Universidad de Guayaquil
Facultad de Ingeniería Química

Revista Ingeniería Química y Desarrollo
https://revistas.ug.edu.ec/index.php/iqd

Improvement of the classification process for the digitization of document archives based on the Balanced Scorecard management system.

Mejora del proceso de clasificación para la digitalización de archivos documentales basados en el sistema de gestión Balanced Scorecard

Ing. Alexis Fernando Bolaños Jijón, MSc[1] & Edison Rubén Ladines Suco [2]

Recibido: 12/07/2019 – Revisado: 15/10/2019 -- Aceptado: 05/12/2019

Abstract

Globally, technological advances and the growing need for increasingly comprehensive databases containing sufficient amounts of historical data to be stored have driven initiatives such as archival digitization and actual document storage. From large corporations to government organizations, what began as an opportunity for improvement has now become a growing need. Digitizing information implies not only having technological tools and virtual and cybernetic capabilities, but also having the appropriate personnel with a deep knowledge of the process and adequate training in document and storage techniques, depending on the type of information to be digitized. The digitization process involves several phases: archiving, barcode identification, classification, scanning and data entry of the documents. The objective of this research is to design a management model using the Balanced Scorecard tool to improve the process of classification of document archives in order to increase customer satisfaction.

key words
Digitization, Ishikawa Diagram, Deming Cycle, Balanced Scorecard

Resumen
A nivel mundial, los avances tecnológicos y la creciente necesidad de bases de datos cada vez más completas que contengan cantidades suficientes de datos históricos para ser almacenados han impulsado iniciativas como la digitalización de archivos y el almacenamiento real de documentos. Desde grandes corporaciones hasta organizaciones gubernamentales, se ha visto que lo que comenzó como una oportunidad de mejora, ahora se ha convertido en una necesidad creciente. Digitalizar información implica no solo contar con herramientas tecnológicas y capacidades virtuales y cibernéticas, sino también contar con el personal adecuado con un profundo conocimiento del proceso y una adecuada formación en técnicas documentales y de almacenamiento, según el tipo de información que se desee digitalizar. En el proceso de digitalización se llevan a cabo varias fases: archivo, identificación por códigos de barra, clasificación, escaneo y digitación de los datos de los documentos. El objetivo de esta investigación es diseñar un modelo de gestión empleando la herramienta Balanced Scorecard que permita la mejora del proceso de clasificación de archivos documentales con el fin de lograr el aumento de la satisfacción de los clientes.

Palabras clave
Digitalización, Diagrama Ishikawa, Ciclo Deming, Balanced Scorecard

1. Introduction

In the digitization process, several stages are carried out: barcode recognition, archiving, digitization, and data entry of documents. During the scanning process, some failures were found, such as pages not being in the scanned area, illegible documents, irrelevant procedures interfering with the scanning process, and images affecting the entire process [1].

The root of this problem is in the classification area, where documents are classified according to the process and then scanned [2]. Therefore, it is necessary to adopt a management model to improve the classification process and thus be more efficient in subsequent digitization processes. Constant errors in the classification process cause the final product of the entire document digitization system to not meet customer needs.

Document scanning is of great importance in organizations because the information is kept secure for a longer time. The need to consult historical data and information from previous periods fully justifies the use of a technological solution that reduces search time, maintains accuracy, and significantly improves availability. [3]

[1] Universidad de Guayaquil, Facultad de Ingeniería Química; alexis.bolanosj@ug.edu.ec
[2] Universidad de Guayaquil, Facultad de Ingeniería Química; edison.ladiness@ug.edu.ec

This solution greatly reduces the risk of information loss because physical documents deteriorate over time due to storage conditions, in addition to the physical space required and all the additional tasks this implies, such as maintaining a much larger physical archive of document files. [4]

Our objective is to design a management model using the Balanced Scorecard and the Ishikawa diagram to improve the classification process of document archives, in order to evaluate the causes of deviations and thus increase customer satisfaction.

This methodology can be defined as a managerial tool that helps transform an organization and/or company's vision according to its strategy into specific objectives and standards for communication at different levels, establishing a system of achievement measurement [5].

In other words, the BSC presents the key elements of success, providing the opportunity to expand the vision. The perspectives achieved are not limited to a specific area, such as the financial area, but also allow incorporating new standards from different points of view, generalizing entirely to the various actors that make up the organization [6].

