticulture crops like cucumber and tomato in a greenhouse.

In May 2013, he applied to the Horticulture Department of Rajasthan Agriculture Research Centre, Durgapura, Jaipur for the grant of a subsidy to install shade net but his application was not selected. He applied again in May 2014 but was unlucky. In May 2015, he made multiple applications and this time two applications were sanctioned for the grant of a subsidy to set up a greenhouse by March 2016. The current scheme provided a subsidy of 50% on the cost of construction. The total cost of a 2,016 square-meter greenhouse was Rs 1.42 million (Table 1) out of which Rs 0.71 million was to be borne by Ram Singh Jat. In 2016, the average conversion rate of US\$ 1 was around Rs 67. This was the biggest investment made by him till date relating to his farm. Although he was confident of returns but still wanted to be sure of his decision and wanted to evaluate the likely gains he can expect from this investment over a life span of 10 years. He also had to worry about the possibility of productivity, cost, and prices moving in the adverse direction. His second concern was that the government approved a limited number of applications to every farmer for grant of subsidy while the land available with a farmer may be large. He himself was interested in four greenhouses whereas the approval was

only for two. The government over the period has been reducing the subsidy earmarked for greenhouses. The question that plagued him was if a greenhouse was profitable without subsidy in case he wanted to bear the entire cost?

Table 1: Capital expenditure for construction of greenhouse

No.	Type of Equipment	Amount (Rs)
1	Cost of erection of shade net house using galvanized iron pipe (shade net, insect net, etc.) for 2,016 squaremeters.	999,600
2	Drip andoverhead sprinkler irrigation system for 2,000 square meters in shade net house	287,600
3	Cost of electric motor pump set for fogger	35,000
4	Cost of farm equipments, civil works, etc.	97,800
	Total	1,420,000

To answer these questions, he estimated the cost(Tables2 & 3) and the expected prices for cucumber, which he planned to grow. In case of greenhouse cultivation, the expected yield of cucumber in an area of 2,000 square meters per season was expected to be 22.5 tons for Terminator F1 variety. Cucumber is a short duration crop and takes 3to 4months. It is consumed throughout the year as vegetable or salad and is also used in skin care products by companies and beauty parlors. In case of protected cultivation, he could take three crops in a year. Although the prices of cucumber fluctuate during the year with prices being high in the off-season and low otherwise, the average price for this variety in the nearest Agriculture Produce Market Committee (APMC*) market last year was around Rs.25/- per kilogram.

Table 2: Annual administrative cost

No	Particulars	Amount (Rs)
1	Supervisor (part-time)	240,000
2	Telephone	60,000
3	Travelling	100,000
4	Overheads	75,000
	Total	475,000

Table3: Cost data of cucumber cultivation in greenhouse for one season

No	Type of Equipment	Amount (Rs)
Pre-Planting Cost		
1	Ploughing, harrowing, bed preparations	2,300.00
2	Sterilization/solarisation**	15,000.00
3	Planting material/seedlings(seed, coco pit, andnursery materials)(6,000 plants)	31,000.00
4	Manures (Farm Yard Manure - rice husk,neemcake, vermi-compost,etc.), fertilizers, insecticides andpesticides	20,500.00
5	Laborcharges for planting seeds andtransplanting	4,250.00
	Total A	73,050.00
Production Cost		
1	Transplanting of plants (500 plants/labor)	3,600.00
2	Maintenance cost	6,300.00
3	Cost of plant production,pesticide, etc.	9,100.00
3	Electricity cost	3,500.00
4	Farmyard manure, fertilizer/fertigationcost	13,000.00
5	Laborcharges for the following:	
	(a) intercultural operations, earthling up, a spray of pesticide, etc.	6,100.00
	(b)pruning, training, etcof plantsfor better production	4,000.00
	TOTALB	45,600.00

Post Harvesting Cost		
1	Packing materials	6,000.00
2	Sorting, grading, packing	5,500.00
3	Transportation charges	23,500.00
4	Miscellaneous expenses	7,000.00
	TOTAL C	42,000.00
	TOTAL OF A + B+ C	160,650.00

***Incurred once in a year.*

As there are no taxes on agricultural income in India, there was no advantage of capital expenditure in terms of claiming depreciation and saving taxes. He estimated that the material used in the shade net at the end of project life will be able to fetch Rs. 0.2 million. While the current fixed deposit rates were around 7% to 8%. Ram Singh Jat felt that a return of 15% per annum should be adequate for such investment in a greenhouse. His income from a 2,000squaremeters area by growing tomato, chili, etc. for the last 2to 3years had averaged about Rs0.04 million per year.

Solve the following questions:

1. Do a SWOT analysis of Ram SinghJat's decision to install greenhouse.
2. Calculate project profitability (with subsidy) over its life using financial techniques.
3. Prepare profit and loss account for the first year of operations.
4. Do a sensitivity analysis by:(a) reducing the price by 15%;(b) increasing the cost by 10%;(c) Reducing productivity by 10%; and (d) reducing productivity by 10%,i. e. reducing the price by 15% and increasing the cost by 10%.
5. Is the project profitable without subsidy?
6. What recommendation would you give to Jat with respect to setting up a greenhouse?

*APMC is a marketing board created by many state governments in India. Farmers bring cultivation to marketplaces created for a purpose which is sold through auction. This is to ensure that farmers get a fair price for their produce.

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