NORTH TECHNICAL UNIVERSITY

FACULTY OF ENGINEERING IN APPLIED SCIENCES

CAREER OF INDUSTRIAN ENGINEERING

IBARRA - ECUADOR

ARTICLE ENGLISH

TOPIC:

"Designing a Process Management System to Improve Productivity in the Process of Cultivation and Post Harvest flower FLORELOY Company SA in the city of Cayambe "

AUTHOR: **Edwin Armando Imbaquingo Imbaquingo**

DIRECTOR: **Ing. Edwin Rosero MSc.**

July 2012

SUMMARY

This study was conducted in the flower business FLORELOY SA, located in the area of Guachalá, Cangahua parish, canton of Cayambe, Pichincha province. This research presents a methodology for the Implementation of Process Management System, designed for the Improvement of Productivity in both Cultivation Process of Post-Harvest.

While in general terms a study of this type must be applied to the whole company, in the case of flower fundamental processes of the product are in production processes of growing and post harvest, which has seen the need to achieve and maintain certain levels of productivity.

Experience has shown that a complex organization can be improved effectively through a Process Management System, that encourages the best use of resources to meet or exceed expected results and that makes it possible in due course take the necessary steps for actions corrective, preventive and improvement are required to perform, with this continuous improvement process has become a key element in the strategy that companies develop to meet the existing competitive markets. Among the major include:

• Customer loyalty depends on the value you receive from the company.
• The value that the company delivers customer is generated by their processes.
• Staying competitive in today's markets requires constant updating and improving the value delivered to the customer (internal / external).

In the current competitive environment floriculture activity is away, rather the need to respond appropriately to the ongoing changes and continuing uncertainty, there has been a significant change as far as corporate governance, to be essential, role management control in each of their daily activities in their areas and measure them, to suggest improvements based on topics which includes the Industrial Engineering and be able to make decisions that are better performances.

To contribute to this end, the present work we make a System Design process management in the area of cultivation and post harvest flower of a company engaged in the production of roses covering a classical approach methodology to generate structures support to manage the change aimed at achieving higher levels of productivity in each of the study areas and promote good practices.

CHAPTER I

1. PRODUCTION AND FLOWER MARKET.

1.1 Introduccion.

The economic crisis in developed countries in the eighties deeply affected Latin American countries by the imposition of structural adjustment programs, seeking agriculture as an economic strategy of export of nontraditional products.

This economic reality makes the late 70's in Ecuador enter non-traditional cultivation of flowers, so the export of flowers begins in 1980 during the government of Osvaldo Hurtado, a time when entrepreneurs and power groups saw economic export crops and a very lucrative business. In order to promote this activity was hired specialized technology from Colombia and Israel, countries with experience in this activity.

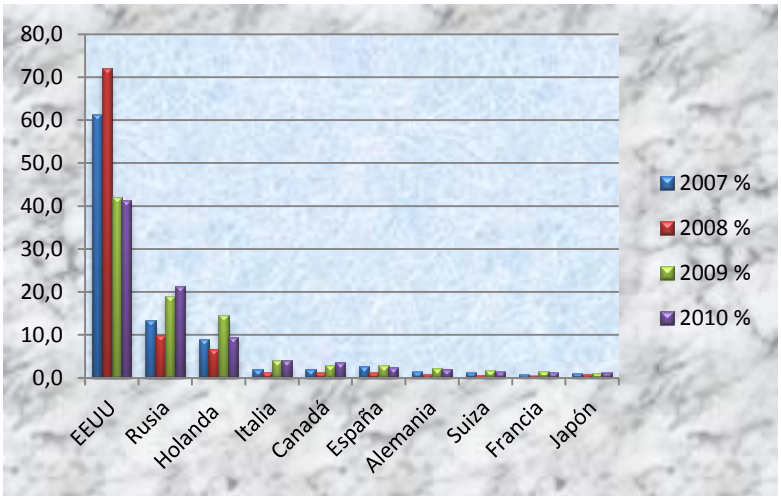
Since then the Andean valleys of Ecuador, especially in the Gauteng province, began to undergo a change of scenery covering of greenhouses of flowers, settled on land previously used for cattle breeding and dairy production. The first flower companies settled in the Cantons of Cayambe (including the parishes Ayora, Juan Montalvo, Cangahua, Otto and Ascázubi) and the Canton Pedro Moncayo (parishes Tupigachi, Hope and Malchingi). Currently Cotopaxi and Azuay provinces have joined this activity.

1.2 Main Markets.

Ecuador covers 7% of global demand for export of flowers. The rose is the flagship product, representing 73% of total flower exports of Ecuador and its main market is the U.S., with about 68% share of exports and to a lesser extent in Europe. We have 42% of U.S. production for which figures derived from sales to that country are significant, in 2010 there were $ 585 million. Consider Table 1.1. and Figure 1.1.

Year / Country	2007	2008	2009	2010
	%	%	%	%
EEUU	61,2	72,0	41,9	41,4
Rusia	13,4	9,8	19,0	21,2
Holanda	8,9	6,7	14,6	9,4
Italia	2,0	1,3	4,0	4,0
Canadá	2,1	1,2	3,0	3,5
España	2,7	1,2	2,8	2,4
Alemania	1,4	0,9	2,3	2,1
Suiza	1,2	0,6	1,7	1,4
Francia	0,9	0,5	1,5	1,3
Japón	1,1	0,8	1,1	1,2

Table 1.1. Main Export Markets of Flores. Source: The Journal EXPOFLORES-Today / Prepared: Edwin Imbaquingo (Feb. 2011).).



2007: It was the year with less exports in the period 2007-2010.
Año 2008: Production increased and sold about 100 thousand tons.
Año 2009: 3821 has grown.
Año 2010: January and February sold $ 132 million.

Table 1.1. **Flower Export Markets Percentage. Source: The Journal Expoflores-Today / Production: Edwin Imbaquingo (Feb. 2011).**

1.3 Statistics in recent years.

Ecuador is situated within the main exporters of flowers and ranks third in world exports of this product, let's exports.

Period	FOB Value (U.S. $ thousands)	Volume (tons)	variation FOB	Change Volume	FOB Value% Growth
2001	238050,18	74229,8			
2002	290325,85	83630,53	18,01%	11,24%	21,96%
2003	308738,21	80362,62	5,96%	-4,07%	6,34%
2004	354818,76	84852,87	12,99%	5,29%	14,93%
2005	397906,96	122185,4	10,83%	30,55%	12,14%
2006	435841,63	104163,64	8,70%	-17,30%	9,53%
2007	469424,41	89924,99	7,15%	-15,83%	7,71%
2008	565662,49	109061,98	17,01%	17,55%	20,50%
2009	527120,26	96956,98	-7,31%	-12,48%	-6,81%
ene-sep/09	400997,57	72873,27			
ene-sep/10	435892,07	76354,25	8,01%	4,56%	8,70%

Table 1.2. **Export Flowers Ecuador. Source: ECB-PCR / Production: Edwin Imbaquingo (Feb. 2011).**

The flower sector has grown steadily at an average rate of 10.79% from 2001 to 2008, taking into account the various vicissitudes that have passed through this area, such as the climatic factor both domestic and commercial partners, as well as the threat of changes in preferences over the years.