This system helps performance evaluation by allowing the organization to understand how it develops in various areas such as customers, finance, and company employees, to analyze them and detect anomalies that contribute to finding solutions for improving company performance. [5]

1.1 Benefits of implementation

- The BSC allows rethinking the actions to be taken based on the results obtained.
- It allows a better understanding through a strategic map that presents the steps to follow to achieve the organization's strategic objectives in a structured way.
- It predicts or detects critical processes that could harm the organization, allowing prompt action.
- It helps top management make decisions through this tool based on financial and non-financial information using the Balanced Scorecard.
- It provides a vision of success through objectives and metrics. [7]

1.2 Ishikawa Diagram

It includes a graphical representation that helps visualize the causes explaining a particular problem, making it a widely used quality management tool because it guides decision-making through problem-solving and provides the basis for determining poor performance. [8]

Using the Ishikawa diagram complements well with the Pareto diagram, which prioritizes action measures related to the causes representing the largest proportion of problems and is often reduced nominally. [9]

The structure of a fishbone diagram is very intuitive: it identifies a problem or impact and then lists a set of causes likely to explain that behavior. [10] Additionally, each cause can be divided into sub-causes. This is useful for corrective actions because the correct action is required on the phenomenon explaining the unexpected behavior. [11]

1.3 The company "Ecuasistemas".

Ecuasistemas is a company located in the city of Guayaquil, with offices in the Urdesa sector and a warehouse in the south of the city where the operational part functions. It offers digitization, storage, and various business solutions services. [12]

Over the years, Ecuasistemas SA has grown as a company, along with its clients, resources, and staff. This marked a new milestone in the country's innovation history, providing the community with professionals with vast experience in areas such as Archiving and Document Management Solutions. The company quickly became the national benchmark and pioneer in providing Document Outsourcing Services and provider of Digital Document Management Solutions [13].

Fig. 1. Services of Ecuasistemas S.A.

The company works as a strategic partner of several brands through which it meets organizational and customer objectives. [14]

ISSN: 1390 –9428 / Revista Ingeniería Química y Desarrollo / Vol. 02 / Nº 01

2. Materials and methods

In this research work, we used an interview format, Ishikawa tree, and descriptive method, using interviews with process operators. Authorization was obtained from the company's Project Manager to enter the facilities and conduct the necessary interviews.

A semi-structured interview model with open-ended questions was designed to gather as much information as possible [15].

From questions 1 to 5, we delve into the respondent's knowledge of their position and, in case of disagreement, their perception of the actions the company has taken to mitigate that knowledge gap. Question 6 highlights strategic indicators. From questions 7 to 10, detailed actions that could signify an improvement in their own processes are requested.

2.1. Observation methodology

Based on the observations, some causes of the current problems facing the classification process were identified, which prevent the digitization service offered from meeting customer requirements.

Observation was managed during visits to Ecuasistemas S.A's facilities from December 7 to 11, 2015, for two hours daily, reviewing the end of the workday.

2.2. Consolidation of Ideas (Causes)

After conducting interviews and observations, the need to consolidate information from these sources systematically, functionally, and orderly was found.

- Documentation status
- File order
- Documentary matrix and/or master list
- Production
- Communication with the client

2.2.1 Personnel

Table 1. Personnel

Personnel	The personnel do not know the type of procedure/document associated with the project to be digitized.
	In the hiring process, key aspects such as experience in handling or knowledge of corporate documentation are not considered.
	It is not always possible to define the department owning the documentation.
	There are no procedures or instructions available for each phase of the digitization process.
	Personnel are confused about the department owning the documents.
	Sometimes, the area owning the documents to be digitized does not provide the minimum organizational conditions to develop the project.

2.2.2 Document Status

Table 2. Document Status

Document Status	**There are documents older than 5 years.**
	Several torn pages have been presented in the documents.
	The documents present illegible writings.
	There are documents damaged by humidity, leaks, or pests.

2.2.3 File Order

Table 3. File Order

File Order	Mobilization causes the loss of files.
	There are extensive procedures that have not been organized, divided by phases.
	Sometimes, the numerical coding is discontinuous.
	There are folders with disorganized procedures.
	At the detail level, sometimes papers belong to departments different from their physical location.
	Some documents are without a cover.
	In the process, new documents that were never defined in the respective process are found.

2.2.4 Documentary Matrix

Table 4. Documentary Matrix

Documentary Matrix	There is no timely list of document types inherent to the project to be digitized.
	There is no prior review of documents before starting the classification process.
	The document matrix is not used in the classification process.
	Personnel are unaware of the procedures indicated in document matrices of similar projects.
	There are very uncommon procedures.

2.2.5 Production

Table 5. Production

Production	The daily production goal is the same regardless of the type of document being digitized.
	The client sometimes does not provide office materials on time.
	Personnel rush to meet production and classify poorly.
	There are very complex procedures, and more time must be invested to be reached.
	Lack of office materials to make the classification process more effective.

2.2.6 Communication with the Client

Table 6. Communication with the Client

Communication with the Client	There is no detailed inventory of the documents received.
	Lack of interest from the company's areas receiving the service.
	Distance between the digitized company and the area where the digitization process takes place.
	The custody time given by the company to carry out the process is very short due to the document's importance.

