MANAGEMENT INFORMATION AND EVALUATION SYSTEM (MIES) - A STRUCTURED COST PLANNING AND CONTROL TOOL

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Resumo:

This paper presents a model for a management information system that offers cost and efficiency measures of processes, activities and products, which is a powerful tool for planning the companys future change and controlling the day to day operation. MIES (Management Information and Evaluation System) is a management tool to structure the organization Data aiming to support the decision making process when cost information is needed. It is based on the UEP (Product Effort Unit) Cost System and ABC (Activity Based Costing) concepts. This model proposes a system that integrates all areas in the organization supporting each decision making levels for its different purposes. It can be used for planning, prevention through simulations, controlling operations and efficiency on monthly basis as well as checking the economic results of projects. Furthermore, MIES is not designed to be used independently, but as a tool for problem solving projects, Quality Control Circles, Total Quality Management or any other improvement methodology, helping the decision making process by offering economic data.

Área temática: *Custos e Tomada de Decisões*

5.4. MANAGEMENT INFORMATION AND EVALUATION SYSTEM (MIES) - A STRUCTURED COST PLANNING AND CONTROL TOOL

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ABSTRACT

This paper presents a model for a management information system that offers cost and efficiency measures of processes, activities and products, which is a powerful tool for planning the company's future change and controlling the day to day operation.

MIES (Management Information and Evaluation System) is a management tool to structure the organization Data aiming to support the decision making process when cost information is needed. It is based on the UEP (Product Effort Unit) Cost System and ABC (Activity Based Costing) concepts.

This model proposes a system that integrates all areas in the organization supporting each decision making levels for its different purposes. It can be used for planning, prevention through simulations, controlling operations and efficiency on monthly basis as well as checking the economic results of projects.

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Keywords: Management Information System, Cost Management, Planning and Control

I. INTRODUCTION

In order to enable continuous improvement in Quality and Productivity indicators, the modern organization management information system shall be adequate to the new competitive environment, mainly related to cost management and control.

Cost information is not just a simple data to calculate product profitability. Nowadays cost it is a target to be achieved aiming to secure the company's competitiveness in an world open trade economy.

Furthermore, new manufacturing systems, such as Just In Time and new manufacturing strategies, such as Total Quality Control and Reenginnering, need some control on the process based productive flow. These systems have a concept to structure the company on many business units and require a great deal of information to function accordingly. The new Horizontal Organization is structured in processes and activities, incorporating the concept of internal customer and supplier, which devides the company in small business units working to achieve one common goal: Customer satisfaction resulting with the company's success.

Thus, Management Information systems shall incorporate process and activity cost measures to guide the company's decision making process. New manufacturing strategies can't ignore how much it is costing to implement new changes and it is also necessary to know in advance the return on investment in new technologies.

II. COST SYSTEMS AND THE NEW HORIZONTAL ORGANIZATION

Traditional cost systems were created to help management overview product cost and profitability. The company's envirronment had characteristics such as mass production, high labor costs, company oriented, Quality as a department, low competition. Thus, knowing exactly how products and services consume resources was not demanding. Nowdays, the market has changed, competition is very high, Supplies and overhead cost are higher than direct labor costs, customers require the best quality at the lowest cost. Therefore, new cost information is needed to enable management to make the right decisions that will bring the company competitive advantage.

Some characteristics of traditional cost systems that aren't adequate for modern organization's environment, are described below.

- Cost for pricing: Traditional cost systems mainly objective to estimate costs in order to estipulate product price. Today, the price is estipulated by the market, and in this case, the company should be able to produce its products at a cost below market price in order to be profitable. Thus, cost information has a managerial focus to help the company in controlling its operations and achieve the desired results. Traditional cost systems don't bring enough information to point to cost causes. Furthermore, distortions caused by this systems on product profitability may cause managers to make the wrong strategic decisions.

- Indirect costs (automation and services) higher than direct costs: Traditionally, management enphasis was based on production. Support activities such as marketing, sales and customer services were considered secondary e its costs were low. Today, such activites

are as important as producion, demand higher costs and shall be considered for cost management.

- Mass production and homogeneity: in the beggining of the century companies use to produce anourmous quantities of one product and they had high inventory. Cost calculations were simple and adequate to this type of production. Modern companies work with mininum inventory and produce a great variety of products. Diversified products consume different resources from the organization. This, allocating costs to products has become a more comples task and requires cost drives that represent the right amount of resources necessary to produce manufactured goods.

- Focus on production: Henry Ford sais once that americans could choose their car's color as long as it was black. This picture is not present on the market anymore. Competitiveness growth puts the customer on the driver's seat, when companies are doing their best to please the customer with high investments in market surveys and technology.

- Depreciation data taken from financial reports: Traditional cost systems use depreciation information based on the financial report because these costs were not representative. But automation and high technology have made equipment costs an important part of the overall costs and therefore they shall be as accurate as possible when calculating activity costs.