By 2009 the financial turmoil worldwide had an impact on the sector, so that decreases 6.81% compared to 2008, decreasing export volume of 109,061.98 tons. ton in 2008 to 96,956.98. in 2009, while what is going to September 2010 recovery is evident, resulting in an increase in export volume of 72,873.27 tons. Jan-Sep 2009 to 76,354.25 tons. Jan-Sep 2010 and FOB value is U.S. $ 435.89 million, increased by 8.70% compared to the same period of 2009 (U.S. $ 401.00 million), this thanks to the largest number of foreign sales amounting to U.S. $ 73.00 million during February and April 2010 (Theatre and Valentine). Flower exports accounted for January to September 2010, 3.47% of total exports (4.12% Jan-Sep. 2009). Consider Figure 1.2.

Referring to export varieties, September 2010 80% of total exports belong to the variety of roses, and 8.00% is the variety of gypsophila, Ecuador being the world's largest producer with the largest number of acres of culture, and finally, the remaining 12.00% corresponds to varieties other, Flowers for bouquets or for ornamental and Carnations.

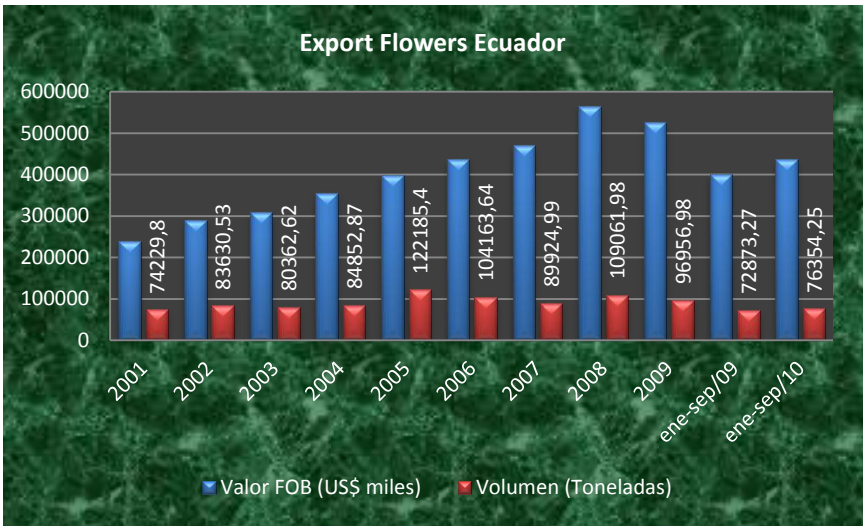


Table 1.2. Export Flowers Ecuador. Source: ECB-PCR / Production: Edwin Imbaquingo (Feb. 2011)..

The Ecuadorian rose is described by the world market as the best quality, and is the largest producer of roses in the world with approximately 4 000 hectares., Up from Colombia, Kenya and Ethiopia, as well as Ecuador is the world's largest producer in the varieties of Gypsophila, Liatris and Hypericum, which are types of summer blooming varieties of which are also created genetically in the country. The coastal region has ideal climatic conditions for these crops.

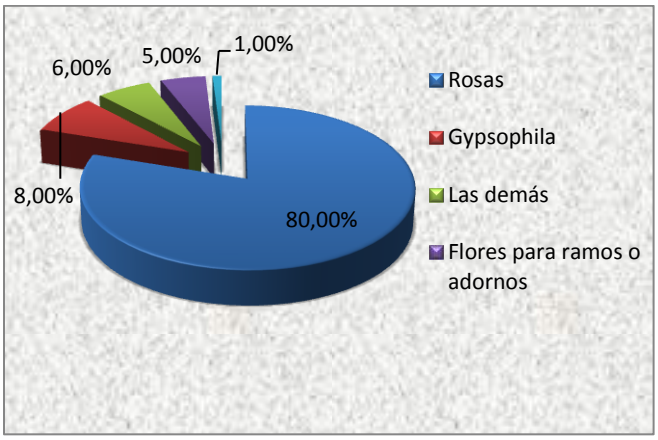


Table 1.3. Export by Variety Ecuador. Source: ECB-PCR / Production: Edwin Imbaquingo (Feb. 2011).

CHAMPTER II

2. THE PROCESS MANAGEMENT.

2.1 Introduction to Process Management.

The competitive climate of our country has increased significantly to the dynamics of change, openness of the economy and the presence of business cycles becoming shorter. This poses a challenge for companies, both production and services, the need to achieve and maintain certain levels of competitiveness, as well as efficient and effective results in their management.

History tells us that the first wave of process was initiated in the twentieth century and is dominated by the "management theory" of Taylor (processes were implicit in the practice of labor and non-automated). The second wave, BPR (Business Process Reingeneering) are the '90s was the rise of integration and business process improvement (standards appeared, the flow of work became collaborative). The third wave passes the information age to the era of the process, from 2000 onwards came BPM, the emergence of standards and management more possible to increase the degree of integration, reusability and acceptance by the organizations and especially geared to the customer.

2.2 Benefits of Process Management.

Process Management proposes a change that is building a new quality and not delete the old way:

- Frame in the Quality Management and is a useful tool for the development of one of the central strategies of the Quality Plan.
- Proposes a cultural change in processes, since it takes into account from the beginning to the needs and expectations of customers.

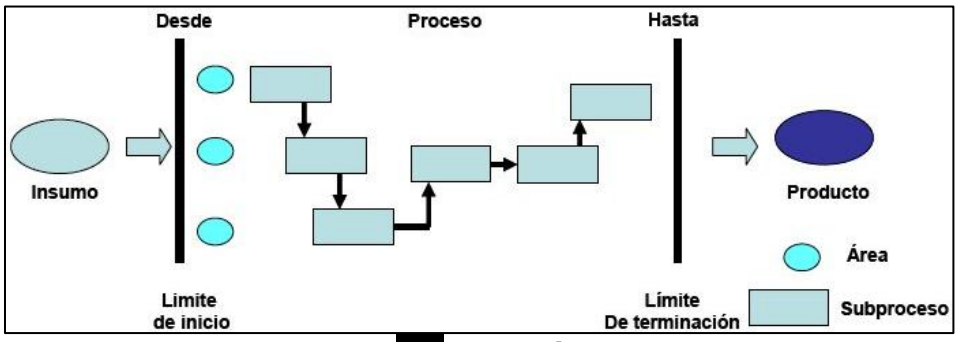
- Teamwork combining efforts of professionals from different disciplines.
- Integrated information system for evaluating the activities.
- Remove useless activities, break times or interfaces and fill in the blanks in the management of the services offered to users.
- Is concatenated with planning activities, implementation and support in a circle of Deming.
- Increase productivity
- Notes are structured as flows of information and materials

2.3 Processes.

The word comes from Latin processus process, which means progress and progress. A process defines what is done, and a procedure, how. A process is a set of interrelated work activities characterized by requiring certain inputs (products or services from other providers) and individual tasks involving value-added in order to obtain certain results. Every process is part of a set of elements that interact to achieve a common purpose, this is known as a system.

