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THEME:

**"SYSTEM DESIGN PROCESS MANAGEMENT IN THE
PRODUCTION LINE SPORTS SHIRTS SUBLIMATED OF
CONFECCIONES JHINOS FOR ENHANCING PRODUCTIVITY"**

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"System Design Process Management in the production line sports shirts sublimated of Confecciones JHINOS for enhancing productivity"

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Abstract.

This project was conducted in Confecciones "JHINOS" which it's dedicated to making sublimated sports uniforms, producing clothing such as shirts , shorts, heaters among others.

In order to improve productivity in the production line sublimated sports jerseys System Process Management was designed.

The project begins with the development of the theoretical foundations that were used for this research, then the analysis of the current situation of the company is presented using industrial engineering tools for describing the current process, through a time study and application of cause-effect diagrams identifying problems it is performed to establish improvements in threads. Later based on the problems discussed proposals to increase productivity was established, information on the threads in the proposed manual procedures documented. Finally, an analysis of results by establishing a comparison between baseline and improvement proposal.

Keywords

Process Management System, Manual Processes, Flowchart, Productivity.

Introduction

Confecciones JHINO'S is a company that is in a highly competitive market due to the existence of several companies engaged in the manufacture of sports uniforms in the city of Ibarra and the province of Imbabura, which requires employers to improve their processes continuously to differentiate position and stay in the market.

The company has disorder in its processes and does not have a defined organizational structure, a situation that has not allowed establish procedures, allocation of responsibility, the functions of workers and control in the working methods also delay occur in delivery order

occasioned by the lack of inventory control and disorganization storage area materials.

By designing a Process Management System, the organization can better understand their processes, will allow you to structure, control and improve them, maximizing their resources.

It is also necessary that each process is carried out efficiently and effectively to minimize costs and generate the required quality to maintain customer loyalty through maximum satisfaction of each of them.

This management system will enable the company to meet and establish the relationship between each of its departments, to assign responsibility for each process and specify the functions of each of its partners in both the administrative and operational area of the organization improve its overall performance and increase productivity of it.

Materials and Methods

Materials

The materials used in this research include office supplies such as paper, pencils, pens, CD's, flash memory, computer, and printer; also, it has been used tools for studying times, which are stopwatch, camera, time study board and forms for recording information.

Methods

Inductive – Deductive

For the development of the theoretical basis it is necessary to use inductive - deductive method because it allows compiling bibliographic information from other documents and books that serve as reference for the creation of the theoretical framework.

Descriptive method

You must use this method for diagnosis of the current situation of the company through direct observation and data collection. The descriptive method allows us to describe the information collected from numerical and graphical form.

Qualitative and Quantitative

These methods allow to acquire information on the current situation in which the company is located, we provide numerical data for later analyze the different results.

Inductive

Part of the particular facts to general statements, I mean, this implies that based on the results obtained through observations and raised information can hypothesize that provides solution to a problem presented.

Analytical

This method allows disintegrate a whole in several elements to thereby analyze separately each of its parts and thus know the relationships among them. Analysis is important because it allows us to know the characteristics of each of its parts; the analytical method allows us to know more detail the object of study. The use of this method allows knowing the main causes and effects that create the reality investigated.

2.1 Diagnosis of the current situation

Confecciones JHINOS is a company dedicated to making sports uniforms sublimated, producing clothing such as shirts, shorts, warmers, tights cycling, swimming and; in addition to selling all kinds of sports equipment such as balls, shin guards, knee pads, gloves and others; the factory is located in the street Manuela Cañizares and Leon (Facing the Condominiums "Square Garden" after the petrol station "Florida").

Description of the areas of the company

Table 2.1: Description of the areas of the company

ÁREAS		DESCRIPCIÓN
Management		Legally represent the company, evaluate, and monitor all areas of it.
Administration		Manage accounting enterprise systems and manage and inputs.
Sales		Customer service, reception order and order planning.
PRODUCTION	Diseño	Shirt model design and printing sheets sublimation.
	Cut	Tender and cut fabric pieces according to the amount of requested items.
	Sublimation	Transfer the leaf pattern sublimation cut pieces
	Making	Join the precut pieces and sew them according to the model set out in sheet production.
	Polished	Make finished garments to subsequently deliver them to the customer.