- Allocation basis: As a way to identify, control and act on the expenses generated to manufacture products, the allocation base normally utilized is direct labor hours or is based on the volume of manufactured goods. But today, indirect costs and supplies represent the majority of most company's costs. Therefore, using direct labor to allocate costs to products is not representative in the modern organization.

- Information agregation level: The modern organization is based on the horizontal excellence flow of business processes and not departments. Therefore, cost systems have to be adequate to this reality, providing information about processes and their activities, allowing a broader understanding of internal processes in a way that they can be better managed.

The modern organization has an horizontal production flow of processes and management focus should lie on its processes, not vertical departmentes. Therefore, generic cost information for the whole organization has become obsolete because companies need to improve dramatically productivity and market share and the way they are doing it it thrgough better quality, flexibility, time and lower costs.

In order to achieve continuous improvement it is necessary to reduce the evaluation scope from an holistic overview to a specific one. The figure below shows an example of modern companies management structure.

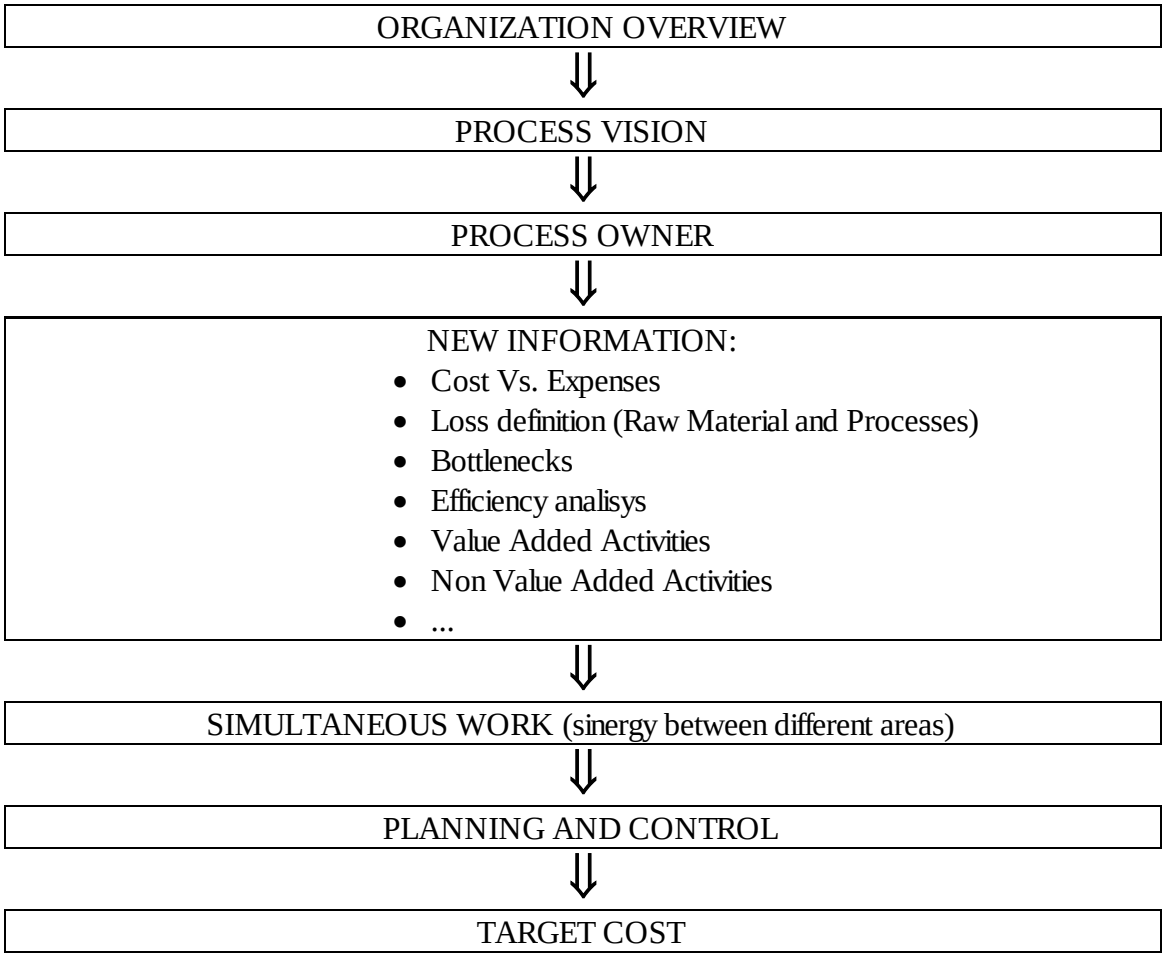

Fig 1: Modern Company Management Structure

Information on processes and activities allow a precise, structured fast planning and change to achieve significant financial results. This information needs to be structured in a management system, linked with all areas in the organization. This is what is proposed by MIES (Management Information and Evaluation System).