2.3 Ishikawa Cause-Effect Diagram

Despite the above, we still need to complete the analysis using the Ishikawa methodology before presenting the final analysis.

The first step is to list the causes derived from the observation method and the interview, coding each of the analyzed causes.

Despite showing great diversity, the presented causes can be consolidated or eliminated in case of redundancy or repetition, which will help us reduce the number and ensure they are mutually exclusive.

.

Table 7. Causes by topic

Personnel	***A1***	Staff is unaware of the type of procedure/document associated with the project to be digitized
	A2	Key aspects such as experience in handling corporate documentation are not considered during the hiring process
	A3	Sometimes, it is not possible to define the department owning the documentation.
	A4	There are no available procedures or instructions for each phase of the digitization process
	A5	Staff gets confused about the department that owns the documents
	A6	Occasionally, the department owning the documents to be digitized does not provide the minimum organizational conditions required to develop the project
Document Status	*B1*	There are documents older than 5 years
	B2	Several torn pages have been found in the documents
	B3	Documents contain illegible writings
	B4	There are documents damaged by humidity, fire, or pests
File Order	*C1*	Moving files causes loss of records
	C2	There are extensive procedures that have not been organized and divided into phases
	C3	Occasionally, the numerical coding is discontinued
	C4	There are folders with disorganized procedures
	C5	Sometimes, papers belong to different departments than their physical location
	C6	Some documents are without covers
	C7	Occasionally, new documents are found that were never defined in the respective process
Documentary Matrix	*D1*	The list of document types inherent to the project to be digitized is not available in time
	D2	There is no prior review of documents before starting the digitization process
	D3	There are very uncommon procedures
	D4	Staff is unaware of the procedures indicated in documentary matrices of similar projects
Production	*E1*	The daily production target is the same regardless of the type of document being digitized
	E2	Staff rush to meet production targets and classify documents incorrectly
	E3	The client occasionally fails to supply the necessary office materials on time
	E4	Lack of materials that help in making the classification process more effective
	E5	There are very complex procedures that require more time for analysis
Communication with the Client	*F1*	There is no detailed file of the documents we receive
	F2	Lack of interest from the company areas to which the service is provide
	F3	Distance between the digitized companies and the area where the digitization process takes place
	F4	The custody time provided by the company to carry out the process is very short due to the importance of the document

Once the causes are identified by topic, we will eliminate and consolidate the information detailing each one of them

Table 8. Consolidation of Causes

Consolidación de las causas					
Topic	Code Retained	Code Eliminated	Observation	Cause Detail	Methodology
Personnel	A1	D4	Consolidated	The staff is unaware of the type of procedure/document associated with the project being digitized, nor the document matrix of other projects..	Personnel
	A2	-	Retained		Personnel
	A3	A5	Consolidated	It is sometimes impossible to define the department that owns the documentation, causing confusion among staff..	Environment
	A4	-	Retained		Methods

	A6	-	Retained		Environment
	B1	-	Retained		Environment
Document Condition	B2	B3 - B4	Consolidated	Several documents have been found with torn pages, illegible writings, and damage caused by moisture, fire, or pests.	Environment
	C1	-	Retained		Methods
File Order	C2	C6	Consolidated	There are lengthy procedures that have not been organized and divided into phases, or documents are found without a cover page	Methods
	C3	-	Retained		Methods
	C4	-	Retained		Methods
	C5	-	Se mantiene		Environment
	C7	-	Retained		Methods
	D1	-	Retained		Methods
Documentary Matrix	D2		Retained		Methods
	D3	-	Retained		Methods
	E1	E2	Consolidated	La meta de producción diaria es la misma indistinta del tipo de documento que se digitalice, razón por la cual el personal se apresura en cumplir con la producción y clasifica mal.	Methods
Production	E3	-	Retained		Environment
	E4	-	Retained		Recurso
	E5	-	Retained		Methods
	F1	-	Retained		Methods
Communication with the Client	F2	-	Retained		Environment
	F3	-	Retained		Environment
	F4	-	Retained		Methods

