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FACTORS AFFECTING FLORICULTURE FARMERS' PRODUCTIVITY: A CASE STUDY OF PUNE

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Abstract

The floriculture industry in India is identified as a 'sunrise industry' and has been accorded 100% export oriented status by the Indian government. Floriculture has the potential to increase farm incomes and the production of cut flowers in this format was fuelled by the liberalization of trade policies and ease of doing business. The literature on the economic aspects of the Indian floriculture farmers, however, is scant. Based on the structured interviews of 35 purposively selected floriculture enterprises (farmers) from Talegaon's Floriculture Park in 2018, the paper identifies the factors affecting farm productivity and highlights the employment and marketing channels followed by floriculture farms. This study finds that the benefit-cost ratio is 1.74, which shows that the return on investment is high. On the other hand, farm productivity is 1.13 lakh rose stem per acre, which has a scope to improve. The regression results indicate diminishing marginal returns, when one increases the acreage under rose. Export orientation fetches higher returns compared to domestic markets. This paper expands the discourse on floriculture enterprises' productivity and returns

Key words: Floriculture, Export, Agribusiness, Flowers, Productivity

Introduction

Cut flowers are an important ornamental crop with rose, carnation, tulip and chrysanthemum being the most marketed cut flowers (Msogoya & Maerere, 2007). The cut-flower industry is characterized by dynamic supply chains shaped by volatile shifts in trends and tastes along with intense competition amongst countries, both developed and developing, that are bent on increasing their share of the market. Hughes (2000) notes that the principal markets for the production and consumption of flowers have historically been concentrated in the West with The Netherlands being at the forefront of cut flower production. This stems from the cultural significance that flowers have in the local customs and traditions of Western countries.

Hughes (2000) notes that the 1960s saw a perceptible shift in market structure due to the entry of many developing nations situated in Africa, Latin America and South Asia which took up the export of flowers and started showing significant impact on global supply during the 1980s, thereby kick-starting a trend of globalization in the floriculture industry. This shift was motivated by the ability of such countries to undertake flower production at much lower costs due to low wages paid to labour (Msogoya & Maerere, 2007). These countries also had the benefit of a varied climate that permits year-round cultivation unlike the cold environs of Northern European countries which necessitate significant 'environmental modification costs'. Furthermore, the industry was recognized as a significant source of foreign exchange and the governments of such countries promoted flowers as lucrative export crops, the proceeds of which could be used to pare down international debt (Hughes, 2000).

India is still a small player on the global stage. In 2017, India's cut flower exports in US$ value terms accounted for 0.27% of total global floriculture trade (Observatory of Economic Complexity, n.d.). In the Indian context, floriculture elicited government attention only towards the late 80's and early 90's. This was in line with a consensus amongst the then policymakers to push for horticulture (of which floriculture is a constituent) as a viable avenue for crop diversification, to promote efficient use of land resources and to generate employment for the rural masses (Tuteja, 2011). In fact, diversification towards high value crops (such as flowers) was designated as a focus area under the 8th Five Year Plan (1992-1997) and later on in the 10th Five Year Plan

(2002-2007) (Sen & Raju, 2006). Further, in light of its export potential, the flower business has been designated as a 'sunrise industry' and has been accorded 100% 'export oriented status' by the Government of India.

Currently, after over three decades (since late 1980's) of commercial floriculture, India has 2.55 lakh hectares of land under flower cultivation with the state of Maharashtra accounting for 23,000 hectares (Jadhav, 2016). In addition, while there has been a fair amount of support extended by National and State governments, Thippaiah (2005) notes that the industry has still not achieved its full potential and is yet to make a significant breakthrough in the international markets with investment in the sector lagging behind its Western counterparts.

