An Economic Analysis of Floriculture (Rose Flower) System in Pichincha Province, Ecuador

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Abstract: In the sub-basin of the Guayllabamba river, the largest numbers of rose producing farms are concentrated for export. The analysis was performed by obtaining financial-economic indicators with information from the annual reports of 58 farms associated to Expoflores from 2005-2013 year, of the superintendence of companies and technical information of the association. In addition, the categorization was made to the farms for analysis based on the number of sales. The economic analysis was developed with profitability, liquidity, solvency and productivity. According to these indicators, it was found that the sector studied, reported that midsize companies type "B" and large enterprises are stable economically because they have positive financial and economic profitability (0.293, 0.036 and 0.094, 0.045) in these indicators, it was observed that in the sector, taxation and overall farm performance are factors that determine the results of negative returns (ROE = -0.0552 and ROA = -0.050). Overall solvency rate showed that the sector lacks the ability to pay short-term debts (CR = 2.83), debt ratios explain that more than half of the assets of the companies which are engaged to the rose plantations are debts (AD = 0.626). Additionally with respect to productivity, companies are found to be efficient in its production capacity and its average productivity of factors, only in 2008 and 2011 year. Within the sustainability analysis, it was found that the farms are sustainable economically with a value of 2.65.

Key words: Economic analysis, economic sustainability, financial indicators, capacity, engaged

INTRODUCTION

In Ecuador, the floriculture is one of the major activity appeared in the 80s and during the last 10 year it has been accelerated and accounting for the third export of non-traditional type after bananas and shrimp (Naranjo, 2010). Today, with the incorporation of new technologies in production, the floriculture sector has become a manufacturing export industry which is sent not only roses but different elaborate products such as bouquets, mini flower arrangements, etc. (Argothy and Sacoto, 2010).

Of all flowers types produced in the country, rose flower is the elite export product whose production has contributed to the economic and social development of Ecuador, allowing production growth in the provinces of Pichincha, Azuay and Cotopaxi in recent years. In addition to job creation in rural areas of the country which benefit directly and indirectly around 70 thousand people (Perez *et al.*, 2005).

The quality of the Ecuadorian rose flower is unique, highly competitive and comparative advantages having flowers throughout the year and also offering unique varieties to the international market (Martinez, 2015), allowing increased production and export. The floriculture sector contributes to the economy with 0.7% of Gross Domestic Product (GDP) and ranks as the third non-traditional export product, for this reason it is

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Fig. 1: Cultivation of rose under natural conditions

important to perform a periodic assessment of the floriculture sector including problems identification and alternatives for immediate solution.

The survey surface and continuous agricultural production in 2012 reported that for growing roses 4000 ha have been used (INEC, 2011). Compared with 2010, an increase of 50% of the acreage in production was established (Table 1) and now the total area for growing roses is 5473 ha (INEC, 2011). The province with the highest rose's plants production is Pichincha with 66% of national production total[3] in this province the most important cantons are: Tabacundo and Cayambe.

Roses export is influenced by economic, political and social factors hence, the values may fluctuate from year to year. Sales evolution in floriculture sector has been the result of a joint effort between floricultures entrepreneurs, producers and state support. Between 2005 and 2014, they have exported to a total of 664, 264, 10 tons of roses from Ecuador to the tune of 3710, 665, 85 FOB dollars to the national economy. In 2014, the total export of rose was 2.24% of total exports (Banco Central del Ecuador, 2015). In floriculture, labor is the main cost of production and occupies about 55%, followed by freight costs and during the last year it has increased by 20% (Parra, 2014). Flower growers are forced to be competitive due to the constant growth of the world market and competition (Marcano, 2007), for that reason and for the business sector, China becomes the new market potential for diversification purposes (Pozo, 2015).

Holland, Colombia, Ecuador, Kenya and Ethiopia in 2012 held 84% of the Flower Market. Holland has established itself as the leading producers with 54% of export (Expoflores, 2014). Colombia covers 50% of the American market and is positioned as the second most

important, spend most of their products (flowers) to the mass market and focuses its sales in Miami, Ecuador on the other hand has 14% in this market. With respect to the Russian market, Ecuador is the second country that sends rose plants to this country after the Netherlands with 35%.