Analysis FODA

Has made the SWOT analysis in order to identify strengths and weaknesses, opportunities and threats, it allows a diagnosis to identify the improvement actions that can be applied in the company.

Table 2.2: Analysis FODA

FORTALEZAS	DEBILIDADES
Experienced staff. Brand loyal customers. Prices accessible to its customers. Position in the domestic market. Development of novel product designs according to fashion trends	Disruption of processes and lack of allocation of functions. Misallocation of plant Inventory control inefficient. Lack of training programs for staff throughout the company. There are no investments in advertising strategies.
OPORTUNIDADES	AMENAZAS
Offer training institutions for the textile area. Use of new technologies. Possibility general contracts with public and private institutions at the local level. Counseling and vocational training. Fads and trends. International agreements that expand the supply of textiles and apparel.	Increased new competition. Political and economic instability in the country. Unfair competition Rising costs of raw materials and supplies. Year sales variables Establishment of economic policies by the government and negatively affecting the textile and apparel sector.

Diagram SIPOC

It is a tool to visualize the process in a more simple way, in this diagram supplier, inputs, processes, outputs and customers is presented.

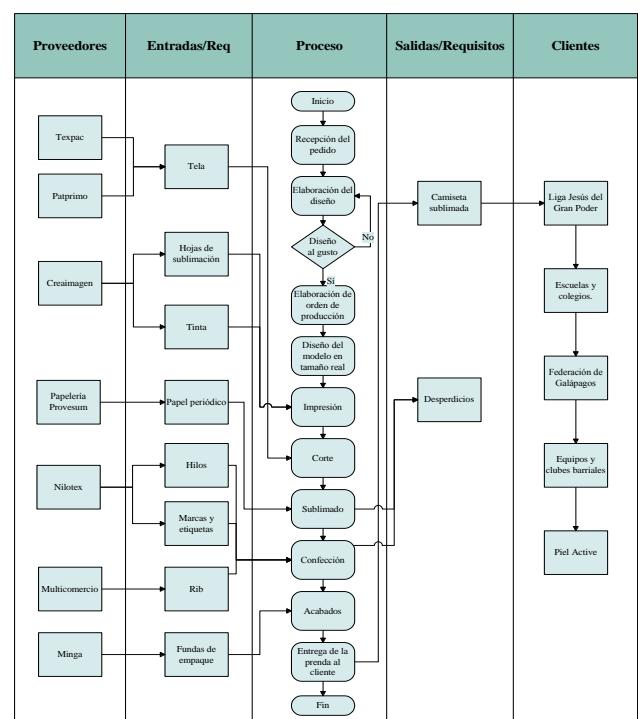


Figure 2.1: Diagram SIPOC

Process Flow Diagram

Through this diagram you can learn about the different activities taking place in the process of making sublimated sports jerseys.