Table 9. Identification of Causes According to Ishikawa

Methodology According to Ishikawa		
Area	**Code**	**Cause Detail [Final]**
Environment	A3	It is sometimes impossible to define the department that owns the documentation, causing confusion among the personnel.
Environment	A6	Sometimes the area that owns the documents to be digitized does not meet the minimum organizational conditions for the project
Environment	B1	There are documents older than 5 years.
Environment	B2	Several documents have torn pages, illegible writings, or damage caused by moisture, fire, or pests
Environment	C5	At a detailed level, sometimes papers belong to departments different from their physical location.
Environment	E3	The client occasionally fails to supply the necessary office materials on time
Environment	F2	Lack of interest from the company areas to which the service is provided
Environment	F3	Distance between the digitized companies and the area where the digitization process takes place
Personnel	A1	The staff is unaware of the type of procedure/document associated with the project being digitized, nor the document matrix of other projects.
Personnel	A2	Key aspects such as experience in handling corporate documentation are not considered during the hiring process
Methods	C1	Mobilization causes the loss of files.
Methods	C2	There are lengthy procedures that have not been organized and divided into phases, or documents are found without a cover page
Methods	C3	Sometimes numerical coding is discontinued
Methods	C4	There are folders with disorganized procedures
Methods	D3	There are very uncommon procedures
Methods	E1	The daily production target is the same regardless of the type of document being digitized, causing staff to rush and classify documents incorrectly.
Methods	F1	There is no detailed file of the documents we receive.
Methods	F4	The custody time provided by the company to carry out the process is very short due to the importance of the document
Methods	A4	There are no procedures or instructions available for each phase of the digitization process
Methods	C7	Occasionally new documents are found that were never defined in the respective process
Methods	D1	The list of types of documents inherent to the project to be digitized is not available in time
Methods	D2	There is no prior review of documents before starting the digitization process

Methods	E5	There are very complex procedures that require more time for analysis
Resources	E4	Lack of materials that help make the classification process more effective

3. Results

ECUASISTEMAS S.A. currently lacks a Vision that provides a clear projection of its direction as a digitizing company and defines its place in the market.

Additionally, it does not have a Mission, which means its objectives, its raison d'être, and how it wishes to be recognized by its clients are unknown.

3.1 Design of a Balanced Scorecard Model for the Classification Process

After reviewing the previous scheme about the current situation of ECUASISTEMAS S.A. and having outlined the methodology that will guide the work, the design of a Balanced Scorecard (BSC) model for the Classification process is presented below.

The strategic objectives are formulated by merging the causes of the six previously identified topics and categorizing them according to the five categories of the Ishikawa diagram.

The objectives are specific, measurable, achievable, relevant, and time-bound. Once each objective is identified, we will define it according to each BSC perspective in the strategic map.

Table 10. Strategic Objectives

Strategic Objectives	
Financial Perspective	Minimize Operational Costs
	Minimize Defect Costs
Customer Perspective	Achieve internal customer satisfaction through the proposed attributes
	Meet delivery time (Classification)
Internal Process Perspective	Internal Customer Satisfaction
	Improve operation (Classification)
	Improve communication with internal suppliers
Learning and Growth Perspective	Staff training (Training)
	Staff retention
	Growth of Classification infrastructure

3.2 Strategic Map

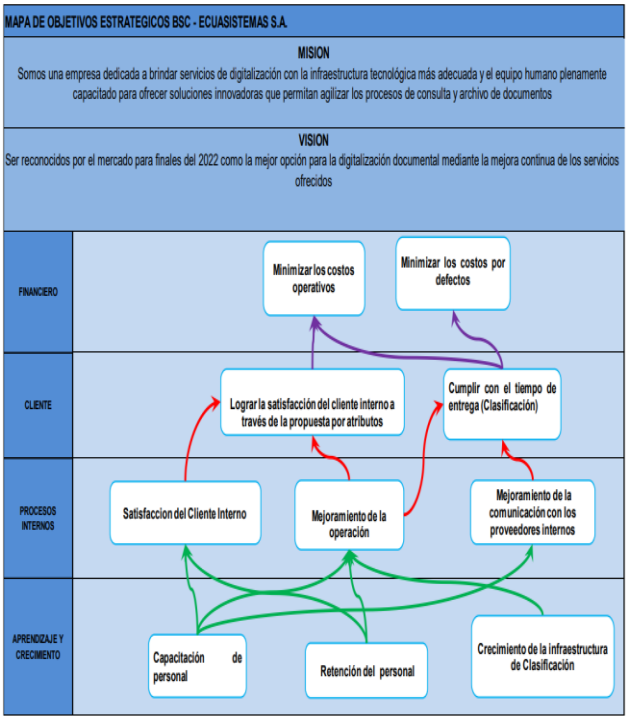


Fig. 2. Strategic Map of ECUASISTEMAS S.A.

3.3 Control Panel

After presenting the strategic map, the Control Panel was developed. Clear indicators were established to align with the objectives to be measured.

For the control panel of ECUASISTEMAS S.A., 10 strategic indicators were carefully defined. For the financial area, 2 indicators were constructed; for customer-related objectives, 2 strategic indicators were designed; for the internal processes area, 4 indicators; and for the learning and growth area, 2 indicators were proposed.