In our country, Expoflores ranks companies in: small, medium and large. However, according to the Andean Community of Nations, the stratification of floriculture companies should be performed depending on the number of annual sales and number of employed personnel (INEC, 2011). For this reason INEC (2011), ranked all companies in the country such as: micro, small, medium type "A", medium type "B" and large. Proecuador (2013) records around 571 farms in flower production, without using the INEC classification, the agency reported that 62% of these farms are small companies, 28% for medium and the remaining 10% large companies. The economic crisis in the roses exporting countries, limited sales and profitability of the producing farms, plus taxes to be paid annually are the factors affecting growth in the floriculture sector and should be given special attention. This research evaluates the behavior that floriculture sector had during the past nine years and identifies the factors that determine the profitability using economic and financial indicators from the annual accounts that are declared to the Superintendency of Companies, also provides the basis for an economic sustainability assessment of floriculture sector (Fig. 1).

MATERIALS AND METHODS

Economic analysis of floriculture sector in Pichincha province, Guayllabamba river sub-basin, developed as a

descriptive research with quantitative approach, using financial and economic indicators. Additionally an economic sustainability analysis was performed using (Sarandon, 2002) methodology and the SAFE method proposed by(Sauvenier; Van *et al.*, 2007).

The population in this research corresponds to floriculture in Pichincha province located around the basin of the Guayllabamba river. The sample size for the evaluation was not probabilistic type, because it did not depend on selection criteria based on probability. For economic analysis and consensus with Expoflores representatives, 58 floriculture companies were selected.

Statistic analysis: The data obtained were analyzed in Microsoft Excel and then analyzed in R statistical Software. Once constructed indicators, correlation analysis was developed between all indicators except those representing monetary values such as: working capital and net income, in addition to those that are projected in time as the NPV and IRR.

Measures variables: According to Superintendence of Companies (2000) indicators, following variables were used: Liquidity, solvency, profitability and productivity. For economic-financial indicators preparation and sustainability, information of 58 farms registered on Ecuador Superintendence of Companies website was taken. A balance of each farm was obtained from 2005 to 2013. The balances in 2005-2011 periods were found in EAS (Ecuadorian Accounting Standards) format and in 2012-2013 periods IFRS (International Financial Standardization) format. The information for development of productivity indicators was obtained by Expoflores through surveys of the farms under study. This information was collected from 2008-2011 periods. To develop NPV and IRR productivity indicators, the costs variation, expenses and income was estimated for a period of 2008-2013 and with variation percentages, the discounted cash flows to five years were analyzed.

RESULTS AND DISCUSSION

Starting from floriculture annual accounts, INEC (2011) ranked the companies according to their size in: micro, small, medium flower company's type "A", medium company's type "B" and large companies to determine correlation degree, graphs and pivot tables were prepared.

Economic sustainability assessment: Evaluation was based on SAFE framework (sustainability assessment of farming and the environment framework) (Sauvenier *et al.*,

2006; Van *et al.*, 2007). Furthermore, in determining formula and quantification indicators for economic sustainability, the methodology proposed by (Sarandón *et al.*, 2006) was used.

Location: The research was conducted in Pichincha Province, Quito Canton, in Guayllabamba river sub-basin, on 58 farms Expoflores associated, within which the main product are roses.

Companies size of annual sales: Of the 58 farms tested during the years 2005-2013 and according to categorization by the INEC (2011). Figure 2 shows that midsize companies "B" have a higher participation percentage. Large companies during 2012 and 2103 showed significant growth.

Profit and net margin: In the floriculture companies it was recorded negative average only in 2005 and 2009 years (Table 1). Economic losses were due to price variation to -9% per rose kilogram which led to the decline in farms profits (Marcano, 2007). The negative result for 2009 was due to international economic crisis (Naranjo, 2010) which led to decline in exports, was indicated by Ecuador Central Bank.

Table 2, shows that net income does not exceed the average presented in 2010 by Companies Superintendency (0.138). However, midsize companies (MB) and large companies (G) had a positive net margin of profit. Compared to Colombia (0.17), the farms do not reflect good margins. This indicator shows that taxes capture a large amount of net profits in companies.

Liquidity: The total average current liquidity index during the study period was 2.8, within which, as shown in Table 3, microcompanies are those that significantly exceed the ideal average (Garrido, 2012) and should be between 1.5-2. Small, medium "A", medium "B" and large companies do not reach the ideal value, although they are close to the value. Furthermore, performing the analysis for years (Fig. 3) shows that the index is kept constant but, in 2009 the rate increases to 15 points, this index is normalized in the following year.

Working capital: According to companies categorization, midsize companies type "A" (MA) were those that showed negative working capital during the study period, followed by small (S), type medium companies (M) and large companies (L). Micro companies have positive working capital excluding 2006-2008 years (Table 4).