"A process is an orderly network of related activities which are carried out repeatedly and using information and resources to transform inputs into products ranging from the beginning of the process to satisfy customer needs"

Is any attitude or set of activities that uses an input, adds value and provide a product to an internal or external customer this way all the activities present in developing a process must have a common purpose aimed at satisfying the need the client.



Process Chart.

2.4 Types of Processes.

a. Key: These are the processes that have direct contact with the customer (the business processes necessary to implement the product / service from which customers receive quality and value: marketing, service planning, service delivery, delivery , billing, etc..).

b. Strategic: These are the processes responsible for analyzing the needs and constraints of society, the market and shareholders to ensure the response to those strategic needs and constraints (process management responsibility of management:

marketing, human resources management quality).

c. Support: Those that allow the operation of the institution. Example: administrative processes, pay payroll, accounting, purchasing.

CHAPTER III

3. THE QUALITY MANAGEMENT SYSTEM ISO 9001 2008 / INDICATORS OF DEALING..

3.1 Quality Management System ISO 9001-2008.

Figure 3.1., Generally represents a system of Quality Management ISO 9000 is the one implemented on the current version of the standard requirement is ISO 9001-2008.[1]

Figure 3.1. ISO 9000 Quality Management. Source: Process management.

If we look at ISO 9001:2008, is clearly identified, we have management processes that would be focused in Section 5 of the rules, the processes of embodiment, which corresponds to point 7 of the rules, the support processes that we have defined the resource management and improvement processes, which correspond to points 6 and 8.

[1] Manual para las Pequeñas Empresas, Guía Sobre la Norma ISO 9001-2008, Traducción al español realizada por ICONTEC. Pág 10

3.2 Evolution of ISO 9001-2008

The Figure 3.2. shows the evolution of ISO 9001, ISO 9001 according to the 2008 revision makes the following improvements:

- Structure of process-oriented standard,
- Improved compatibility with other management systems, especially with the environmental management system ISO 14001.
- Ease of application in all branches and all types of products, including services,
- Ease of application also to SMEs
- Appropriate adaptation to the respective situation of the company.
- They were also integrated the ISO 9002 and 9003 in the new ISO 9001.
- The process orientation provided concept presented is adapted to the integration. PDCA cycle is also used.

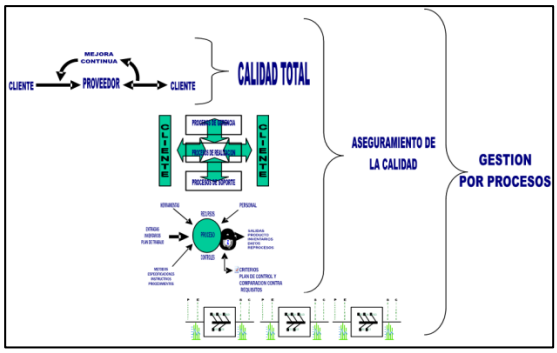


Figure 3.2. Evolution of ISO 9001-2008. Information Process Management..

3.3 Relationship of the Process Management with ISO 9001-2008.

In ISO 9001:2008, clause 7, Chapter 7.1, it suggests that every organization must evaluate its process as follows:

- Determine and implement the necessary arrangements for measuring, monitoring and follow-up to ensure effective operation of processes and the product / service meets the requirements.
- Ensure the availability of documentation and records of the process to provide operational criteria and information to support the effective operation and monitoring of processes. This documentation must be in a format that suits the operating practices of the organization and shall, when required, including written plans for quality.
- Provide the necessary resources for the effective operation of processes.

CHAPTER IV

4. PRODUCTION SYSTEMS.

4.1 Fundamentals of Production Systems.

The first economist to study the division of labor was Adam Smith. He did note that the specialization of labor increases the production due to 3 factors:
1) The increase in the skill of workers
2) Avoid lost time due to changing work and
3) The addition of the tools and machines.

4.2 Ergonomics and Production.

Ergonomics is an art that seeks to humans and technology work in complete harmony, designing and maintaining the products, jobs, tasks, equipment, etc.. in accordance with the characteristics, needs and human limitations. Failure to consider the principles of ergonomics take various negative effects that are generally expressed in injury, occupational disease, or deterioration of productivity and efficiency.

Saying integral optimization we mean obtaining a systemic structure to the following three criteria:

- Participation: of human beings in terms of technological creativity, management, compensation, comfort and psychosocial roles.
- Production: in all that makes effective and efficient production of Man-Machine System (in short: productivity and quality).
- Protection: Subsystems of Man (industrial safety and occupational health) of the machine subsystems (accidents, failures, breakdowns, etc..) And environment (collective security, ecology, etc..).

4.3 Studies of times.

It is a technique to determine as accurately as possible, based on a number of observations, the time to perform a particular task under a performance standard preset.

Standard Time: We describe the definition of standard time from various points of view to better

understand their concept and how to get it after taking out the time and motion study. Is the time required for an operator of average, fully qualified and trained and working at a normal rate, perform the operation.

CHAPTER V

5. FLORELOY the flower growing company.

5.1 Background.

ELOY FLOR Inc. is a company located in the city of Cayambe, Pichincha Province, Pan North Castle Km.3 Guachalá diversion. The main shareholder of the company is Luis Martin Ribón of Colombian nationality.

This company is dedicated exclusively to the production and export of roses and was established about 13 years ago, on land belonging to the Castle Guachalá. At its inception had 11 blocks and about 20 workers from their surrounding communities. FLORELOY name is given to honor the SAN ELOY ditch that crosses the land

The main communities surrounding the company are: Josephine, Cuniburo, San Luis de Guachalá, and The Good Hope, from which come the main workers. Currently provides employment for about 200 workers directly and indirectly and in the surrounding area are other flower farms as Villa Maria Bonita, Villa Juanita, FlorMare Finca, Finca Corland, Mistic House, Villa Rosa Villa Prima and Fiorentina, Olympus House Flowers, which become one of the main local skill.

5.2 Description of Functional Areas of the Company.

5.2.1 Crop Area.

The cultivation area Florícola Flower Company is directed Eloy for two years or so by the Manager Technical Engineer Balseca Diego, who, based on data, results and direct observation in the blocks planned tasks Court Desyeme, Pinch, Sunset of Hormonal (Cedral), Leaf Drop, scarifying, etc..

The cultivation area is composed of 3 sub-areas specific to their respective blocks, to which are assigned a supervisor, an assistant and an average of 20 workers especially female, and 1 filled the area with yellow color his supervisor, Mr. Augustine Coyago, area fill color 2 tomato with your supervisor Mr. Joseph Quishpe, and area 3 gray filled his supervisor Mr. José Cedeño.

Each Supervisor from the beginning of the day is responsible for controlling harvest in the morning from Monday to Saturday all day during the week is verified desyeme activities, pinch, place hormone, etc.

5.2.2 Post-Harvest Area.

Post-Harvest is directed for several years by Mr. Kleber Reinoso, he is responsible for fulfilling duties as Head of Post-Harvest, the area consists of 4 sub-areas: Pre-cold room, cold and Admin.