Literature on the economic aspects of the floriculture industry India is scant. Singh and Singh (2001) whilst studying the economic viability of the Damask rose plantation in Palampur (Himachal Pradesh) found the enterprise to be capital intensive but profitable. Majumdar and Lahiri (2012) found profitability to be higher in hibiscus compared to rose and jasmine in West Bengal. In the literature, most approach the industry as a simple agrarian activity and focus on cultivation practices and other mechanics of production. Further, floriculture is often analyzed as one sub-sector amongst many others that come under the umbrella of 'horticulture' (refer Thippaiah (2005) and Tuteja (2011)). Sen & Raju (2006) do comment on the economic aspect of floriculture to a certain extent; they note the high value nature of flowers and examine how it is a source of income diversification for farmers. However, this study also reflects the 'simple agrarian activity' perspective on floriculture. Studies which are focused on the Pune belt are very limited. Gondkar (2011) provides an excellent review of the historical evolution of the floriculture industry of Pune. Kadam (2012) provides an extensive overview of cost-benefit ratios, per hectare cost conditions, and returns on different flowers grown in Pune. On the other hand, Panchpande (2013) is different as it analyzes the competitive edge that is possessed by Pune's flower growing farms. The author uses the PESTLE analysis along with the Porter Diamond model and favourably concludes on the inherent strengths of Pune's flower growing farms in terms of climatic conditions, proximity to major markets and local government support. It further notes the acute lack of research that has been done on floriculture.

This is in stark contrast to the literature that exists on other countries. Many studies have been conducted on the policies (Whitaker & Kolavalli (2006), trade practices and export constraints (Gebreeyesus, 2015; Hughes, 2000) and labour conditions of the industry (Suzuki, Mano, & Abebe, 2018) in the context of Ethiopia and Kenya. Belwal & Chala (2008) provide excellent commentary on the recent rise of Ethiopia's flower industry with minimal secondary sources. Many such studies have also been conducted on the Dutch floriculture industry (Tavoletti & Te Velde, 2008). The lack of literature on India, along these paradigms, may be because India's floriculture sector is still small and upcoming - in contrast, the Netherlands is the world's largest flower producer (Badgujar, Bhagat, Bhosale & Supe, 2019) while Kenya and Ethiopia are amongst leading cut rose exporters to the European Union ("Exporting Roses to Europe", 2017).

Data on Pune's floriculture industry is very scant. Much of it is maintained at an aggregate level and is concerned with area under cultivation and production. Very little is known about the export orientation or the worker characteristics of Pune's flower growing farms. Since floriculture has been recognized as a 'sunrise industry' by the Government of India and has contributed massively to the economies of developing nations such as Kenya (and therefore, can do so for India too), the authors believe that more research and data is required on the potential and future prospects of India's floriculture industry.

In this vein, this paper conducts a case study of the Pune floriculture industry and provides a formal analysis of the factors that affect the productivity of the small and medium agribusiness enterprises (SMEs) that comprise this industry. To this end, primary data was collected on the characteristics of the owners, workers, and that of the farms themselves. More specifically, the paper examines the (a) functioning of floriculture farms (employment and marketing aspects); (b) determinants of productivity and profitability of rose cultivation in Pune.

The rest of the paper is organized as follows: Section 2 discusses 'Data and Methods', describes the sampling design and data collection methods that were used, Section 3 describes the econometric model used; Section 4 discusses Pune Floriculture industry; Section 5 discusses major findings and Section 6 concludes and provides direction for future research.

Data and Methods

To understand the profile of farms in Pune's floriculture cluster and to overcome the lack of statistical information on the same, a quantitative research strategy was deemed appropriate. Further, a cross-sectional study design was adopted using a survey - based approach. This was because there was no intention of evaluating the performance of such farms over a period and a paucity of time would have precluded the adoption and effective administration of a longitudinal study design.

Quantitative data was secured through interviews conducted with the owners (or managers, supervisors or production planners if the owner was absent) of 35 floriculture farms near Pune, while qualitative data was obtained from two semi-structured interviews that were conducted prior to commencing the interviews to collect necessary background information. This choice of approach is what distinguishes the present study from Belwal & Chala (2008). Belwal and Chala (2008) adopt a qualitative research strategy collected through eight semi-structured interviews. Although, the present study has a somewhat similar objective, given the statistical bent of the same, a quantitative research strategy and a larger sample size (>30) has been considered here. This is close to the sample size of Panchpande (2013) which surveyed 37 floriculture farms.

The interview schedule comprised of seven sections - demographic information about the respondent, background information about the farm, resources, labour practices, trade practices, cost and pricing conditions, revenues and training skills. All the farmers were majorly growing rose, the life period of which is 7 years. The cost and profitability of rose cultivation on a per acre basis for the year 2017-18 was calculated. The costs include pesticides/ insecticides (per acre/ annual), electricity, irrigation, maintenance of polyhouse, labour, and rent. The respondents' answers were enumerated by the authors and questions were posed in the local language to all.