Solvency: The 56 companies rely on >50% of its creditors to finance itsassets, approximately every dollar
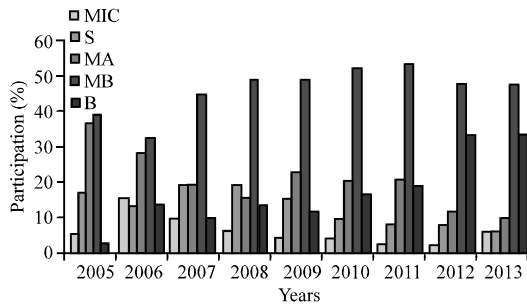
Fig. 2: Floriculture companies evolution by size according to annual sales volumes during 2005-2013 year. MIC = micro company, S = small company, MA = medium company A type, MB = medium company B type, B = Big company
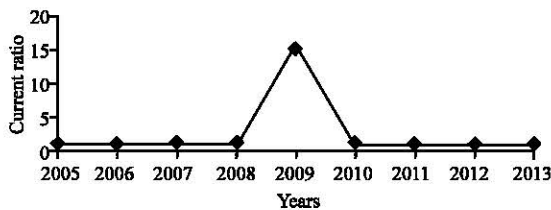

Fig. 3: Current liquidity evolution annual rate

Table 1: Net income in floriculture companies

Years		USD	
	Average	X_{min}	X_{max}
2005	-13083.259	-792956.840	148087.050
2006	280091.261	-252633.830	12674530.223
2007	20441.762	-402042.530	639982.718
2008	29341.283	-449560.320	507823.580
2009	-54163.956	-1437675.000	1109739.173
2010	103453.414	-313669.940	2070420.070
2011	127608.509	-1408842.070	3973663.820
2012	117524.917	-1343602.700	6171082.180
2013	160130.465	-1859411.710	2833203.170

Table 2: Net profit margin during 2005-2013 in floriculture sub-basin of the Guayllabamba river

Size	Average	X_{min}	X_{max}
MIC	-0.931	-27.688	2.486
P	-0.068	-0.921	0.146
MA	-0.026	-1.265	0.250
MB	0.037	-0.435	6.296
G	0.036	-0.088	0.238

Table 3: Average liquidity ratio by company size during 2005-2013 period

Size	Liquidity index
MIC	30.359
P	1.319
MA	1.123
MB	1.101
G	1.249

generated in assets, 0.50 cents are financed by debt. Values that match the average of 0.556 reported by
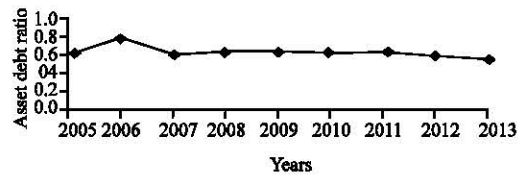

Fig. 4: Asset debt index evolution during 2005-2013 analysis period

Table 4: Average working capital (USD.) per company per year

Years	MIC	S	MA	MB	L
2005	1536.415	-73581.293	-149859.121	26101.115	108503.350
2006	-342653.596	-184645.078	-70928.583	-248616.663	-3750.393
2007	-107380.396	-77963.633	-97195.079	-489917.155	524353.852
2008	-91502.583	-8769.045	-63306.948	-65927.212	-86703.606
2009	23525.050	-13626.294	-102831.706	-253524.333	-21340.678
2010	4042.855	66422.548	-207755.747	-136865.441	-97820.410
2011	10005.270	-13707.310	-56466.155	-102413.625	-05829.571
2012	449.205	-103902.470	-55235.857	-129143.822	-00076.706
2013	5022.027	-37657.590	-127250.698	-68651.526	10863.477

Table 5: Indebtedness asset index by companies segment

Segment	Asset debt index
Microempresas	0.544
Pequeñas empresas	0.726
Medianas empresas tipo "A"	0.654
Medianas empresas tipo "B"	0.611
Grandes empresas	0.592

Superintendency of Companies (2010) and Marcano (2007). As shown in Fig. 4, the debt ratio has a linear downward trend; this explains that companies seek to reduce debt in generating long-term assets.

Table 5 shows that the average overall indebtedness was 0, 62 and surpassing the global average are small and medium type "A" companies (S and MA), midsize companies "B" tend to average and, micro and large companies are below (MIC and L). For this indicator, compared to Superintendency of Companies (2010) it is observed that the values obtained are within the average. The average equity debt was 18.4 and depending on the business segment the highest rate was recorded in micro (MIC), small floricultures (S) and medium-sized companies type "B" (MB). Midsize companies type "A" (MA) and large companies (L) show the lowest average (Table 6), however only companies with higher sales to 5,000,000 USD (L) are within the optimal level mentioned by Garrido (2012) which should be 1 and not exceed 2.5.