In the Pre-cold room is responsible for receiving and dusting of roses, dispensed and output meshes to the room, where the goal is to hydrate the stems of roses and prevent some diseases. In this room there are 3 people, a supervisor who is responsible for receiving flower in post-harvest control of abuse and cutoffs, dusting and check mesh by crop, an assistant lowers roses of the car when they arrive and are filled at different tubs in the room and a skater who is responsible for removing the mesh and sprayed room stocked with their relative rankings and boncheo.

Another person in charge of plucking the stems even and place a link to the adjustment, the other person is responsible for locating plastic cover and put the stems leafless league, someone else is responsible for entering the data system of each bunch, locate the respective tickets and placed in tubs, and the fifth person in charge of transporting the Bonches tubs and entered into the system and sort according to orders and varieties.

CHAPTER VI

6. DIAGNOSTIC PROCESS AROUND THE COMPANY.

6.1 Situational Diagnosis.

6.1.1 Problem Identification and Prioritization.

Problems in general level I could see in the percentage of national flower

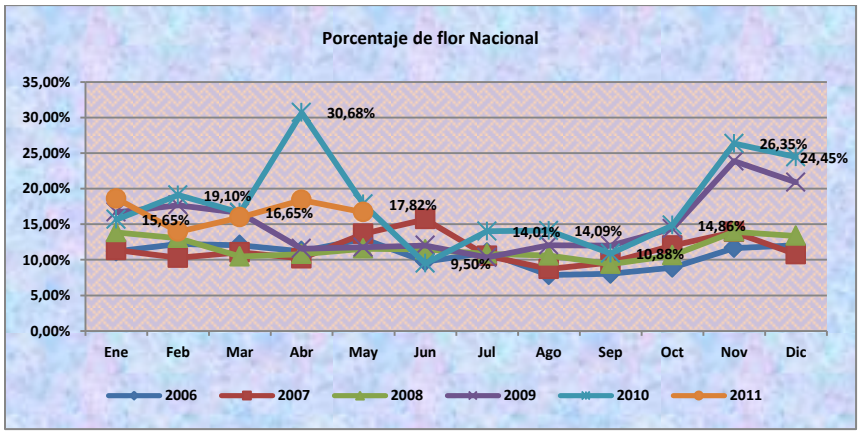


Figure 6.1. Percentage of national flower since 2006 until May 2011. Source: Company Database..

For the period January 2009 to May 2011 we have more varieties to issue national flower.

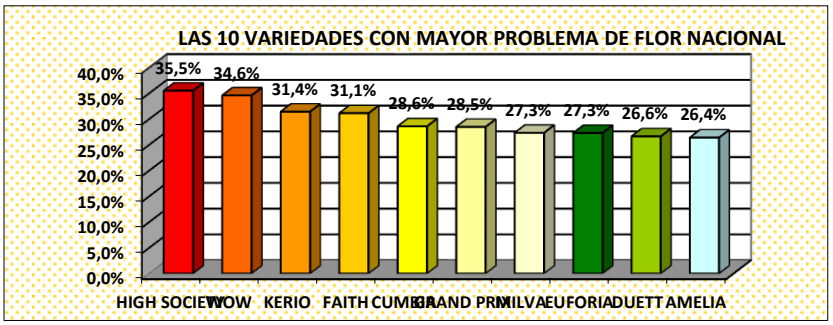


Figure 6.2. Varieties with higher national flower problem in January 2009 period in May 2011. Source: Company Database..

Figure 6.3. Percentage by Group National Flower. Source: Company Database.

Analyzing data and according to observations found the following problems in both the culture and post-harvest:

6.1.2 Prioritization Matrix..

Prioritization Matrix according to the identification of problems, contains two basic options Feasibility and Possible Application. In each of the problems listed above should weigh about 5 according to the observations and experience, to get a total and identify the priority of process improvement.

Crop Area. Prioritization Matrix in Table 6.1., One can observe the prioritization matrix culture área.

GROWING PROBLEM AREA				
L°	**Problem**	**Feasibility**	**Possibility of Application**	**Total**
a)	Personnel engaged in activities crop sprayed blocks.	5	4	**9**
b)	Movements too long in the harvesting process.	5	5	**10**
c)	Lack of a maintenance plan.	5	4	**9**
d)	Lack of standardized processes.	5	2	**7**
e)	High indicator waste.	4	3	**7**

Table 6.1. Prioritization Matrix Problems culture. Prepared by: Edwin Imbaquingo (Dec. 2011).

Post Harvest Area. Prioritization Matrix in Table 6.2. , One can observe the prioritization matrix area of Post-Harvest.

PROBLEM AREA OF POST-HARVEST				
L°	Problem	Feasibility	Possibility of Application	Total
a)	Time-outs in the process	4	4	**8**
b)	Tables of boncheo in inadequate conditions for the worker	3	4	**7**
c)	Bottlenecks in the quality control process.	5	4	**9**
d)	Nonstandard Processes	4	3	**7**
e)	High rate of wastage	4	4	**8**
f)	Excess Personal Area.	3	3	**6**

Table 6.2. Prioritization Matrix Problems of Post-Harvest. Prepared by: Edwin Imbaquingo (Dec. 2011).

CAPÍTULO VII

7. DESIGN PROCESS MANAGEMENT SYSTEM IN THE PROCESS OF CULTURE AND POST-HARVEST IN THE COMPANY SA FLORELOY

7.1 Value Chain Company (Process Map).

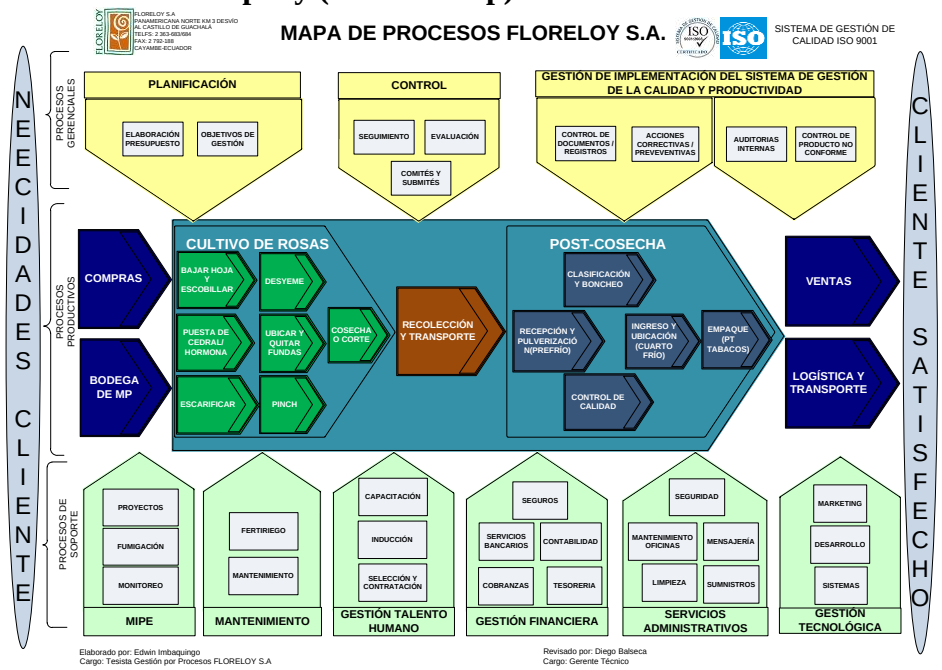


Figure 7.1. FLORELOY Company Value Chain Inc. Prepared by: Edwin Imbaquingo (Dec. 2011)..