In addition to data on cost of rose cultivation, data on export orientation, resources possessed by the farms and the demographic characteristics of the individuals who owned or managed the enterprises is analysed using Microsoft Excel. The training and skill profile of the workers who worked at these farms has also been reported. Out of the 35 farms surveyed, 30 were located at the Maharashtra Industrial Development Corporation (MIDC) Floriculture Park at Talegaon Dabhade, Maval Taluka, Pune District. MIDC Floriculture Park effectively functions as a cluster of small agro-enterprises. The five remaining farms (non-MIDC) were located at Yelse (2), Shindewadi (1), Alandi (1) and Karde (1) in the Maval Taluka, Pune District. Due to lack of sampling frame, the authors have adopted snowball sampling as sample selection method for this study. The dominance of MIDC farms was shaped by time constraints. Within MIDC, multiple farms are situated close to each other, which allowed the authors to quickly reach a suitable sample size. This does mean that the findings of the study would be largely applicable to MIDC farms. However, every attempt was made to not let convenience-based biases to creep in while approaching these farms. Authors went to each farm that they noticed and did their best to not skip any farm

The profile of the respondents (in terms of occupation) is displayed in Table 1. 62% of the respondents were farm managers. Although, the person of interest at the farms was the owner(s) of the enterprise, very often, the owner would not be on site at the time the authors would reach the premises. In such a situation, the manager, supervisor or production planner of the farm was approached. Despite, a preponderance of managers and supervisors over owners, the quality of responses obtained was not substantially different. Moreover, it was observed that the managers or supervisors have an important role to play in the daily functioning of the farm and are responsible for whether the farm makes a profit or a loss since they control what output gets sent where. These individuals can thus be considered as proxies for the enterprise owners. It may be noted, however, that the questions that were asked did not probe into very specific matters and asked about general business conditions.

This potentially accounts for why owners and those who were not owners answered similarly and why considering the latter as 'proxy owners' is a reasonable assumption.

Model Specification

To identify the factors determining net returns by floriculture farms, ordinary-least-squares (OLS) regression model of the following type was used:

$$AvRevAcrAinlakhs = Constant + B_1PercExp + B_2PercTSWorker + B_3farmsize + B_4D_1 + \varepsilon$$

AvRevAcrAinlakhs is the average annual revenue generated by unit acre of a polyhouse. PercExp is the percentage of total production exported. PercTSWorker refers to the percentage of skilled workers as a ratio of total workforce. The size of the farm where rose is grown in acres is captured in 'farmsize'. D1 is a dummy variable where '1' indicates that the entrepreneur has had previous work experience in floriculture and '0' indicates no previous work experience. Finally, ε is the error term.

The dependent variable "AvRevAcrAinlakhs", which is the revenue generated by an acre of a polyhouse in a year, serves as a proxy variable for the 'productivity' of the flower farms. One might expect the previous work experience of the entrepreneur to have a positive effect on the productivity of the farm. This is because floriculture requires an intrinsic understanding of the cultivation process and market demands to accordingly peak or temper the production to augment incomes as well as the knowledge to adopt appropriate practices required to maximize output. Since floriculture is considered as a sunrise industry by the government and has the potential to expand farmers' income, the share of output exported has been included as a variable of interest. Closely related to the above concern, it becomes imperative to understand whether the size of a farm affects the productivity of a farm. Generally, a large farm size would lead to larger output and revenue and therefore positively affect the export share as well. Over the course of primary surveys, it was made amply clear that the industry is encumbered with a lack of trained labour force and high worker attrition. In this context, to assess if the presence of skilled labour force holds any positive association with the farm productivity, the percentage of skilled workers relative to total workforce was included in the model.

The Flower Industry in Pune

Pune and Bangalore are the two major cluster of rose cultivation in India (Dande, 2010). Gondkar (2011) provides an exhaustive account of the genesis of the floriculture sector in Pune based on interviews conducted with government officials and individuals from various private organizations. Rose is mainly cultivated under 'protected cultivation' i.e. cultivation under polyhouse (also called as greenhouse). Rose cultivation with the help of greenhouse began in Pune in the year 1990-91 on a trial basis wherein ten farmers were allocated with one greenhouse each with the state government subsidizing all costs. The pilot venture, however, failed miserably because of low motivation from the farmers themselves (Gondkar, 2011). Things changed in 1993 when the State Cooperative Floriculture Development Society was established with the objective of encouraging protected flower cultivation and popularizing it among local entrepreneurs. These efforts paid off initially with the entry of certain multinational companies (1993-94) and subsequently by local entrepreneurs (1998-99). However, there was a serious lack of information and awareness amongst the farmer-entrepreneurs, who had to depend on private consultants for planning their business models (Gondkar, 2011). Gondkar (2011) avers that this knowledge gap was subsequently overcome with the promulgation of the Tech Floriculture and Vegetable Project at the College of Agriculture, Pune in 2000.