III. WHAT IS MANAGEMENT INFORMATION AND EVALUATION SYSTEM (MIES)

MIES is a management tool to evaluate how resources are used on manufacturing sold goods. MIES distributes these resources between manufacturing, support and administrative processes, providing information to support the decision making for planning and control.

The system is based on UEP (Production Effort Unit) and ABC (Activity Based Costing) concepts to obtain cost of processes and products. Basic assumptions of this two methods are described below:

UEP - Production Effort Unit

This method applies the principle that productive processes require the same type of resources, such as labor, equipment, materials, etc, and they are utilized in different quantities. The consuption of resources by activities is called Productive Effort. Thus, it is possible to compare different activities and products by the amount of productive effort spent by them.

For example, considering two copy machines, a manually fed (C1) and an automatically fed (C2). The final product will be the same, but C1 can produce 1 copy in 15 seconds while C2 can produce 5 copies in 15 seconds. The copy machine C2 can produce 5 times more than C1 in the same amount of time. Thus, the productive capacity of C2 is five times the capacity of C1 (C2=5C1).

The same assumption is used for costs, creating productive relations between processes and products. This method allows multi-product companies to evaluate and compare the cost of many different products as well as mono-product companies to evaluate their different processes using the same basis.

ABC - Activity Based Costing

ABC first allocates costs to activities using representative cost drives and then distributes activity costs to products. For example, instead of using number of employees in certain activity to distribute the sales costs, a more representative cost driver would be the number of orders for that activity.

The key point of this method is to find the real cause of costs through cost drivers, resulting in more accurate cost data and providing information at a micro level to support decision making.

MIES utilizes UEP method for productive processes and ABC method for support processes, providing a powerful tool for activity management.

The system is not designed only to obtain process and product cost, but it is also designed to evaluate the losses caused by failures or non utilization. MIES provides a standard cost, which is the regular cost under normal conditions based on historical data and financial budget reports. This standard cost is then the basis to compare the day to day operation of the business and can also be called target cost, for it does not include failures, breakdowns or non utilization. The difference between what is spent each month and the target cost are considered losses, that will be classified under categories such as: waste, rework, non-utilization, remakes, etc.

This tool allows periodic review of actions implemented through time and gives management economic data for their improvement projects at the process level.

IV. MIES data model

The system aims to create a pattern to be the basis or deviation control through the comparision between the pattern cost and what is happening every month.

Mies data model is composed by four data plans and four result plans, as shown below:

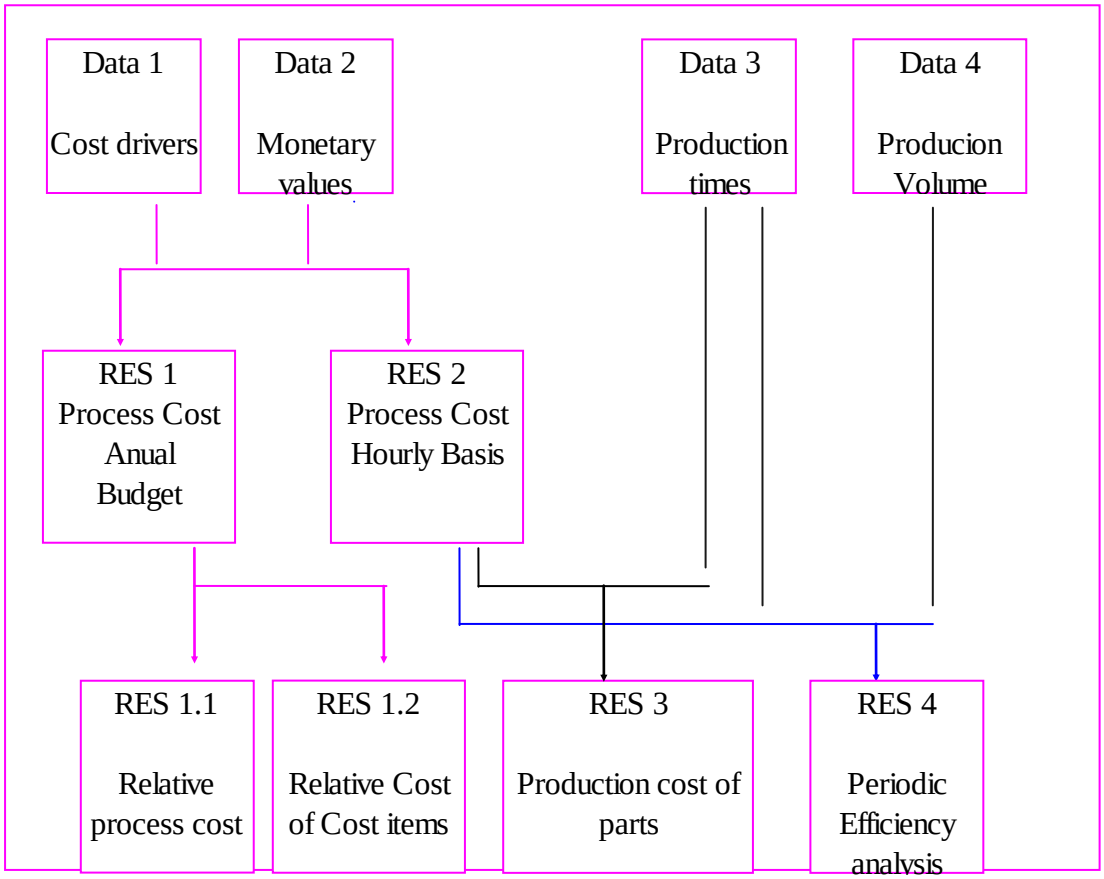

Fig 2: MIES data model

2.3 MIES Data Base

The system utilizes four main variable for definition of managerial information: Cost Drivers, Monetary values, operating time and production volume, described as follows:

- **DATA 1:** Database 1 corresponds to the percentual distribution of cost items through the processes. They are cost drives to allocate resouces to processes.
- **DATA 2:** Corresponds to the monetary value of cost items according to the annual budget. This data can be obtained through the year history or the year's budget.
- **DATA 3:** It is the processing time of parts in each process.
- **DATA 4:** It is the total volume of each part produced in a period of time, usually a month.

2.4 MIES preliminary results

- **RES 1:** Result 1 plan corresponds to the annual budget distributed along processes in Business Units. This plan comes from database 1 and 2.
- **RES 1.1:** Result plan 1.1 is the relative participation of processes in its Business Unit.
- **RES 1.2:** Result plan 1.2 is the relative participation of cost items in each process and in the overall Business Unit.
- **RES 2:** Result plan 2 corresponds to the hourly cost of processes and it is obtained through databases 1 and 2.
- **RES 3:** Result plan 3 provides component costs. These results come from the combination of database 4 and Result plan 2.
- **RES 4:** Result plan 4 is an efficiency analysis for a certain period of time, which can be provided monthly or annualy. It analyses variations between the standard cost (cost in normal conditions and according to the budget) and expenses through the period (what really happened). This is obtained using database 3, database 4 and Result plan 2.

Many other results can be obtained by the system, such as cost of rework, waste, brakes, internal failures etc. MIES offers databases that can be combined to produce different results depending on the company's needs.

IV - POTENCIAL INFORMATION PROVIDED BY MIES AND ACTIONS SUPPORTED AND CONTROLLED BY THE SYSTEM

IV.1 PLANNING AND CONTROL

1. Process improvement;
2. Better use of human, physical and financial resources;
3. Profitability analysis;
4. Cost analysis;
5. Process substitution or reengineering;
6. New process design;
7. New products design;
8. Use of alternative raw-material;
9. Identification of financial gain or loss;
10. Return on investment analysis;
11. Product and Process profitability analysis;
12. Simulations on adding or reducing resources:

- Higher production: efficiency levels, bottle necks;
- Lowering fabrication time: reduction on costs, improving capacity and efficiency levels;
- Redistribution of cost drivers and resources, comparision between target cost and monthly performance.

IV.2 INDIRECT RESULTS

These are analysis that can be done using information from the system, although aditional information is necessary for decision making.

1. Downsizing analysis;
2. Producing or buying option;
3. Raw-material substitution;
4. Supplies substitution;
5. Budget comparasion (monthly/annually);
6. Plan and actual situation comparasion - Forecast analysis;
7. Research on new processes, products and materials;
8. Balanced process timing.

V. MIES SIMPLIFIED EXAMPLE

Tables 1 and 2 below present the distribution of production costs for 3 processes and the value of resources consumed by this processes for each cost item.

COST ITEMS	UNIT	TOTAL	PROC 1	PROC 2	PROC 3
Salary labor (wages + taxes)	Labor/proc	6.00	3.00	2.00	1.00
Direct labor (wages + taxes)	Labor/proc	19.00	10.00	5.00	4.00
Indirect labor (wages + taxes)	Labor/proc	1.00	0.20	0.30	0.50
Building/installation services	Percent	1.00	0.50	0.30	0.20
Insurance	Percent	1.00	0.35	0.35	0.30
Investment	Value $$	750,000.00	500,000.00	150,000.00	100,000.00
Usefull life of equipment	Years		10	10	15
Electricity	Kw	220	100	50	70
Specific area maintenance	Percent	100%	15%	50%	35%
Specific supplies	Percent	100%	25%	35%	40%
General supplies	Percent	100%	20%	50%	30%
Outside services	Percent	100%	10%	10%	80%
Utilities	Percent	100%	30%	40%	30%