The development of the Value Chain (Process Map), was designed according to operations made by the company and information provided with, and this map will serve as support for other processes and threads FLORELOY SA

EMPRESA FLORÍCOLA FLORELOY S.A

CAYAMBE-ECUADOR

HOJA DE CARACTERIZACIÓN DE PROCESOS

PROCESO:	Productivos o de Realización.			**Código:**	
SUBPROCESO:	Cultivo de Rosas			**Versión:**	
Responsable:	Supervisores de Cultivo	**Revisó:**	Supervisores	**Página:**	
Elaboró:	Edwin Imbaquingo	**Aprobó:**	Gerente Técnico	**Fecha:**	22-dic-11

OBJETIVO:	**ALCANCE:**
Asegurar que la flor sea exportable de acuerdo a la planificación de las distintas actividades de producción, de manera que satisfaga las necesidades requeridas por el Proceso de Post-Cosecha y de Ventas o Comercialización.	Este proceso se considera desde la planificación de la producción, hasta la entrega de la flor a Post-cosecha ("Flor acorde con las especificaciones" Exportable y Nacional).

CONTROLES	**MECANISMOS O HERRAMIENTAS**	
Rendimientos en las Actividades.	Coche de Cosecha	Mallas
Puntos de Corte en la Cosecha.	Tijeras de Corte	Mesas de Cultivo
Eficiencia del Proceso.	Coches de Basura	Contenedores
Eficacia del Proceso.	Herr. de Escarificar	
Productividad del Proceso.	Herr. de Bajar Hoja	
Seguimiento de Planes de Producción	Epps.	

PROVEEDOR	ENTRADA	SUBPROCESO	RESPONSABLE	SALIDAS	CLIENTE
Ventas/Post-Cosecha	Hoja de Pedidos	Cosecha	SC	Mallas de Rosas	Post-Cosecha
Bodega	Insumos, Materiales y Equipos	Todos los Subprocesos	SC	Camas y Plantas Tratadas	Cultivo
Mantenimiento	Observación e Inspección de Invernaderos	Todos los Subprocesos	SC	Invernaderos en Buen Estado	Cultivo
Riego	Planificación de Riego	Todos los Subprocesos	SC	Camas Húmedas.	Cultivo
MIPE	Planificación de Fumigación	Todos los Subprocesos	SC	Bloques Fumigados	Cultivo
RR.HH.	Plan de Capacitación	Cosecha, Pinch, Desyeme.	SC	Personal Capacitado	Cultivo
RR.HH.	Control del Personal	Todos los Subprocesos	SC	Personal con experiencia	Cultivo
Externo	Plantas/Variedades	Tratamiento y Producción de Rosas	SC/GT	Camas Cultivables	Cultivo
Post-Cosecha	Hoja de Pedidos	Cosecha	SC	Mallas de Rosas	Post-Cosecha
Gerencia General	Sellos y Certificación	Todos los Subprocesos	SC	Ambiente de Trabajo Justo	Cultivo
Gerencia Técnica	Orden Indicadores de Gestión	Medición de Productividad, eficiencia, etc.	SC	Calidad de Información	Gerencia General

RECURSOS	**POLÍTICAS DE OPERACIÓN**
Humanos	→Políticas, planes estratégicos y operativos de la empresa.
Líderes del Proceso Trabajadores de Cultivo Cocheros	→Los bloques existentes no deben encontrarse fumigados.
Tecnológicos/Equipos/Otros	
Capacitación Mantenimiento	

INDICADORES	
Eficacia:	→ Porcentaje de planes de cultivo entregados.
	→ Porcentaje de proyectos de inversión tramitados
	→ Estudio y evaluación del total de proyectos.
	→ Nivel de eficacia de la MO
Eficiencia:	→ Cobertura del proceso de Cultivo por subprocesos.
	→ Nivel de eficiencia de las MO.
Productividad	→ Nivel de Productividad MO en el Proceso.
Otros indicadores como Througtput, Gasto de Operación, etc.	

DOCUMENTACIÓN SOPORTE
Interno
Manual de Funciones y Procesos Reglamento Interno Manual de Seguridad Documentación de Sellos y Certificaciones
Externo
Ordenanzas Municipales Documento de Licencia Ambiental

SISTEMAS DE INFORMACIÓN
Software Empresa

Table 7.1. Characterization Sheet Cultivation Process. Elaboration.: Edwin Imbaquingo (Dec. 2011).

7.2 *D*esign and Process Survey of Post-Harvest.

EMPRESA FLORÍCOLA FLORELOY S.A

CAYAMBE-ECUADOR

HOJA DE CARACTERIZACIÓN DE PROCESOS

PROCESO:	Productivos o de Realización.			**Código:**	
SUBPROCESO:	Post-Cosecha de Rosas			**Versión:**	
Responsable:	Jefe de Post-Cosecha	**Revisó:**	Jefe de Post-Cosecha	**Página:**	
Elaboró:	Edwin Imbaquingo	**Aprobó:**	Gerente Técnico	**Fecha:**	22-dic-11

OBJETIVO:	ALCANCE:
Asegurar que las órdenes de los clientes sean despachadas cumpliendo los requerimientos y especificaciones por ellos definidas, a través de ventas, (Pedidos de Flor a Post-cosecha).	Este proceso se considera desde que ingresa las mallas de rosas al cuarto pre-frío, hasta que la flor es cargada en el embarque para su traslado o es vendida y despachada del post-cosecha.
CONTROLES	**MECANISMOS O HERRAMIENTAS**
Rendimientos en las Actividades. Puntos de Corte en Recepción. Eficiencia del Proceso. Eficacia del Proceso. Productividad del Proceso. Seguimiento de Planes de Post-Cosecha	-Pulverizador - Árboles -Tinas -Banda Transportadora -Cortadora -Mesas de Boncheo y Clasificación -Epps.