Table 9. Strategic Indicators

Strategic Indicators	
Financial Perspective	Operational Costs
	Defect Costs
Customer Perspective	Internal Customer Satisfaction (Scanning)
	Internal Customer Satisfaction (Digitization)
	Operational Classification Time
Internal Process Perspective	Classification Production
	Compliance with Requirements
Learning and Growth Perspective	Staff Turnover
	Training Coverage
	Infrastructure Planning

3.4 Strategic Indicators for Financial Perspective Objectives

With financial indicators, we can measure and track the financial strategic objectives set in the company. They are at the highest level of the strategic objectives map since achieving the other objectives contributes to this one.

3.4.1 Operational Costs

The reduction of a company's costs is achieved by effectively managing the development, production, and sales processes.

The operational costs of the Classification process include:

- Labor
- Office supplies
- Transportation
- Lunch
- Water
- Electricity
- Cell phone

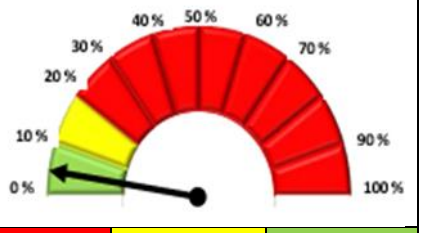
The objective of the index was determined by setting a maximum percentage as the operational cost of the classification process, analyzing the project's size and delivery time in advance.
The operational costs of a project are generally allocated at 60% by department as follows:

Table 12. Operating Costs

Operating Costs	**%**
File	5%
Classification	10%
Scanning	15%
Digitization	30%
Total Operating Costs per Project	60%

According to the above, the maximum operating cost for Classification is 10%, setting a target not to exceed this percentage.

Table 13. Financial Perspective – Operating Costs

Indicator	Operating Costs	
Related Objectives	*1. Minimize operating costs*	
Calculation	(Operating Costs of Classification / Project Value) * 100	
Process Applying It	Financial Management	
Target	Unit	Target
	%	9%
Speedometer	**Operating Costs** 	
	> 10%	10%	< 10%
Measurement Frequency	Per Project		
Evaluation	Annually		
Responsible	Financial Manager		

The "costs by defects" indicator refers to the costs associated with errors and failures in classification or customer rejection.

Errors that may occur in the Classification process include:

- Disorder of classified documents
- Documents not classified as required by the client
  Situations that may result in predetermined costs include, but are not limited to:
- Equipment mobilization
- Increased labor
- Delays in other projects
- Increased supply expenses

Before starting the project, the maximum percentage as a cost by defect is established by analyzing the project size and delivery time.

The predetermined cost for a project defined by the organization represents the second total of the project, allocated per department as follows:

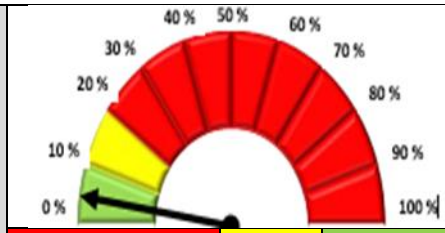
Table 14. Defect Costs

Defect Costs	**%**
File	0%
Classification	1,50%
Scanning	0,25%
Digitization	0,25%
Total Defect Costs per Project	2%

Table 15. Financial Perspective – Defect Costs

Indicator	**2. Defect Costs**	
Related Objectives	*1. Minimize defect costs*	
Calculation	(Defect Costs of Classification / Project Value) * 100	
Process Applying It	Financial Management	
Target	UNIT	TARGET
	%	1,5%
Speedometer	**Defect Costs**	

ISSN: 1390 –9428 / Revista Ingeniería Química y Desarrollo / Vol. 02 / Nº 01

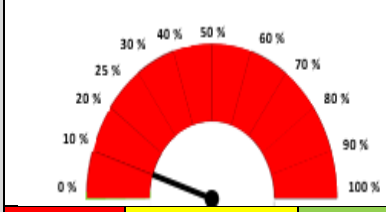
	 > 1,5 | 1,5 | < 1,5
Measurement Frequency	Per Project
Evaluation	Anually
Responsible	Financial Manager

3.4.2 3 Indicators for Customer Perspective Objectives
This section is one of the most relevant and representative parts of the control panel. Customer satisfaction is analyzed and measured to guide decision-making based on results from the customer's perspective.

3.4.2.1 Internal Customer Satisfaction (Scanning)
This indicator measures the satisfaction of one of the internal customers of Classification, which is the Scanning area. Scanning receives batches of classified documents and must digitize them into a previously prepared document.

To measure this index, a weekly record will be kept in the scanning area, establishing the number of documents with stapler errors at the time of scanning. The stapler is a primary error, and its cost can even be the total loss of digitizing devices. Therefore, the objective of this metric is a defect acceptance rate of 0%. Records must be counted weekly for index calculation.