Table 1 - Allocation Basis / Cost Drivers

COST ITEMS	TOTAL (US$/YEAR)
Salary labor (wages + taxes)	32,400.00
Direct labor (wages + taxes)	86,640.00
Indirect labor (wages + taxes)	7,800.00
Building/installation services	30,000.00
Depreciation	71,666.67
Electricity	79,200.00
Specific area maintenance	50,000.00
Specific supplies	70,000.00
General supplies	25,000.00
Outside services	23,000.00
Utilities	42,000.00

Total Value	520,706.67

Table 2 -Cost Items Value

Following the sequence, table 3 quantifies some other information that are important in the development of this theorical example.

Hours worked per year	6,000
Average hour worked per month	500
Annual production volume	16,000 units
Salary labor (wages + taxes) monthly	450.00
Direct labor (wages + taxes) monthly	380.00
Indirect labor (wages + taxes) monthly	650.00
Kwh cost	0.06

Table 3 - General Data

Tables 4 and 5 present processing time and total production volume for 3 different products in each process.

	Proc 1		**Proc 2**		**Proc 3**	
	setup	**operation**	**setup**	**operation**	**setup**	**operation**
Prod A	0.006	0.40	0.008	0.20	0.004	0.25
Prod B	0.007	0.20	0.005	0.10	0.004	0.25
Prod C	0.020	0.20	0.013	0.40	0.010	0.50

Table 4 - Products processing time through processes in hours

	JAN	**FEB**	**MAR**
PROD A	900	1250	100
PROD B	200	0	0
PROD C	300	0	900

Table 5 - Production volume per month

Tables 1 through 5 presented the data model for the system. Next, tables 6 to 8 will show some results obtained from the data tables such as process costs, product unit cost and monthly processe efficiency.

COST ITEMS	**TOTAL**	**PROC 1**	**PROC 2**	**PROC 3**
FIXED ITEMS (US$/hour)	**51.78**	**27.57**	**13.17**	**11.05**
Salary labor (wages + taxes)	5.40	2.70	1.80	0.90
Direct labor (wages + taxes)	14.44	7.60	3.80	3.04
Indirect labor (wages + taxes)	1.30	0.26	0.39	0.65
Building/installation services	5.00	2.50	1.50	1.00
Insurance	0.50	0.18	0.18	0.15
Depreciation	11.94	8.33	2.50	1.11
Electricity	13.20	6.00	3.00	4.20
VARIABLE ITEMS (US$/product)	**13.13**	**2.81**	**5.07**	**5.25**
Specific area maintenance	3.13	0.47	1.56	1.09
Specific supplies	4.38	1.09	1.53	1.75
General supplies	1.56	0.31	0.78	0.47

Outside services	1.44	0.14	0.14	1.15
Utilities	2.63	0.79	1.05	0.79

Table 6 - Process costs by cost item per hour (fixed costs) and per product (variable costs)

PRODUCTS	**PROC 1**		**PROC 2**		**PROC 3**		**TOTALS**		
	Setup	oper.	Setup	oper.	Setup	oper.	Setup	oper.	Setup+ oper
PROD A	0.165	13.834	0.105	7.702	0.044	8.013	0.315	29.55	29.86
PROD B	0.184	8.320	0.066	6.385	0.044	8.013	0.294	22.72	23.01
PROD C	0.0551	8.320	0.176	10.335	0.111	10.776	0.837	29.43	30.27

Table 7 - Product unit costs

PROC 1			
	JAN	FEB	MAR
Total available hours	500	500	500
Total utilized hours	460	500	220
Efficiency	92%	100%	44%

PROC 2			
	JAN	FEB	MAR
Total available hours	500	500	500
Total utilized hours	320	250	380
Efficiency	64%	50%	76%

PROC 3			
	JAN	FEB	MAR
Total available hours	500	500	500
Total utilized hours	425	312.5	475
Efficiency	85%	63%	95%

Table 8 - Process Efficiency Analysis by period.

From this presented database and preliminar results, it will be showns some simulations through hipotetic scenarios.

SCENARIO 1

- Company need:
  - Increase profit margin of Product A to achieve a minimum of 10%.
- Actual situation:
  - Product A actual sale price: $ 31.00 (not including taxes, comissions, etc...)
  - Product A manufacturing cost: $ 29.86
  - Actual profit margin: 3.82%
- Objective:
  - Reduce product A cost, being a target a maximum cost of $ 27.90
- Cost reduction possibilities:
  - Time variable: reduce production time of product A (setup time and/or production time);

- Fixed cost variable: increase production volume and/or reduce utilized resources;
- Variable cost: reduce volume and/or reduce material aquisition cost;

- Hipothesis 1: Reduction on production time for Product A

Product A production time is longest on Process 1 (bottleneck). Simulating reduction on setup time and production time, it is possible to increase production volume for a better utilization of fixed resources.