Financial leverage: In accordance with Gutierrez (1992), financial leverage depends on indebtedness level, profitability, risk and other factors. Leverage was done comparing average obtained by the Superintendency of Companies (2010) which was 3.2. As shown in Table 7, results indicate that leverage ratios are high except for large and medium companies "A" type.

Table 6: Equity debt index by companies segment

Segment	Debit equity index
Micro companies	42.199
Small companies	34.220
Medium companies "A" type	8.386
Medium companies "B" type	21.658
Big companies	1.891

Table 7: Leverage index

Segment	Leverage	Financial leverage
Micro company	44.887	34.901
Small companies	35.220	35.999
Medium companies type "A"	9.418	14.549
Medium companies type "B"	22.656	17.127
Big companies	2.875	0.372

Table 8: Average index financial and economic performance by factory segment

Segment	Financial profitability	Economic profitability
Microcompanies	-3.782	-1.295
Small companies	-0.580	-0.017
Medium companies type "A"	-2.196	-0.002
Medium companies type "B"	0.293	0.036
Large companies	0.094	0.045
$\otimes$	-0.552	-0.050

Table 9: Percentage evolution of average productivity ha^{-1}/year

	USD (%) selling Xha^{-1}/year			
Years	2008	2009	2010	2011
$\otimes$	2.02	1.58	2.86	1.98
X_{Min}	-5.61	-1.61	0.27	0.46
X_{Max}	9.84	7.30	12.29	4.58

Respect to financial leverage, Superintendency of Companies (2010) indicates that the optimal value must be greater than unity and results (Table 7) show that large companies do not achieve that result is, do not use debt to increase production while micro, small, medium "A" and medium "B" substantially exceed the value.

Profitability: The economic profitability during the study period shows a linear trend, however, in 2012 a significant decrease is observed in the index recovered for the following year (Fig. 5). Regarding the financial profitability index, does not show a specific trend because it fluctuates from year to year, showing the lowest value in 2005 and the highest value during 2013.

The overall index was -0552 financial profitability and -0.050 economic profitability. Developing analysis segment, companies that had positive averages rates financial and economic profitability were, midsize companies type "B" and big companies. Companies that exceed the average reported by the Superintendency of Companies (2010) of 0.29 are Medium Enterprises "B" (Table 8). The aforementioned was given because in 2006, the boom of roses and selling price was high (Marcano, 2007; Pullas, 2014). In 2010 the price per kilogram rose was high and relatively low production costs (Expoflores)

Table 10: Index yield between 2008-2011

	Roses stems X (ha^{-1})			
Years	2008	2009	2010	2011
$\otimes$	753982.90	701613.62	1101998.20	738725.67
X_{Min}	572967.03	285518.18	364137.93	510000.00
X_{Max}	1104000.00	1491501.36	8218666.67	960000.00

Table 11: Percentage variation average cost, expenses and income between 2009 and 2013

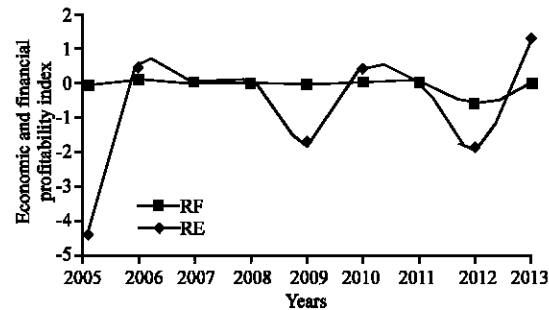|		Percentage	
Years	Costs	Expenses	Income
2009	7.40	-12.53	-2.20
2010	10.00	23.88	12.20
2011	1.72	13.79	1.01
2012	-14.16	32.50	-5.89
2013	3.93	4.74	3.74
$\otimes$	1.78	12.48	1.77
∂	0.09	0.17	0.07

Fig. 5: Evolution economic Index and financial profitability on roses farms producing

and in 2013 a low level of production costs allowed producers to better economic returns.

Productivity: The productivity rate as mentioned surface Lorenzo (1990) reflects the percentage of total gross margin surface (ha) crop brings in a given year. According to Table 9, results show that this index is highly variable, with the lowest value in 2009 and higher in 2010.

Table 10 shows the same trend as the results in Table 9; 2009 are the year of lower performance and the highest yield is 2010 while 2008 and 2011 show on average similar values.