Table 16. Indicator Sheet - Internal Customer Satisfaction (Scanning)

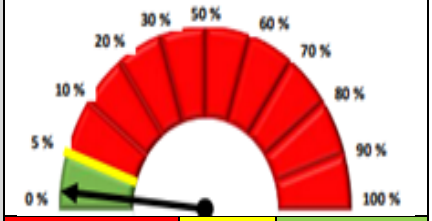
Indicator	**Internal Customer Satisfaction (Scanning)**	
Related Objectives	*1. Achieve internal customer satisfaction through attributes*	
Calculation	((Total number of errors recorded in Scanning /Number of sheets scanned) *100	
Process Applying It	Scanning	
Target	UNIT	TARGET
	%	0%
Speedometer	**Satisfacción Del Cliente Interno -Escaneo**  > 0 | N/A | 0	
Measurement Frequency	Weekly	
Evaluation	Per Project	
Responsible	Scanning Supervisor	

3.4.2.2 Internal Customer Satisfaction (Digitizer)
Another internal customer is the Digitized Domain and this metric allows measuring their satisfaction.

The Digitized Domain takes a database of previously classified digitized documents to process it in an orderly and systematic manner.
For the calculation of this indicator it is necessary to carry out a record in the Digitization area where the number of daily errors presented due to the classification process is recorded, such as: writing exigency, document disorder.

The records should be counted weekly to calculate the rate. As a goal, it has been determined that the maximum filing error rate should be 5%, since out of 100 classified documents only 5 can reach this area with a certain type of error.

Table 17. Indicator Tab - Internal Customer Satisfaction (Digitizer)

Indicator	**Internal Customer Satisfaction (Digitization)**	
Related Objectives	*1. - To achieve internal customer satisfaction through the proposal by attributes*	
Calculation	(Total number of errors recorded in Typing/ Number of documents typed) * 100	
Process Applying It	Digitation	
Target	**Unit**	**Target**
	%	5%
Speedometer	**Customer Satisfaction**  > 5% | 5% | < 5%	
Measurement Frequency	Weekly	
Evaluation	Per Project	
Responsible	Supervisor de Digitación	

3.4.2.3 Operational time of the sorting process

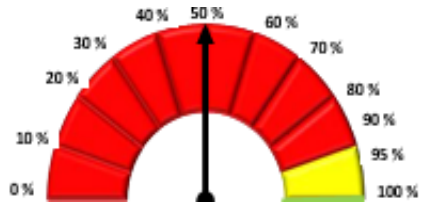
Time is a key factor in meeting deadlines and commitments to internal and external clients. Delays in the delivery of confidential documents meant that the deadlines agreed in the project plan were not being met. This metric is used to measure the effectiveness of the Classification service in respecting the agreed delivery time. The objective is to reach 100%.

For better measurement and quick decision making in the event of a negative result, the frequency of measurement

ISSN: 1390 –9428 / Revista Ingeniería Química y Desarrollo / Vol. 02 / Nº 01

will be at the end of each rated area, for example, at the end of the Classification of Credit, Treasury, Human Resources documents. the index will be calculated.

Table 10. Ficha del Indicador - tiempo operativo del proceso de clasificación

Indicator	**Operative time of the Classification Process**	
Related Objectives	*1. - Meeting the turnaround time (Classification)*	
Calculation	(Number of documents classified in time/ Total number of documents classified) * 100	
Process Applying It	**Classification**	
Target	**Unit**	**Target**
	%	100%
Speedometer	**Classification Operating Time** 	
	< 95%	95% - 99% > 99%
Measurement Frequency	At the end of the classification of each area	
Evaluation	Per Project	
Responsible	Classification Supervisor	

3.4.3 Indicators of the objectives of the internal process perspective

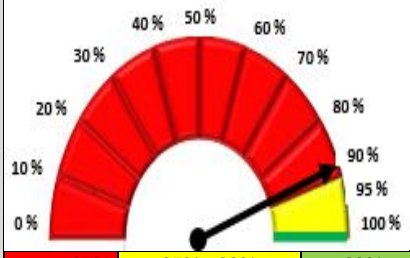
The indicators related to the processes reflect the work and the improvement of the Classification process.

3.4.3.1 Classification Production

It measures the compliance of the weekly production of the classification area with respect to the planned amount of production.