- Actual Situation:
  - Setup time for process 1: 0.006 hours, which corresponds to $ 0.165 per product.
  - Production time for process 1: 0.40 hours, which corresponds to $ 13.834 per product.

- Desired situation:
  - Setup time for process 1: a major reduction in setup time will not garantee a significant gain.
  - Production time for process 1: if it is less or equal 0.33 hours will result in a total cost of $ 29.70 (see table 9)

PRODUCTS	**PROC 1**		**PROC 2**		**PROC 3**		**TOTALS**		
	Setup	oper.	Setup	oper.	Setup	oper.	Setup	oper.	Setup+ oper
PROD A	**0.165**	**13.834**	0.105	7.702	0.044	8.013	**0.315**	**29.55**	**29.86**
PROD B	0.184	8.320	0.066	6.385	0.044	8.013	0.294	22.72	23.01
PROD C	0.0551	8.320	0.176	10.335	0.111	10.776	0.837	29.43	30.27

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PRODUCTS	**PROC 1**		**PROC 2**		**PROC 3**		**TOTALS**		
	Setup	oper.	Setup	oper.	Setup	oper.	Setup	oper.	Setup+ oper
PROD A	**0.165**	**11,871**	0.105	7.702	0.044	8.013	**0.315**	**27.59**	**27.90**
PROD B	0.184	8.320	0.066	6.385	0.044	8.013	0.294	22.72	23.01
PROD C	0.0551	8.320	0.176	10.335	0.111	10.776	0.837	29.43	30.27

Table 9 - Product A cost alteration by reducing production time on process 1

- **Hipothesis 2: Reduction on fixed costs**

Process 1 is the one of the highest fixed cost among those 3 processes. Therefore, it is the one chosen to be worked on reducing its costs.

Actual situation:

Total fixed costs for Process 1: US$ 27.57 per hour

Product A costs on Process 1: US$ 11.027 per unit

Desired situation:

Total fixed costs for Process 1: US$ 22.668 per hour

Product A costs on Process 1: US$ 9.067 per unit

In order to achieve these target costs, some changes will be made on the process, as shown below:

COST ITEMS	UNIT	PROC 1 Actual	PROC 1.1 Simulation
Salary labor (wages + taxes)	Labor/proc	3	2
Direct labor (wages + taxes)	Labor/proc	10	8
Usefull life of equipment	Years	10	12

These modification will alter the product and process cost as shown on Table 10.

PRODUCTS	PROC 1		PROC 2		PROC 3		TOTALS		
	Setup	oper.	Setup	oper.	Setup	oper.	Setup	oper.	Setup+ oper
PROD A	**0.165**	**13.834**	0.105	7.702	0.044	8.013	**0.315**	**29.55**	**29.86**
PROD B	0.184	8.320	0.066	6.385	0.044	8.013	0.294	22.72	23.01
PROD C	0.0551	8.320	0.176	10.335	0.111	10.776	0.837	29.43	30.27

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PRODUCTS	PROC 1		PROC 2		PROC 3		TOTALS		
	Setup	oper.	Setup	oper.	Setup	oper.	Setup	oper.	Setup+ oper
PROD A	**0.132**	**11,59**	0.105	7.702	0.044	8.013	**0.281**	**27.30**	**27.59**
PROD B	0.184	8.320	0.066	6.385	0.044	8.013	0.294	22.72	23.01
PROD C	0.0551	8.320	0.176	10.335	0.111	10.776	0.837	29.43	30.27

Table 10 - Cost alteration of Product A after reduction of fixed costs

- **Hipothesis 3: Reduction on variable costs**

In order to reduce the cost of product A, some variable cost items will be reduced for all the processes.

Actual situation:

Product A total costs: US$ 29.86 per unit

Desired situation:

Product A total costs: US$ 27.90 per unit

In order to achieve these target costs, some changes will be made on the processes, as shown below:

COST ITEMS	TOTAL (US$/YEAR) ACTUAL	TOTAL (US$/YEAR) SIMULATION
Specific area maintenance	50,000.00	45,000.00
Specific supplies	70,000.00	57,000.00
General supplies	25,000.00	20,000.00
Outside services	23,000.00	20,000.00
Utilities	42,000.00	36,000.00
Total Value	210,000.00	178,000.00

Table 11 shows the result of these changes on the cost of Product A.