PROVEEDOR	ENTRADA	SUBPROCESO	RESPONSABLE	SALIDAS	CLIENTE
Ventas	Pedidos	Pre-Frío/Sala/Frío	JP/AJP	Bonches de Pedidos	Empaque
Bodega	Insumos, Materiales y Equipos	Todos los Subprocesos	AJP	Insu., Mat y Equi. Requeridos	Post-Cosecha
Mantenimiento	Observación e Inspección de Equipos	Todos los Subprocesos	SP	Equipos en Buen estado	Post-Cosecha
Riego	Planificación de Riego	Todos los Subprocesos	SP	Agua	Post-Cosecha

Cultivo	Planificación de Producción	Plan de Ventas Post-Cosecha	JP/AJP/SP	Tallos de Producción	Pre-Frío
RR.HH.	Plan de Capacitación	Todos los Subprocesos	JP/AJP	Personal Capacitado	Post-Cosecha
RR.HH.	Control del Personal	Todos los Subprocesos	JP/AJP	Personal con experiencia	Post-Cosecha
Cultivo	Mallas de Rosas	Todos los Subprocesos	JP/AJP	Tabacos	Ventas/ Logística y Transp.
Gerencia General	Sellos y Certificación	Todos los Subprocesos	JP/AJP	Ambiente de Trabajo Justo	Post-Cosecha
Gerencia Técnica	Orden Indicadores de Gestión	Medición de Productividad, eficiencia, etc.	JP	Calidad de Información	Gerencia General

RECURSOS
Humanos
Líderes del Proceso Trabajadores de Post-Cosecha Trabajadores de ventas
Tecnológicos/Equipos/Otros
Capacitación Mantenimiento Motores de Enfriamiento PC's e Impresoras

POLÍTICAS DE OPERACIÓN
→ Para el proceso se debe considerar las políticas, planes estratégicos y operativos de la empresa. → Para realizar los subprocesos se debe verificar que las condiciones de los cuartos deben ser adecuados. → El uso de los Epps es obligatorio para todo el personal.

INDICADORES		
Eficacia:	→	Porcentaje de planes de Post-Cosecha entregados.
	→	Porcentaje de presupuesto invertido.
	→	Evaluación del rendimiento en las actividades.
	→	Nivel de eficacia de la MO
Eficiencia:	→	Cobertura del proceso de Post-Cosecha por subprocesos.
	→	Nivel de eficiencia de las MO.
Productividad	→	Nivel de Productividad MO en el Proceso.
Otros indicadores como Througtput, Gasto de Operación, etc.		

DOCUMENTACIÓN SOPORTE
Interno
Manual de Funciones y Procesos Reglamento Interno Manual de Seguridad Documentación de Sellos y Certificaciones Plan de Calidad
Externo
Ordenanzas Municipales Documento de Licencia Ambiental

SISTEMAS DE INFORMACIÓN
Software Empresa

Table 7.2. Sheet Process Characterization of Post-Harvest. Elaboration.: Edwin Imbaquingo (Dec. 2011).

7.3 Analysis of Results, Cost Analysis and Comparison Charts.

7.3.1 Preventive Action Pest-Crop Interaction Processes

Preventive Action Pest-Crop Interaction Processes

PLANNING AND CROP SPRAYING BLOCK				
PRAYING AND HARVESTING	AREA 1	AREA 2	AREA 3	N°
	GRUPO 1	GRUPO 1 Y 2	GRUPO 2	
BLOQUES A FUMIGAR DE 05H00 A 08H00	2^4^6		14^16^20	6
BLOQUES A COSECHAR DE 07H00 A 08H00	3^8	11^13	18^21	6
BLOQUES A FUMIGAR DE 08H00 A 09H00	3^8		18^21	4
BLOQUES A COSECHAR DE 08H00 A 09H00	1^5	9^10	15^17	6
BLOQUES A FUMIGAR DE 09H00 A 10H00	1^5		15^17	4
BLOQUES A COSECHAR DE 09H00 A 10H00	2^6	7^12	19^22^23	7
BLOQUES A FUMIGAR DE 10H00 A 11H00	11^13		19^22^23	5
BLOQUES A COSECHAR DE 10H00 A 11H00	4		14^16^20	4
BLOQUES A FUMIGAR DE 11H00 A 13H00		G1(7^9) G2(10^12)		4
TOTAL BLOQUES FUMIGADOS				23
TOTAL BLOQUES COSECHADOS				23

Table 7.3. Fumigation Process Plan Outcome-culture interaction. Prepared by: Edwin Imbaquingo (December 2011)

Table 7.3., The Plan presents the result of interaction processes-Post-harvest fumigation, which was based on the redistribution of beds.

The Plan of Interaction between processes Fumigation-culture and the new distribution of beds we have the following results:

- We won at harvest time in constant varieties in the areas and also in transport by coachmen.
- Post-harvest varieties will be constant over a given time, thus facilitating the process of classification and boncheo; also optimize long stems that are lost when you do not have the varieties in the same time in qualifying.
- Reduce the likelihood of contracting occupational diseases for the TC.
- We have a higher yield at harvest in blocks not sprayed, as CT, they will be supported to learn that the company is veiled by their health and wellbeing.
- The idea that our mind has to have a high number of beds in a block, cause job stress, with the new system people will have fewer beds, which will host the mind, resulting in a decrease in stress, and a better teamwork.

7.3.1.1 Corrective Action Process in the Harvest of Roses..

TRAVEL TIME USED IN CURRENT							
BLOCK	MINUTES	HOURS	HOURS	HOURS	HOURS	DOLLARS	Min/ person
N°	Day	Day	Week	Month	Year	USD ($) Year	min
BLOQUE 1A-1B	34,83	0,58	3,48	15,09	181,10	305,08	6,97
BLOQUE 10-12	56,34	0,94	5,63	24,41	292,97	493,54	9,39

BLOQUE 11-13	56,34	0,94	5,63	24,41	292,97	493,54	9,39
BLOQUE 14-16	56,34	0,94	5,63	24,41	292,97	493,54	9,39
BLOQUE 15-17	56,34	0,94	5,63	24,41	292,97	493,54	9,39
BLOQUE 18-20	48,66	0,81	4,87	21,09	253,05	426,30	9,73
BLOQUE 19-21	31,14	0,52	3,11	13,50	161,94	272,81	6,23
BLOQUE 2	28,17	0,47	2,82	12,21	146,49	246,77	4,70
BLOQUE 3	28,17	0,47	2,82	12,21	146,49	246,77	4,70
BLOQUE 4	28,17	0,47	2,82	12,21	146,49	246,77	4,70
BLOQUE 5	28,17	0,47	2,82	12,21	146,49	246,77	5,63
BLOQUE 6	28,17	0,47	2,82	12,21	146,49	246,77	4,70
BLOQUE 7	28,17	0,47	2,82	12,21	146,49	246,77	4,70
BLOQUE 8	28,17	0,47	2,82	12,21	146,49	246,77	5,63
BLOQUE 9	28,17	0,47	2,82	12,21	146,49	246,77	4,70
TOTAL	**565,36**	**9,42**	**56,54**	**244,99**	**2939,87**	**4952,55**	**99,93**

Table 7.4. Actual results Displacement time you make a TC for the Harvest. Prepared by: Edwin Imbaquingo (December 2011)..