In 2001, the EXIM Policy of 1997-2001 designated Pune as an Agri-Export Zone (AEZ) for flowers with the policy's focus being on strengthening the local industry's linkages in a bid to magnify exports. This period was further marked by a diversification amongst the floral entrepreneurs' (both new and established) cultivation choices to include carnations, orchids and anthuriums along with the already popular rose and gerbera. This diversification was motivated by intensifying competition from countries such as Kenya and Thailand (Gondkar, 2011). The year 2002 proved to be a watershed point due to the establishment of the Floriculture Park by the

Maharashtra Industrial Development Corporation (MIDC) at Talegaon, a tiny hamlet close to Pune and with proximity to the Mumbai-Pune Expressway. The Park was established with the objective of increasing the area under production and the exports of flowers. For Talegaon, flowers have come to represent a Rs. 200 Crore business opportunity and have added substantially to the industrial landscape and real estate business of the tow (Kulkarni, 2012). The setting up (in the same year) of the Horticultural Training Centre by the Maharashtra State Agricultural Marketing Board [MSAMB] and the National Institute of Post-Harvest Technology [NIPHT] further complemented the MIDC Park with financial assistance from the Netherlands itself. The institute imparts training courses in various aspects of horticultural management to several aspiring entrepreneurs (Gondkar, 2011).

Pune, today, is an exciting epicenter for the Indian floricultural industry and is now home to an increasing number of tie-ups between indigenous agribusiness SMEs and premium Dutch companies. While the Dutch companies benefit from the cheap labour, fertilizer, power and other input costs, Pune's agro-entrepreneurial firms benefit from state-of-the-art planting material and greenhouse technologies. To put it into perspective, "India's annual yield of traditional rose varieties is estimated at about 800,000 flowers per hectare, but imported seeds and saplings cultivated under greenhouse conditions are guaranteed to yield almost five million roses per ha in the same time span" (Jain, 2015).

Results and Discussion

Sample Profile

The socio-economic profile of respondents is depicted in Table 1. The average age of respondents is 41 years, with a majority being middle aged (36-58 years). More than 60% of respondents are graduate and above, indicating that a majority of them are well educated. Half of the sampled floriculture enterprises were established before 2008 and thus have more than ten years of experience in floriculture farming. 90% of the respondents were within 5 km of the export processing centre. 55% of the respondents had started the floriculture farm with the help of loan from a commercial bank or cooperative bank. All the farm enterprises were growing rose with five also cultivating gerbera along with rose. Farmers were primarily into farmer enterprise and are not into other field crop cultivation. All were using polyhouses for rose cultivation. Average farm size of the respondents is 5.5 acres out of which 5.26 acres is under polyhouse. All respondents were growing rose using drip irrigation.

Most of sample farms had access to cold-chain solution and exported cut-flowers. 27 of the sample farms were associated with export managers. 10 out of the 35 respondents have contracts with their export agents. As per the contract terms, farms have to sell cut-flowers at fixed rates. On an average 50% of the produce is exported. On average, 30 workers are employed with each sample farm, with the maximum being 180 in one of the sample farms and the minimum being five. 66.59% of the workers in the sample farms are migrant labourers while 33.41% of the workers are non-migrant labourers. The workers comprise of males and females. Average monthly salary for males is Rs. 6097 and for females is Rs. 5397. The owner prefers family couples, where husband and wife are working. The couples get a salary of Rs. 11715. Out of 35 farm enterprises, 27 enterprises have employed farm managers/supervisors on their farm who were paid an average monthly wage salary of Rs. 19907.