PRODUCTS	PROC 1		PROC 2		PROC 3		TOTALS		
	Setup	oper.	Setup	oper.	Setup	oper.	Setup	oper.	Setup+ oper
PROD A	**0.165**	**13.834**	**0.105**	**7.702**	**0.044**	**8.013**	**0.315**	**29.55**	**29.86**
PROD B	0.184	8.320	0.066	6.385	0.044	8.013	0.294	22.72	23.01
PROD C	0.0551	8.320	0.176	10.335	0.111	10.776	0.837	29.43	30.27

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PRODUCTS	PROC 1		PROC 2		PROC 3		TOTALS		
	Setup	oper.	Setup	oper.	Setup	oper.	Setup	oper.	Setup+ oper
PROD A	**0.165**	**13.390**	**0.105**	**6.936**	**0.044**	**7.222**	**0.315**	**27.55**	**27.86**
PROD B	0.184	7.876	0.066	5.620	0.044	7.222	0.294	20.72	21.01
PROD C	0.0551	7.876	0.176	9.569	0.111	9.985	0.837	27.43	28.27

Table 11: Cost reduction of Product A resulting from the changes on variable costs

Note that the target cost on Product A was achieved and the reduction on the total variable resources also caused reduction on the costs of Products B and C.

SCENARIO 2

- Company need:
  - Analyze the economic viability of sub_contracting Process 2.
- Actual situation:
  - Fixed cost for Process 2 are: US$ 13.17 per hour and US$ 78,990.00 yearly.
  - Variable costs for Process 2 are: US$ 5.07 per unit and US$ 81,100 yearly.
  - Average efficiency of Process 2 is 63% (utilizes only US$ 8.30 per hour, being the rest considered an avaiable resource that is not fully utilized, causing the company a loss of US$ 49,763.70 per year.
  - Cost of sub_contracting Process 2: US$ 15.00 per hour
- Objective:
  - Analyze the economic viability of sub_contracting Process 2.
- Analysis

Sub_contracting Process 2 means that variable costs can totally eliminated, but on short term, fixed costs can not. Some fixed costs can be eliminated on short term:

COST ITEMS	UNIT	PROC 2	Cost per hour (US$)
Salary labor (wages + taxes)	Labor/proc	2.00	1.80
Direct labor (wages + taxes)	Labor/proc	5.00	3.80
Electricity	Kw	50	3.00
		Total	8.60

The remaining fixed costs such as indirect labor, insurance and depreciation can not be eliminated on the short term.

Considering for this analisys that the production volume will remain the same, with an average efficiency of 63%, then the company will have to pay US$ 56.700,00 for the sub_contracted services and still will have an internal cost of US$ 27,390.00 per year. The total cost of sub_contracting Process 2 will then be US$ 84,090.00, which is less the the actual cost of US$ 160,090.00 for Process 2.

Table 12 shows how cost will behave with sub_contracting Process 2.

PRODUCTS	**PROC 1**		**PROC 2**		**PROC 3**		**TOTALS**		
	Setup	oper.	Setup	oper.	Setup	oper.	Setup	oper.	Setup+ oper
PROD A	0.165	13.834	**0.105**	**7.702**	0.044	8.013	0.315	29.55	**29.86**
PROD B	0.184	8.320	**0.066**	**6.385**	0.044	8.013	0.294	22.72	**23.01**
PROD C	0.0551	8.320	**0.176**	**10.335**	0.111	10.776	0.837	29.43	**30.27**

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PRODUCTS	**PROC 1**		**PROC 2**		**PROC 3**		**TOTALS**		
	Setup	oper.	Setup	oper.	Setup	oper.	Setup	oper.	Setup+ oper
PROD A	0.165	13.834	**0.037**	**3.913**	0.044	8.013	0.246	25.76	**26.01**
PROD B	0.184	8.320	**0.023**	**1.957**	0.044	8.013	0.251	18.29	**18.54**
PROD C	0.0551	8.320	**0.061**	**7.826**	0.111	10.776	0.723	26.92	**27.64**

Table 12: Reduction on product costs by sub_contracting Process 2

Based on these results it is possible to conclude that sub_contracting Process 2 is economic viable and will result in savings of US$ 76,000.00 yearly.

VI. CONCLUSION

A system like MIES can be used for planning and control, allowing scenarios to be analysed before the actual implementation. Cost control purelly is not sufficient to improve competitiveness. It is necessary to achieve a target cost, which is desired to get the minimum profitability which will bring economic growth.

Thus, information systems must be able to forsee the whole company being a support tool considering as many variables as possible to facilitate the decision making process.

MIES incorporates this caracteristics because it offers not only control of the past, but prevention of future decision that would bring negative results as well as an analysis of the return on investment for new projects in each activity and for the final cost of finished goods.

It is a very powerfull economic tool to be used in all levels of the organization with different scopes for each part and hierarchical level.

VII. BIBLIOGRAFY

Brown, Tom. Cost Control: the Next Quality Movement; Effective Cost Management Can Create a Competitive Edge, Industry Week, May 2 1994, v243, n9, p19(1).

Caplan, Frank, The Quality System: A Sourcebook for Managers and Engineers, Chilton Book Company, Radnor, Pennsylvania: 1980.