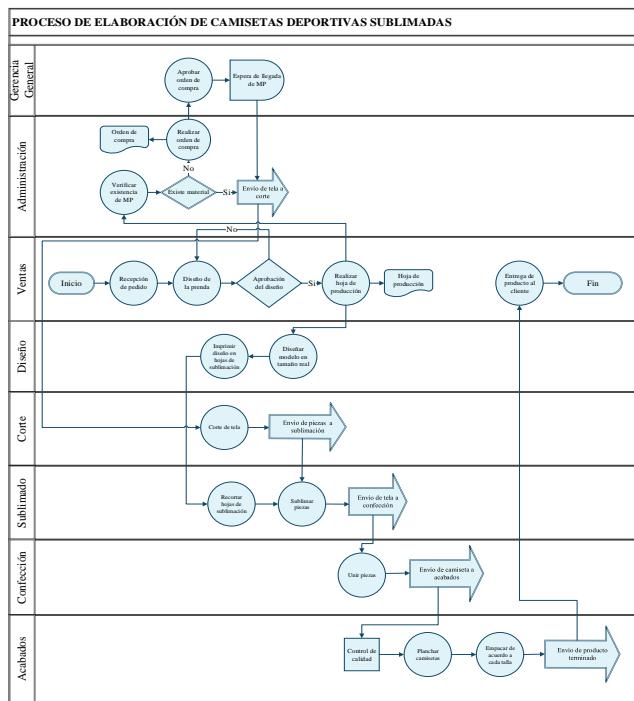


Figure 2.2: Process Flow Diagram

Calculating the cycle time

To calculate the cycle time of each process a time study is performed by using a stopwatch and direct observation of the process.

Table 2.3: Cycle time

Process	Time (min/camiseta)	Number of employees
Design	6,00	2
Cut	5,28	1
Sublimation	6,25	1
Making	10,91	2
Polished	4,54	2
Packaging	1,81	1
TOTAL	34,79	9

Table 2.4: Acquisition cycle time MP

Process	Time (min)	Time (hours)	Number of employees
Acquisition MP	1855,43	30,92	1

Therefore, the total to make 50 shirts time taking into account the acquisition time of raw material and production time is as follows:

$$\text{Total Time} = \text{Time acquisition time} + \text{Production time MP}$$

$$\text{Total time} = 1855,43 \text{ min} + 1739,64 \text{ min}$$

$$\text{Total time} = 3595,07 \text{ min}$$

The total time is 3595.07 min; 59.91 hours therefore can determine that the delivery time of the order of 50 t is 7.48 days.

Diagramming Cause - Effect

Cause and effect diagrams to identify the main causes of the problems generated in each of the areas of the company, which affect production time.

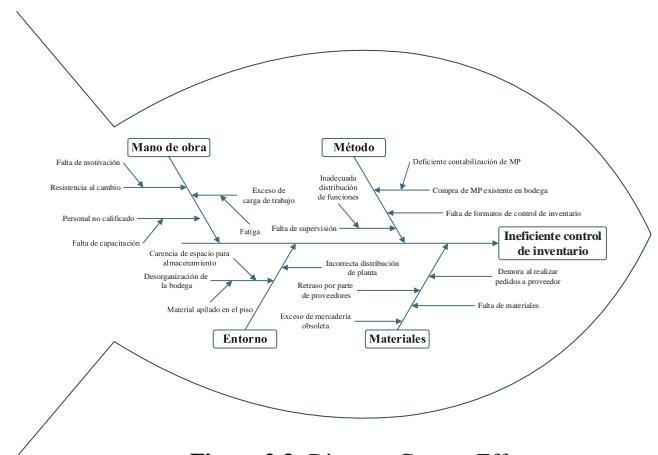


Figure 2.3: Diagram Cause - Effect

This diagram was applied to areas that have a higher cycle time, below is an example.

Calculation of the current productivity

For measuring productivity proceeds to use the following data:

Table 2.5: Data collected

COLLECTED DATA	
Working days per month	24
Hours per day	8
Total hours of work per month	192
Order Delivery time (week)	1
Number of shirts produced	50
Cycle time min / t	71,89
Cycle time (hours)	59,91
Production per hour (t)	0,84
Number of workers	9

$$\text{Labor productivity} = 0,10 \frac{\text{shirts}}{\text{hour / worker}}$$

General productivity = 0,84 shirts/hour

Production capacity = 161,28 shirts/hour

Results

Design of structural organizational chart

The design of the structural organization allows the company to identify and meet the levels of authority, relationships responsible for each of the departments, which must handle the correct operation thereof.