Table 1: Socio-Economic Profile of Respondents

Variable	No. Of Respondents	Percentage (in %)

Age (average in years)	41.1	
- Young (upto 35 Years) - Middle Aged (36-58 Years) - Old (More than 59 Years)	11 20 4	31.4 57.1 11.5
Level of Schooling		
- No Schooling - Up to Class X - Up to Class XII - Diploma/Polytechnic - Graduate/Post Graduate General - Graduate/Post Graduate (Professional)	2 3 4 4 14 8	5.7 8.6 11.4 11.4 40.0 22.8
Primary Occupation		
- Manager - Supervisor - Owner - Production Planner/Manager - Deputy Manager	22 6 4 2 1	62.8 17.2 11.4 5.7 2.9
Source of initial capital		
Own funds	15	42.8
Loan from commercial bank	14	40.0
Loan from cooperative bank	5	14.3
Financial assistance from government	1	2.9
Flowers Grown		
Rose	30	85.7
Rose and Gerbera	5	14.3
Average Farm Size (acres)	5.54	
Average area under polyhouse (acres)	5.26	
Average workforce	30.0	
Access to cold-chain solution	30	85.7
Average % of total production exported	50.71	

Source: Primary Survey

Net returns of floriculture

Total Farm productivity is 1.13 lakh rose stems per acre which is lower compared to the findings of Bhingardive (2014) study (here, location of study was Sangli), where productivity of roses was 2.2 lakhs per acre. The operation wise costs for rose cultivation per acre is depicted in Table 2. Total production costs per acre was Rs. 1,98,998. Fertilizer and plant protection costs (Rs. 65,994 per acre) constitute one-third of the total costs. Fertilizers costs included organic and chemical fertilizers. Plant protection costs include micro-nutrients, pesticides and insecticides. This was followed by labour costs. Rental value of land includes the total land under rose cultivation. Ten out of 35 respondents had taken land on lease for rose cultivation. For those who had not taken land on lease, the cost was imputed based on the lease rates in that area. Irrigation charges include maintenance of drip sets and water charges.

Total gross revenue was Rs. 5,45,556 per acre and net revenue was Rs. 3,46,558. Total gross revenue has been calculated by taking the weighted average of the revenue earned by the firm in the domestic and international markets. Net revenue was calculated using the average price per stem of rose received by sample farmers in the domestic market, which was Rs. 3.6, while in the international market it was Rs. 10.7. Within the domestic markets, farmers sold their flower produce mainly to wholesale markets of cities viz. Pune, Mumbai, Nashik,

Nagpur, Delhi, Indore, Bhopal, Jammu, Varanasi, Jaipur, Lucknow, Patna, Bhubaneshwar, Hyderabad, Ahmedabad, Surat, Rajkot, Kolkata, Guwahati, and Delhi. The benefit-cost ratio is 1.74 which means that for one rupee of variable cost incurred, farmer earns Rs. 1.74.

Table 2: Costs and returns of rose cultivation for 2017-18

Particulars	Amount (Rs.)	% of total cost
Fertilizers & plant protection	65,994	33.2
Electricity	6,864	3.4
Irrigation	10,267	5.2
Maintenance of polyhouse	26,750	13.4
Labour	54,796	27.5
Rent land	34,327	17.2
Total Costs	1,98,998	
Production (numbers)	1,13,000	
Total Revenue	5,45,556	
Net revenue	3,46,558	
Benefit-cost ratio	1.74	

Source: Primary survey

Regression Results

Based on the model specified in Section 3, the regression model had an adjusted R^2 of 60.41%. This means that the model explains 60.41% variation in the revenue of the farm per unit acre annually based on the given parameters (Table 3). The percentage of total production exported, percentage of skilled workers as a ratio of total workforce and farm size variables were significant at 5% level. The dummy variable for previous work experience in floriculture was significant at 10% level. Percentage of total production exported had a positive association with gross revenue. If the farmers share of marketed surplus exports increases by 1%, on an average gross returns increase by Rs. 28,624. Thus, more exports, would be leading to increase in the revenues. Similarly, if the share of skilled worker increases by 1%, gross returns declined by Rs. 20,279. This may be because skilled labour have higher wage rate, but the marginal returns do not offset the higher wage. The possible reason for this phenomenon is that the floriculture industry is a labour-intensive industry. Irrespective of the time spent on training a labourer the concurrent effects on productivity are negligent, indicating that there are overhead costs associated with training labourers which do not have a positive multiplier on the productivity. Anecdotal evidence highlights that farms run by new-entrants, who do not have prior experience in the sector, emphasize on hiring an experienced labour force but have lower productivity in terms of per unit stems produced, indicating a deep-seated problem in the production aspects.