One of the key steps to comply with the plan is that each classifier is clear about what and how each document should be classified, for which it is essential to maintain excellent communication with internal suppliers who provide all the necessary information for the work to be carried out successfully

Table 11. Indicator tab - classification production

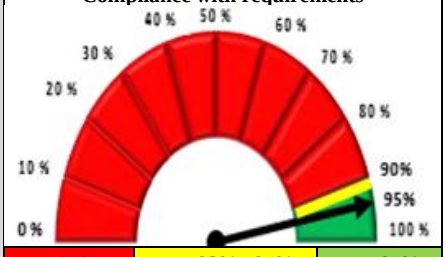
Indicator	**Classification Production**	
Related Objectives	*1. Improved operation (Classification)* *2. Improved communication with internal suppliers*	
Calculation	(Sorting Production/ Planned Sorting Planned Sorting Production) * 100	
Process Applying It	Clasification	
Target	**Unit**	**Target**
	%	100%
Speedometer	**Classification Production** 	
	< 95%	95% - 99% > 99%
Measurement Frequency	Weekly	
Evaluation	Per Project	
Responsible	Classification Supervisor	

3.4.3.2 Fulfillment of Requirements

The main internal customer of the Taxonomy Area is Digitization, as they are the recipients of the database of documents scanned for processing. Internal customers refer to scanners and scanners whose actions have a significant impact on the final service provided, so it is critical to establish effective processes to determine scanner needs, requirements and expectations.

To see if their requirements are being met on a weekly basis, the satisfaction rate of the Typing area will be measured by using the Typing function of the Internal Customer Satisfaction Index from the customer's point of view.
The minimum satisfaction rate is 95%.

Table 12. Indicator tab - compliance with requirements

Indicator	**Compliance with requirements**	
Related Objectives	*1. Internal customer satisfaction*	
Calculation	(1 - internal customer satisfaction indicator - digitization) *100	
Process Applying It	Digitization	
Target	**Unit**	**Target**
	%	95%
Speedometer	**Compliance with requirements** 	
	< 92%	93% - 94% > 94%
Measurement Frequency	Weekly	
Evaluation	Per Project	
Responsible	Project Manager	

ISSN: 1390 –9428 / Revista Ingeniería Química y Desarrollo / Vol. 02 / Nº 01

3.4.4 Indicators of the objectives of the staff learning and growth perspective.

This group of indicators is related to the human talent of the Classification process, with them we will measure their external rotation, promotions or changes of positions (internal rotation), the satisfaction of the classifiers and scanners as internal clients and the training given to the personnel.

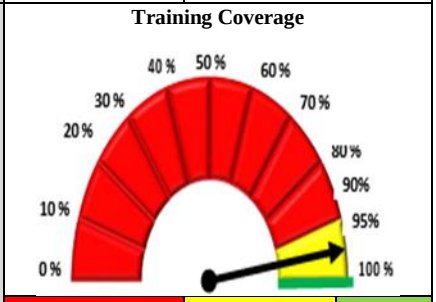
3.4.4.1 Training Coverage

Staff training is very important as it is the basis of the staff's knowledge and enables the operator to work with better criteria.

The documentation handled in each type of business, in each company, in each area and by each person is different; therefore, it is essential that the classifiers have been trained 100% on the documents they will be working with.

This indicator shows the coverage of trained classification personnel by project.

Table 13. Indicator Tab - Coverage of training

Indicator	**Training Coverage**		
Related Objectives	***1. Staff Training***		
Calculation	(Total Persons Trained in Classification /Total Persons in the Classification Area) *100		
Process Applying It	Clasification		
Target	**Unit**	**Target**	
	%	100%	
Speedometer	**Training Coverage** 		
	< 95%	95% - 99%	100%
Measurement Frequency	Per Project		
Evaluation	Anually		
Responsible	Project Manager		

3.4.4.2 Personnel Turnover

Calculate the percentage of people who resigned or were dismissed when leaving a classified position.
The measurement will be taken for each project and the maximum percentage of revenue allowed is 15%.

Table 14. Indicator tab - Personnel turnover

Indicator	**7. Personnel Turnover**	
Related Objectives	***1. Personnel Retention***	
Calculation	(Number of people separated from Classification/Total number of Classifiers)*100	
Process Applying It	Human Resources	
Target	**Unit**	**Target**
	%	15%
Speedometer	**Personnel Turnover** 	
	> 15%	15% < 15%
Measurement Frequency	Per Project	
Evaluation	Anually	
Responsible	Human Resources - Project Manager Project Manager	

3.4.4.3 Infrastructure Improvement

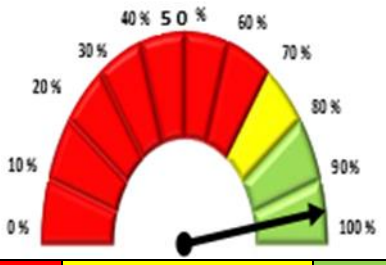
The infrastructure needs are various and depending on the project for the sorting area, there are projects carried out in Ecuasistemas' offices and other houses where the client in collaboration with Ecuasistemas prepares a place in the company to carry out the project.