TRAVEL TIME USED IN IMPROVED							
BLOCK	**MINUTES**	**HOURS**	**HOURS**	**HOURS**	**HOURS**	**DOLLARS**	**Min/ person**
N°	**Day**	**Day**	**Week**	**Month**	**Year**	**USD ($) Year**	**min**
BLOQUE 1A-1B	20,34	0,34	2,03	8,81	105,75	178,16	4,07
BLOQUE 10-12	30,82	0,51	3,08	13,36	160,26	269,98	5,14
BLOQUE 11-13	30,82	0,51	3,08	13,36	160,26	269,98	5,14
BLOQUE 14-16	30,82	0,51	3,08	13,36	160,26	269,98	5,14
BLOQUE 15-17	30,82	0,51	3,08	13,36	160,26	269,98	5,14
BLOQUE 18-20	28,09	0,47	2,81	12,17	146,04	246,03	5,62
BLOQUE 19-21	19,51	0,33	1,95	8,45	101,44	170,89	3,90
BLOQUE 2	19,59	0,33	1,96	8,49	101,88	171,63	3,27
BLOQUE 3	19,59	0,33	1,96	8,49	101,88	171,63	3,27
BLOQUE 4	19,59	0,33	1,96	8,49	101,88	171,63	3,27
BLOQUE 5	19,59	0,33	1,96	8,49	101,88	171,63	3,92
BLOQUE 6	19,59	0,33	1,96	8,49	101,88	171,63	3,27
BLOQUE 7	19,59	0,33	1,96	8,49	101,88	171,63	3,27
BLOQUE 8	19,59	0,33	1,96	8,49	101,88	171,63	3,92
BLOQUE 9	19,59	0,33	1,96	8,49	101,88	171,63	3,27
TOTAL	**347,95**	**5,80**	**34,79**	**150,78**	**1809,32**	**3048,01**	**61,56**

Table 7.5. Results Improved Displacement time you make a TC for the Harvest. Prepared by: Edwin Imbaquingo (December 2011).

TIEMPO DE DESPLAZAMIENTOS OPTIMIZADO							
BLOCK	**MINUTES**	**HOURS**	**HOURS**	**HOURS**	**HOURS**	**DOLLARS**	**Min/ person**
N°	**Day**	**Day**	**Week**	**Month**	**Year**	**USD ($) Year**	**min**
BLOQUE 1A-1B	14,49	0,24	1,45	6,28	75,34	126,93	2,90
BLOQUE 10-12	25,52	0,43	2,55	11,06	132,71	223,56	4,25
BLOQUE 11-13	25,52	0,43	2,55	11,06	132,71	223,56	4,25
BLOQUE 14-16	25,52	0,43	2,55	11,06	132,71	223,56	4,25
BLOQUE 15-17	25,52	0,43	2,55	11,06	132,71	223,56	4,25
BLOQUE 18-20	20,58	0,34	2,06	8,92	107,01	180,27	4,12
BLOQUE 19-21	11,63	0,19	1,16	5,04	60,50	101,92	2,33
BLOQUE 2	8,58	0,14	0,86	3,72	44,61	75,15	1,43
BLOQUE 3	8,58	0,14	0,86	3,72	44,61	75,15	1,43

BLOQUE 4	8,58	0,14	0,86	3,72	44,61	75,15	1,43
BLOQUE 5	8,58	0,14	0,86	3,72	44,61	75,15	1,72
BLOQUE 6	8,58	0,14	0,86	3,72	44,61	75,15	1,43
BLOQUE 7	8,58	0,14	0,86	3,72	44,61	75,15	1,43
BLOQUE 8	8,58	0,14	0,86	3,72	44,61	75,15	1,72
BLOQUE 9	8,58	0,14	0,86	3,72	44,61	75,15	1,43
TOTAL	**217,41**	**3,62**	**21,74**	**94,21**	**1130,55**	**1904,54**	**38,36**

Table 7.6. Time Displacement Results Optimized for performing a CT Harvest. Prepared by: Edwin Imbaquingo (December 2011).

Analyzing tables Summary we have:

- During the current crop of roses, considering the whole process of the blocks and all CT analyzed over a period of time, we have used daily journeys 565.36 minutes, which equates to 9.42 hours. With the corrected and improved distribution we used 347.95 minutes daily is equivalent to 5.80 hours spent on travel, with an optimization of 217.41 minutes equal to 3.62 hours per day.
- With the current distribution have a TC uses an average of 9.92 minutes to travel during the harvesting process. With corrected and improved distribution have a CT uses an average of 6.10 minutes in displacement during the harvesting process, optimizing an average of 3.81 minutes for each CT.
- So we can usually make multiple comparisons by making the change is not observed, but generally looking at optimizing note.
- To change the location of the containers is necessary to mention also should change the saran that shades the petals located at the top of each container.

Some important observations are:

- With the results we have that the stems of roses will hydrate over time.
- This new distribution works best when you make a good and proper planning Fumigation of blocks, as well we can perform the harvest in adjacent blocks.
- It is better to raise the performance by making changes to our workers feel supported, then ask workers to raise their performance without providing adequate tools does not work, rather increases the waste returns to try to make impossible by the method of work..

7.3.1.2 Process Improvement in the Harvest of Roses.

You can see the difference (time optimized) of the results to make changes wooden table tool. Table 7.7.

TIEMPO OPTIMIZADO				
TYPE	(Te) Wood	(Te) Tool	(Te) Optimized	(Te) Optimized
	min	min	min	seconds
C	1,06	0,88	0,18	11
B	1,38	1,21	0,17	10
R	1,67	1,52	0,15	9
PROMEDIO				10

Table 7.7. Optimized Time Harvest Process with changing table. Prepared by: Edwin Imbaquingo (December 2011).

Then we analyze the results with the table of Tool is optimized an average of 10 seconds on screen, as indicated, performed an average of 24 meshes per 240 seconds we have to optimize per person and get 240 seconds x 57 people = 13680 seconds, we see in Table 7.8.:

HARVEST TIME OPTIMIZED WITH TOOL TABLE						
SECONDS	MINUTES	HOURS	HOURS	HOURS	HOURS	DOLLARS
DAY	DAY	DAY	Week	Month	yerar	USD ($)
13680	228	3,80	22,80	98,80	1185,60	1997,28

Table 7.8. Optimized Time Harvest Process with changing table. Prepared by: Edwin Imbaquingo (December 2011)..

As a general result we need every day in the harvest process to the table tool can optimize an average of 228 minutes, equivalent to 3.80 hours, and besides that one side will be reduced by moving people make the move to a good table, and also decrease the effort of people to make meshes, resulting in a reduction of physical and mental stress and thus raising productivity levels.

7.3.2 Process of Post-Harvest..

7.3.2.1 Improved Collection of empty nets Activity.

The results considering the average course load meshes from empty containers behind current post-harvest, at a rate of 1 m in 1.057 seconds this by fatigue and weight of the cars have the time optimized for the drivers. See Table 7.9.

Day			Hours			COST(USD)		
Seconds	Minutes	Hours	Week	Month	Year	Week	Month	Year
2638,83	43,98	0,73	4,40	19,06	228,70	7,41	32,11	385,27

Table 7.9. Travel time to time by Coachmen mesh container load current. Prepared by: Edwin Imbaquingo (December 2011)..

Then a month between all the drivers optimize 19.06 hours which equates to $ 32.11, plus help to improve the collection and transportation of the meshes of post-harvest crop, thus expediting the threads in Post-harvest and increasing productivity.

With improved collection meshes have to use the front door to take part of the net empty and the rest of the mesh should be left in the back. With this alternative location of empty nets help each of the drivers to return as soon as possible to collect meshes with stems of the blocks.