For every acre increase in the net size of the farm, there is an additional revenue generation of Rs. 1,41,577 per acre only. As depicted in Table 2, per acre costs are little less than Rs. 2 lakhs, thus bringing additional acre under cultivation, may not be profitable due to diminishing marginal returns. The previous work experience of the entrepreneur holds a significant value in influencing the revenue of a farm, but it is not as strong as the other factors. The revenue rises by Rs. 1,49,000 per acre if the owner had previous work experience in the floriculture sector. This indicates that the entrepreneur is equipped to understand all the stages of market forecasting, production planning, input intensity and inculcate the same practices on his/her farm, on the basis of the on-job experience he has acquired.

Table 3: Determinants of gross returns using linear regression

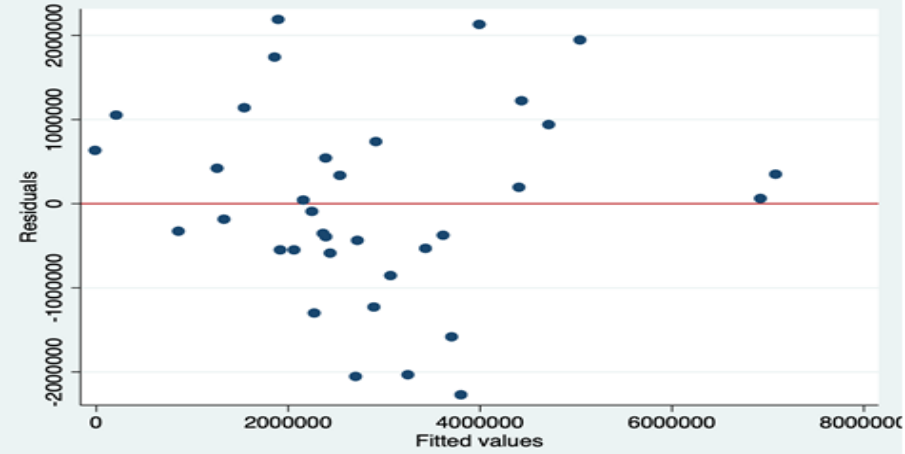
Explanatory Variable (1)	Coefficient (2)	Standard Error (3)

PercExp	28624.0**	6792.105
PercTSWorker	-20279.5**	5897.713
farmsize	141577.1**	28877.61
D1	149302.9*	416060.6
Constant	1731987**	562700.1
No of Observations	35	-
Adjusted R Squared (in %)	60.4	-
F statistic	13.97	-

Note: Dependent Variable is AvRevAcrAinlakhs. *significant at 10% ** significant at 5%; D1=1: entrepreneur has had previous work experience in floriculture, 0 = no previous work experience in floriculture

Source: Primary survey calculations

Figure 1:Scatterplot of Residuals on fitted values of regression model



Model diagnostics of the regression model were also performed. The Cook-Weisberg Test [X^2 (1) =0.37, p=0.54] confirms that no heteroskedasticity exists and the model is applicable to the data. A visual representation of the residuals and fitted values show that the residuals do not have a specific pattern which confirms the absence of heteroskedasticity. To check for multicollinearity, VIF values were inspected (Table 4). The average VIF was 1.03 indicating no problem of multicollinearity in the model.

Table 4: Variance Inflation Factor Values

Variable	VIF	1/VIF
PercExp	1.04	0.962064
PercTSWorker	1.04	0.963883
Currentfarmsize	1.02	0.976516

D1	1.02	0.981149
Mean VIF	1.03	

Source: Primary Data calculations

Conclusion

This study finds that the benefit-cost ratio is 1.74, which shows return on investment is high. The Farm productivity of 1.13 lakh rose stem per acre, which has a scope to improve. The farm productivity (as measured by annual per acre revenue) is positively impacted by farm size, prior work experience of the entrepreneur, and export orientation (that is the proportion of total output that is sent for export). Contrary to expectations however, the number of skilled workers has a negative impact on farm productivity. The regression results indicate diminishing marginal returns, when one increases the acreage under rose. Export orientation fetches higher returns compared to domestic markets. However, this study does have its limitations. One is the marketing costs and fixed costs pertaining to creation of polyhouses have not been taken into consideration. Nevertheless, the paper gives a glimpse into the functioning of the floriculture farms and returns associated with rose cultivation. In conclusion, the authors hope that this study will in some distinguishable way contribute to expanding the discourse on commercial floriculture and small agribusiness enterprises.

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