Clemmer, Jim. Process Re-engineering and Process Improvement: not an either/or choice, CMA - The Management Accounting Magazine, v68, n5, p36, June 1994.

Compton, Ted R. Using Activity Based Costing in Your Organization (part 1), Journal of Systems Management, v45, n3, p32, March 1994.

Compton, Ted R. Using Activity Based Costing in Your Organization (part 2), Journal of Systems Management, April 1994, v45, n4, p36.

Cooper, Robin, Kaplan, Robert S. How Cost Accounting Distorts Product Costs, Management Accounting, April 1988, v69, n10, p20(8).

Cooper, Robin, Kaplan, Robert S. Profit Priorities from Activity-Based Costing, Harvard Business Review, May-June 1991, v107, n1174, p78(3).

Davenport, Thomas H. Reengenharia de Processos, Harvard Business School Press, Campus, Rio de Janeiro: 1994.

Drucker, Peter F. The Theory of Business, Harvard Business Review, September-October, 1994, v72, n5, p95(10).

Feigenbaum, A. V., Total Quality Control, Third Edition, Pittsfield, Massachussets: 1990.

Feigenbaum, A. V. Quality Education and America's Competitiveness, Quality Progress, v27, n9, p83, september 1994.

Harrington, James H. El Coste de la Mala Calidad, Juan Bravo, Ediciones Diaz de Santos:1990.

Harrington, James. Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity, and Competitiveness, MacGraw-Hill, New York:1991.

Hayes, Robert H, Pisano, Gary P. Beyond World-class: the new manufacturing strategy, Harvard Business Review, Jan-Feb 1994, v72, n1, p77(10).

Hayes, Robert H, Abernathy, William J. Managing our way to economic decline, Harvard Business Review, July-Aug 1980, v58, p67(11).

Hayes, Robert H, Jaikumar, Ramchandran. Manufacturing's crisis: new technologies, obsolete organizations, Harvard Business Review, Sept-Oct 1988, v66, n5, p77(9).

Hayes, Robert H, Wheelwright, Steven C, Clark, Kim B. The power of positive manufacturing, Across the Board, Oct 1988, v25, n10, p24(7).

Johnson, H. Thomas, Kaplan, Robert S. The Rise and Fall of Management Accounting, Management Accounting, Jan 1987, v68, n7, p22(9).

Kaplan, Robert S. The Balanced Scorecard - Measures that Drive Performance, Harvard Business Review, January-February 1992, v70, n1, p71(9).

Kaplan, Robert S. In Defense of Activity-Based Cost Management, Management Accounting, November 1992, v74, n5, p58(6).

Kaplan, Robert S. Putting the Balanced Scorecard to Work, Harvard Business Review, September-October 1993, v71, n5, p134(14).

Leonard-Barton, Dorothy. The Factory as a Learning Laboratory, Sloan Management Review, April 1988.

Mather, Hal F. Want to Be More Competitive? Concentrate on Attacking Non-Value-Added-Wastes, Industrial Engineering, May 1991.

Ostrenga, Michael R, Terrence, R. O, Harwood, Mcllhattan, R. D, Harwwood, M. D. Guia da Ernst & Young pra Gestão Total dos Custos, Record, Rio de Janeiro: 1993.

Ostrenga, Michael R. Activities: the Focal Point of Total Cost Management, Management Accounting, February 1990, v71, n8, p42(8).

Porter, M. Vantagem Competitiva. Campus, Rio de Janeiro: 1989.

Porter, M. Estratégia Competitiva. Campus, Rio de Janeiro: 1989.

Roth, Harold P, Albright, Thomas L. What are the Costs of Variability, Management Accounting, June 1994.

Roth, Harold P, Borthick, Faye A. Are You Distorting Costs by Violationg ABC Assumptions?, Management Accounting, November 1991, v73, n5, p39(4).

Selig, Paulo Maurício. Gerência e Avaliação do Valor Agregado Empresarial, Florianópolis:UFSC,1993. Tese de Doutorado em Engenharia de Produção.

Shank, John K, Govindarajan, Vijay. Strategic Cost Analysis: The Evolution from Managerial to Strategic Accounting, Irwin, Boston, MA: 1989.

Stalk, George, Evans, Philip, Shulman, Lawrence E. Competing on capabilities: the new rules of corporate strategy, Harvard Business Review, March-April 1992, v70, n2, p57(13).

Stalk, George, Black, Jill E. The myth of the horizontal Organization, Canadian Business Review, Winter 1994, v21, n2 p26(4).

Turney, Peter B. B, Stratton, Alan J. Using ABC to Support Continuous Improvement, Management Accounting, September 1992.

Turney, Peter B. B. Activity Based Management: ABM puts ABC information to work, Management Accounting, January 1992.