For the calculation of this indicator, a semi-annual record will be kept where all the infrastructure needs of the sorting area will be detailed and the percentage of progress of each improvement will be recorded The improvement will be recorded, qualifying as minimum 0% when no progress. has been made. has been implemented and up to 100% when improvements have been made.

The results of the weighted average of the semi-annual progress will be an indicator to measure the growth of the infrastructure in the Classification area.

Tabla 15. Indicator tab - infrastructure improvement

Indicator	**10. Infrastructure Improvement**	
Related Objectives	*1. Classification infrastructure improvement*	
Calculation	Infrastructure improvement weighted average	
Process Applying It	General Management	
Target	**Unit**	**Target**

	%	80%
Speedometer	**Infrastructure Improvement Planning** 	
	< 70 %	de 70 % a 80% > 80
Measurement Frequency	Semi- Anually	
Evaluation	Anually	
Responsible	General Manager	

4. Conclusions

The analysis and review of the information corresponding to the present investigation point to the conclusion that the BSC is an applicable, flexible and timely metrology for the management of ECUASISTEMAS and for the effective follow-up and improvement of the classification process.

The analysis of the causes allows the definition of strategic objectives, which can be achieved through the fulfillment of the indicators of the control panel.

The results obtained from this research allowed the development of recommendations for improvements that were presented to the Ecuasistemas Operations Management.

The general objective was achieved, which was to design a management model for the "Classification" process based on the qualitative and technical analysis of the interview, provided that the implementation of this tool is correctly planned.

Referencias.

[1] A. I. Zermeño Flores, «Estudios sobre las Culturas Contemporáneas,» diciembre 2001. [En línea]. Available: https://www.redalyc.org/articulo.oa?id=31601406.

[2] S. S. Alvarado Merchán, M. J. Chávez Tomalá y F. J. Duque-Aldaz, «Propuesta de optimización del proceso flexográfico de la empresa Flexoviteq mediante la metodología kaizen,» Universidad de Guayaquil, Guayaquil, 2019.

[3] G. Wendt, R. Jost, J. Linke y D. Werner, «Boletín Científico Técnico INIMET,» diciembre 2008. [En línea]. Available: https://www.redalyc.org/articulo.oa?id=223015192004.

[4] M. Aparisi, «Docunecta,» 2013. [En línea]. Available: https://www.docunecta.com/blog/no-contratar-sistemas-de-gestion-documental-en-empresa.

[5] R. Kaplan y D. Norton, Cuadro de Mando Integral, Boston: Gestión 2000, 1995.

[6] F. J. Duque-Aldaz, M. A. Suriaga Sanchez, M. A. Rodríguez Gómez, G. E. Medina Pinoargote y R. J. Calderón Angulo, La Eficiencia y la Eficacia en Procesos Administrativos, Babahoyo: CIDEPRO, 2019.

[7] R. Kaplan y D. Norton, La Organización focalizada en la estrategia, Gestión 2000, 2005.

[8] M. R. Rodríguez Gallego y R. Ordóñez Sierra, «Profesorado. Revista de Currículum y Formación de Profesorado,» septiembre-diciembre 2012. [En línea]. Available: https://www.redalyc.org/articulo.oa?id=56725002018.

[9] S. A. Dorrbercker, S. Fernández, E. Barreiro, L. Álvarez y J. Arce, «Ingeniería Energética,» marzo 2007. [En línea]. Available: https://www.redalyc.org/articulo.oa?id=329127753008.

[10] «alteco consultores,» 2014. [En línea]. Available: https://www.aiteco.com/diagrama-de-ishikawa-o-de-causa-efecto-como-construirlo/.

[11] L. F. Restrepo B, «Revista Colombiana de Ciencias Pecuarias,» abril-junio 2007. [En línea]. Available: https://www.redalyc.org/articulo.oa?id=295023034012.

[12] D. I. Morillo Cadena, «Sistema Gestor de Documentos,» 21 mayo 2015. [En línea]. Available: http://www.dspace.uce.edu.ec/bitstream/25000/4325/1/T-UCE-0011-173.pdf.

[13] B. A. Fajardo Cáceres, A. A. Soto Cáceres y F. J. Duque-Aldaz, «Propuesta de un modelo Balanced Scorecard en la Empresa “Consulting & Human

Talent Hunter.,» Universidad de Guayaquil, Guayaquil, 2018.

[14] E. Jacho, «Prezi,» 20 diciembre 2012. [En línea]. Available: https://prezi.com/t-exlnsobjcs/diagnostico-de-la-competencia-y-diseno-de-estrategias-competitivas/.

[15] R. Kaplan y D. Norton, El cuadro de Mando, Boston: Gestión 2000, 1995, p. 47.