IRR and NPV: To calculate these indicators, the average percentage of variation of Table 11 were taken, additionally the discount rate for income taxes and workers remained constant according to law states, 22 and 15%, respectively. The results of this analysis show that there is a high variation in expenses and income cost.

By upgrading cash flow by business segment produced 5 year (Annex 5), the results show negative values NPV for an internal rate of opportunity of 20%

Table 12: VAN obtained with average rates of change in Table 11

Segments	NPV (USD)
Big	-4455806.26
Medium "B"	-1158090.47
Medium "A"	-730736.47
Small	-395226.74

Table 13: Results of sensitivity analysis in different segments of the floriculture

Segment	Costs	Percentage	
		Expenses	Income
Big	1.78	12.48	14.39
Medium "B"	1.78	12.48	12.79
Medium "A"	1.78	12.48	16.07
Small	1.78	12.48	19.68

Table 14: Results of correlation between indicators for economic analysis

Variables	Profitability			Liquidity	Solvency			Productivity		
	NPM	FP	P	CR	IA	AI	A	FA	SAP	PFP
NPM	1.000	0.854	0.999	-0.995	0.581	-0.721	-0.740	-0.603	0.448	0.742
FP	0.854	1.000	0.839	-0.823	0.378	-0.492	-0.510	-0.509	0.219	0.871
P	0.999	0.839	1.000	-0.999	0.630	-0.696	-0.710	-0.563	0.502	0.709
CR	-0.995	-0.823	-0.999	1.000	-0.659	0.679	0.702	0.535	-0.533	-0.689
IA	0.581	0.378	0.630	-0.659	1.000	-0.027	-0.050	0.227	0.983	0.117
AI	-0.721	-0.492	-0.696	0.679	-0.027	1.000	0.999	0.952	0.099	-0.451
A	-0.742	-0.514	-0.719	0.702	-0.055	0.999	1.000	0.947	0.073	-0.467
FA	-0.603	-0.509	-0.563	0.535	0.227	0.952	0.947	1.000	0.365	-0.523
SAP	0.448	0.219	0.502	-0.536	0.983	0.099	0.073	0.365	1.000	-0.005
PFP	0.742	0.871	0.709	-0.689	0.117	-0.451	-0.460	-0.523	-0.005	1.000

NPM: Net Profit Margin, FP: Financial Profitability, P: Profitability, CR: Current Ratio, IA: Assets Indebtedness, AI: Asset Indebtedness, A: Appeceament, FA: Financial Appeceament, SAP: Surface Average Productivity, PFP: Partial Factor Productivity

(Table 12). In this case, according to Leon, the third scenario in which the NPV is equal to 0, would, consider other aspects such as the feasibility of achieving this increase in income, availability of markets to sell the product, among others.

The sensitivity analysis shows that revenue should increase for the project within five years term investment recovers. The results in Table 13, indicate that while companies rise in its segment, the percentage of income is reduced to zero NPV and IRR internal rate equal opportunity, in this case 20%.

Correlation analysis: Performing correlation analysis between all indicators used in the analysis, except those representing monetary values (working capital, net income) and those that are a projection over time (IRR and NPV) it was found that the main positive correlations were found between groups indices: profitability and solvency (Table 14). Liquidity has only one indicator available to be subject to this analysis and productivity indicators no significant correlations were found.

Economic sustainability: The economic sustainability assessment is very complex, brings together financial indicators, diversification and income. Based on (Sarandon, 2002) in this investigation results indicates that flower industry is a sustainable economic since "the

minimum threshold value or a system to be sustainable must be equal to or greater than the average value of the scale" in this case greater than or equal to 2. The results in the study period for this sector was 2.65. Finally, applying the formula with the average values of the entire sector, the resulting value for economic sustainability in 58 farms was 2.65.

CONCLUSION

After evaluating floriculture companies economic situation through rates of profitability, productivity, solvency and liquidity, it was determined that in the period considered the greatest profit margin, economic and financial performance presented businesses with higher annual incomes to 2,000,000 USD.

The average net profit margin during the study period stood below the average reported by the Superintendency of Companies in 2010 and that achieved in Colombia in 2009, despite the visible increase in productivity; the usefulness of floriculture companies for 2013 experienced a decline of 42.82% compared to 2006.

With the results of the financial analysis, the floriculture sector is lack of solvency in relation to equity and not active because micro companies are more likely to present idle current assets by the state of development, generating liquidity resulting positive current capital,

Unlike large companies that have a high credit rating with a lower level of debt, as its capital is the one who generates profitability.

ACKNOWLEDGEMENTS

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