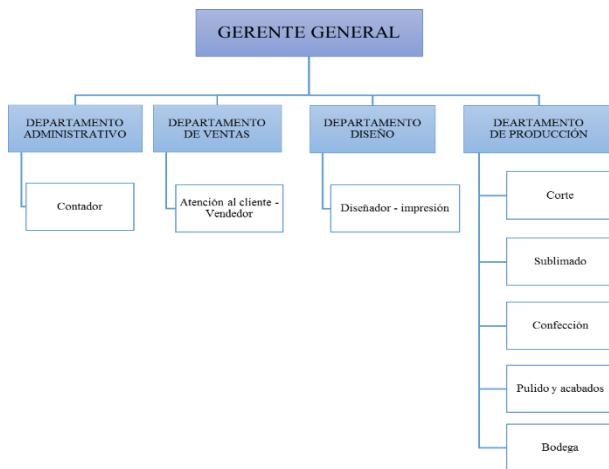


Figure 2.4: Structural organizational

Macroprocess design Confecciones JHINOS

It allows a clear view of the processes and threads that are part of the company consists of Strategic Processes, Key Processes and Support Processes.



Figure 2.5: Macroprocess

Proposal for improvements in the current Management by Processes

1. Improved Distribution Plant

In the layout made in the diagnosis of the current situation of the company it was evident that there is accumulation of material, which are located in the wrong place within the company causing the lack of inventory control.

For this reason, it is important to an improvement in the distribution of plant designating a specific place for the storage of raw materials and supplies that will be located in an orderly manner each of the materials handling labels to differentiate.

By establishing an exclusive space for storage area and creating formats for recording inventory control can reduce delays in delivering the order to the customer, which directly affects the delivery time of the final product, this would be achieved through constant handling of formats and ordering materials in advance before knowing the safety stock available and considering the time of their acquisition.

Formats for recording inventory control

CONFECCIONES "JHINOS"	
CONTROL DE INVENTARIO	
Listado de Productos	
	Listado de Proveedores
	Listado de Clientes
	Ingresos y Egresos
	Stock

Through these records it is possible to control the number of units available to the company thus preventing the acquisition of materials that are in stock also reduces the time of delivery of the product because it already has raw materials and supplies in inventory and you do not need to wait for the time of acquisition and delivery of materials.

2. Elimination of non-value added activities

Based on the analysis of the activities of the production process of making sports jerseys sublimated determined that there are activities that can be removed, added or combined with others, which allow the company to reduce the standard production time and consequently increase productivity.

He proceeded to take the time of the activities that were added since they are easy to perform in order to get real data to know the variation of the time.

Similarly removed acquisition time of raw materials and inputs as above distribution plant was performed and formats for inventory control, thus designed the garments can be made immediately without waiting time supply of materials.

Table 3.2: Removing activities

ÁREAS	Number eliminated activities	Number of combined activities	Number of activities added
Design	3		1
Cut	4	2	1
Sublimation	5		1
Making	5		1
Polished	4	3	1
Packaging	1		
TOTAL	22	5	5

3. Reallocation of staff

Here it is proposed to distribute the personnel taking into account that the company does not want to hire or reduce the number of personnel currently available. It has nine employees which are distributed in the respective areas with a working day of 8 hours per day.

To calculate the number of workers is taken into account improved cycle time based on the elimination and combination of activities previously carried out.

Then the percentage of time for each area based on the total time of the production process is calculated.

Table 3.3: Percentage of time by area

Process	Time (min/shirts)	Percentage of time (%)
Design	5,96	21%
Cut	1,57	6%
Sublimation	6,19	22%
Making	8,60	30%
Polished	4,3	15%
Packaging	1,78	6%
TOTAL	28,4	100%

For the number of workers the percentage obtained in each area by the total number of workers of the company, I mean, for the first operation we get the following is multiplied. $9 * 21\% = 1,89$. We perform the same for the following areas.