7.3.2.2 Corrective Action Processes with Repetitive Work.

As a result we have appropriate methodology will provide an improvement in the process. The new methodology consists of one part in training and staff training in different activities (bonchar and classify particular), on the other hand having trained personnel, rotate during the day, every day or every week in different locations of position, allowing reduce stress at work during work monotonous or repetitive.

So the person will have to shift during the day a classifier processed an average of 1656 stems equivalent to 76 mesh and a bonchador if the percentage of process is 16% national average of 1391 stems Bonches equals 64, so process will reduce both the middle and will have little choice but to improve performance by reducing stress.

7.3.2.3 Corrective Action. Dehydration of Stems.

As a result we obtained in this action must be planned lunch hours between skater, binders, bonchadores and quality control. The skater must have each classifier with an average of 328 stems equivalent to 15 mesh (20 and 25 stems) at 12:00, time to be out to lunch. This rating agencies will lunch at 12h30, 12h45 at the bonchadoras and Quality Control at 13h00, with the policy that no stem should be dehydrated. The time of entry of the skater will be at 13h00 and will be within 30 minutes to have all the lists and sorting tables full of tights.

Classifiers must enter at 13h30, 13h45 at the bonchadores (at this time can supply their tables material) and quality control at 14h00. At 13h00 the classifiers have an average of 164 stems equivalent to 8 mesh. Moreover supervisors should be rotated one out to lunch with the skater and the other out to lunch with the classifiers.

7.3.2.4 Preventive Action. Quality Control Process.

In the process of quality control as a result have to be justifiable to the activity of stem cuttings there are two people trained properly and with the tools necessary to effectively control the product and what possible to ensure its permanence. For example if during a week of crop stalks were obtained but only 160 000 1420 00 stems were free of defects.

Efficiency = 142000/160000 * 100 = 88.75%

The efficacy was 88.75% is the percentage of fulfillment of the goal with stems of good quality, that is not fulfilled the effectiveness of quality.

Another example of controlling the measure of success can be seen in: The

development of classes, whether for a day of work produced 350 lines of which 250 branches are of good quality, others were reprocessed and used more material way affecting direct productivity.

Efficiency = 250/350 * 100 = 71.14%

This means that 71.14% of the branches are made of good quality. Also provides a format, which identify the branches made from defects and placed on it which helped to control the previous variants.

CONCLUSIONS

1) In FLORELOY SA was developed thanks to its openness and wholehearted cooperation of both human talent Cultivation Area of Post-Harvest and together with participants of the thesis has a manual process of the mentioned areas which consists of: Process Map Diagram of process activities, diagram functions, etc..,

2) The survey methodology process identified many opportunities for improvement, correction and prevention, and growing interaction with fumigation process, improved table layout container distribution improved and Post-Harvest collection mesh, in repetitive jobs in dehydration of stems and quality control. This represents changes and interesting developments in the study areas and will serve both for the welfare of workers and business in general.

3) The Harvest Process Interaction with the fumigation process is the heart of the process overall, and with proper planning and a better distribution of beds to the workers of culture, on the one hand improves the way you work interacted spraying, harvesting and collection and transportation of meshes of different varieties of roses to post-harvest activity that takes place every day from 3 to 4 hours depending on the production, and secondly avoiding waste and providing long stems a job with more security personnel.

4) In the critical process of Crop Harvest is held every day in the morning, improved from the table and got the correct location of containers rose mesh respectively with it is possible to obtain a substantial improvement in performance is optimized for an average of 7.814 minutes per worker culture, minutes of which raises the yield of 218 stems / hour to 247 stems / hour, improving productivity of labor (hours / employee) of 2 40 to 2.12 hours / worker, equivalent to a 11.74% improvement in productivity.

5) A Process Management System implemented in areas of cultivation and post-harvest activity to identify opportunities in each generation of ACPI (corrective actions, preventive or improvement) according to indicators related to the process so we can qualify and quantify in the area of culture, before harvesting generally in up to 7 blocks fumigated, constituting a risk to get diseases and reduce their rate of productivity improvement on the other hand the displacement can improve efficiency by 87%.

6) The cultural gap is rather easily palpable, observable in the company, this prevents the incorporation of new paradigms and excludes continuous improvement throughout the investigation the Head of the study

areas Cultivation and Post Harvest began debating many processes that for many years have not been altered, and allowed the leaders of the processes to identify wasted resources and duplication of activities and that issues of everyday life can not be identified and were assumed as a normal part .

BIBLIOGRAPHY

- GONZÁLEZ, Vázquez E., GONZÁLEZ, López, I. y PEREIRO, P. (1995). "Benchmarking, cultura empresarial para el siglo XXI". Marketing Turístico.
- HARRINGTON, H.J.: "El proceso de mejoramiento. Cómo las empresas punteras norteamericanas mejoran la calidad".
- CARNOTA, Orlando. "Curso Básico de Administración". Orlando
- CANTORNA, Sara. (1998) "La eficacia de los sistemas de control interno". Técnica del instituto de auditores (España). 82p.
- ISHIKAWA, K. (1985). "Guía de control de calidad". UNIPUB, Nueva York.
- KAPLAN, Robert S. y NORTON, David P. (1997): "Cuadro de Mando Integral" (The Balanced Scoreboard), Gestión 2000. Barcelona.
- AGUDELO, Luis F. y ESCOBAR, Jorge. (2007). "Gestión por Procesos". Medellín.
- Gardner, R.A. (2001). "Resolving the process paradox", Quality Progress.
- ARELLANO, J. (1997). "Manejo Post-Cosecha en el cultivo de rosas. Quito, Universidad Central del Ecuador, Facultad de Ciencias Agrícolas, Instituto de Postgrado, Programa de Especialización en Floricultura".
- FAINSTEIN, R. (1997). "Manual para el cultivo de rosas en Latinoamérica". Quito, Ecuaoffcet.
- THOMAS, J. (1991). Reportes científicos y artículos misceláneos acerca de las rosas. Inglés-Español. EE.UU .p. 55-59.
- UNOPAC, (1999). Unión de Organizaciones campesinas de Cayambe y Ayora. "La floricultura en Cayambe". UPS, Ayora.
- SUPERINTENDENCIA DE BANCOS Y SEGUROS. "Análisis de la industria florícola y su comportamiento crediticio".
- (CORPEI). Corporación de Promoción de Exportaciones e Inversiones. "Datos Estadísticos".

WEB PAGES

- http://www.slideshare.net/GestioPolis.com/produccion-y-sistemas-de-produccion
- http://www.geocities.com/SiliconValley/Way/4302/definiciones.html
- http://www.maquinariapro.com/sistemas/sistema-de-produccion.html
- http://www.monografias.com/trabajos12/pyme/pyme.shtml
- http://www.calidad.ugto.mx/archivos/Glosario.pdf
- http://www.monografias.com/trabajos16/centro-cimex/centro-cimex.shtml
- http://www.quality-consultant.com/gerentica/aportes/aporte_002.pdf

"Improving the quality directly generates a considerable increase in productivity levels"