Table 3.4: Number of employees

Process	Time	Number of employees	Percentage (%)	Total number of workers Initial Situation	Number Workers Proposal	Percent difference
Design	5,96	2	21%	9	1,89	11%
Cut	1,57	1	6%	9	0,50	50%

Sublimation	6,19	1	22%	9	1,96	-96%
Making	8,60	2	30%	9	2,73	-73%
Polished	4,3	1	15%	9	1,36	-36%
Packaging	1,78	2	6%	9	0,56	144%
TOTAL	28,4	9	100%		9	

The first data obtained is 1.89 which indicates that is required to use 100% first time the operator and 89% the second time for maximum production in this area. It may show that initially was needed to work with 100% time of the two operators and by redistributing we have a 11% remaining time it can be used in other processing activities or to support the percentage of time in another area. This was done in each of the areas to reduce idle time and occupy efficiently in areas that require it.

It is important to distribute work properly with the aim of reducing the idle time in some areas and occupy other need. Per day production is improved as follows:

Table 3.5: Improved Productivity

Process	Standardized production proposal (units/day)
Design	152
Cut	152
Sublimation	152
Making	152
Polished	152
Packaging	152

Comparison of results between the current situation and proposals for improvement

According to the implementation of the improvements, the following information was obtained:

By improving plant distribution, it is obtained an improvement in productivity of 1,72 shirt/hour and 13,76 shirt/day.

Table 3.6: Proposal 1

Analysis variables	Situation (Improved Lay out)	
	Initial	Proposal
Production	6,72 shirts/day	13,76 shirts/day
Labor productivity	0,10 shirts/hour/employee	0,19 shirts/hour/employee
Process productivity	0,84 shirts/hour	1,72 shirts/hour

Applying an improvement activity by eliminating a productivity of 2,11 shirts per hour is obtained and a reduction of 81 - 62 activities is presented.

Then the increase in productivity occurs.

Table 3.7: Proposal 2

Analysis variables	Situation (Removing activities)	
	Initial	Proposal
Production	6,72 shirts/day	16,88 shirts/day
Labor productivity	0,10 shirts/hour/employee	0,23 shirts/hour/employee
Process productivity	0,84 shirts/hour	2,11 shirts/hour
Number of activities	81 actividades	62 actividades

Through a reallocation of staff productivity to 19,01 shirt per hour in a day of 8 hours a day is improved. Similarly, labor productivity is improved 0.10 shirt / hour / employee a 0.23 shirt/hour/employee. The number of workers is preserved because a redistribution of staff that the company has performed.

Table 3.8: Proposal 3

Analysis variables	Situation (Reassigning workers)	
	Initial	Proposal
Production	6,72 shirts/day	152,11 shirts/day
Labor productivity	0,10 shirts/hour/employee	0,23 shirts/hour/employee
Process productivity	0,84 shirts/hour	19,01 shirts/hour

Later it will release the results of the administrative and productive part of the company accompanied the respective support the document made in order that it can take into account the changes proposed for increasing productivity.

4. Conclusions

The collection of the theoretical basis about Process Management System identified the tools that were used to analyze the initial situation of Confecciones "JHNOS" with which the proposed improvements for increased productivity was established.

The analysis of the initial situation of the company allowed to set the standard time of 71,89 min/shirt and initial productivity in the production line sublimated sports jerseys of 0,84 shirt/ hour with a monthly production capacity of 161,28 shirt/month and identify the main causes of the problems these being: lack of inventory control, disorganization storage area of materials, execution of unnecessary activities and improper distribution of staff.

The proposed System Design Process Management improved the distribution plant through the creation of an exclusive space for storage of materials, eliminating activities that do not create value, reduce production time

and redistribute staff that the company has now improving productivity.

When performing a comparative analysis between the current situation and the proposed improvement it was achieved:

Increase productivity of 0,84 shirt/hour to 1,72 shirt/hour by proposing efficient inventory management and construction of the winery.

Reduce the cycle time of 71,89 min/shirt to 28,4 min/shirt and increase business productivity of 0,84 shirt/ hour to 2,11 shirt/hour by eliminating activities and 19,01 shirt/hour through redeployment.

Thanks

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