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A Methodology for Documenting Key Knowledge Through the Application of Knowledge Audit Techniques: The Case of a Mexican Pulp Company

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Abstract

Leveraging organizational knowledge is very important to improve the competitiveness of any company. Likewise, in the case of companies engaged in production of goods, proper documentation of manufacturing processes is critical to ensure the quality of products reaching the customers. This paper aims to propose a methodology to structure and document the process that takes place in the development of new products through the application of tools for auditing knowledge in order to ensure quality in the finished products. In addition to the proposed methodology, it is proposed to structure and design procedures for documenting and troubleshooting processes in the development of new products with a primary emphasis on identifying the key knowledge existing in the processes that are intended to document. Obtaining this key knowledge is through the application of audit techniques for knowledge and its representation is through knowledge maps. To validate this proposal, this methodology was implemented in a company engaged in the manufacture of packaging products located in Northwest Mexico.

Key Words*: Key Knowledge, knowledge audit, quality improvement, new product development, documentation procedures*

1. INTRODUCTION

Organizations are placed in a highly competitive environment where the difference is marked by the use of knowledge of its members so that proper management of this knowledge becomes an important competitive advantage to respond to the changing market demands.

The objective of this study is to propose and implement a model for identifying and documenting key knowledge of the processes involved in developing new products under ISO 9000:2008, in order to improve their quality to meet the requirements of the client.

The paper first presents a theoretical framework that explains the main concepts related to this work, and then the proposal becomes a model for identifying key knowledge for quality improvement in the development of new products. The paper then proposes a methodology for implementation. To validate the model, it is applied in the case of a company that explains each of the activities and results. Finally, the conclusions drawn from this work are presented.

2. THEORETICAL FRAMEWORK

The most important concepts related to this work are presented here which are the subjects of knowledge audit, where the emphasis is on explaining some of their tools, primarily, inventory, knowledge flow and maps. The other item of interest is the development of new products. Finally, the quality issue is described by mentioning the aspects of ISO 9000 procedures and documentation according to ISO 9000:2008.

2.1. Knowledge Audit

According to Nonaka and Takeuchi (1995) knowledge is defined as a dynamic human process of justifying personal belief in search of the truth. Knowledge is a fluid mix of structured experience, values, contextual information and skillful internalization that provides a framework for evaluating and incorporating new experiences and information. It originates, and is applied in the minds of connoisseurs. In organizations, it is often found not only embedded in documents or databases, but also in organizational routines, processes, practices and institutional norms (Davenport and Prusak, 1998).

Knowledge can be tacit which is the knowledge possessed by an individual based on his/ her experience, values, feelings, beliefs, and that can hardly be stored in some medium; and explicit which is found in repositories such as databases, manuals, books, videos and photographs, among others (Perez-Soltero, 2007).

The great challenge for organizations to stay ahead is to develop appropriate strategies for effective and efficient Knowledge Management (KM), allowing them to have a competitive advantage. A cliché that nobody can deny today is one that sounds like: 'Knowledge is power' (Bai and Durai, 2009).

Knowledge audit is a process of identifying the knowledge that the organization considers critical to the successful operation of the organization, so you can see gaps and limitations of the company concerning knowledge (Levantakis et al., 2008; Bai and Durai, 2009; and Perez-Soltero, 2009).

Wiig (1993), as cited in Liebowitz et al. (2000), says that a knowledge audit can identify excess or shortage of information, lack of awareness of information elsewhere in the organization, inability to keep abreast of relevant information, the meaning of 'reinventing the wheel', the common use of outdated information and not knowing where to go for experience in a specific area.

Methodologies for knowledge audit as proposed by Liebowitz et al. (2000), Lauer and Tannuri (2001), Burnet et al. (2004), Choy et al. (2004), Iazzolino and Pietrantonio (2005), Cheung et al. (2005), and Perez-Soltero et al. (2006), to name a few, agree that the main tools are the surveys/

interviews of knowledge, the inventory of knowledge and identifying knowledge flow and knowledge maps. The audit results are the analysis of knowledge maps, analysis and valuation of inventory and flow of knowledge, and the set of recommendations for the organization to design a strategy for implementing KM initiatives (Perez-Soltero et al., 2007).

2.1.1. Support Tools for Auditing Knowledge

There are several tools to support knowledge audits. Some of them are explained here.

Knowledge Inventory: The stock of knowledge is one of the most important elements for an effective KM. To take a 'snapshot' of existing knowledge in the organization, questions like: What knowledge exists?, What knowledge is used?, Where knowledge is used?, When knowledge is used, What organizational role provides knowledge? have to be answered. The What? is answered by identifying the business processes, the Which? refers to knowledge assets that contribute to the successful execution of business processes, the Where? And When? descriptors are captured by time and location of an asset of knowledge, and what organizational role? refers to the abstract roles in an organization involved in the business processes. These roles can be performed by different agents. Identification of knowledge assets is not an easy task, as it is rarely visible immediately. This requires the selection of an appropriate level of description of knowledge assets. Once knowledge assets are identified, it requires a form of representation to make the inventory available for use (Gil et al., 2008).

Knowledge Flow: The primary objective is to allow the flow of knowledge and experience where it is needed, through time, space and geographic distribution because knowledge is not evenly distributed within the company. The success of an organization depends on effective knowledge flow (Nissen, 2002, as cited in Gil et al., 2008).

A flow comprises the interaction of various structural elements (actors: organizational units, project teams, individuals, etc., and artifacts such as documents, reports, software tools), and may consist on informal discussions and semester reports strictly formal. Some flows are bidirectional and unidirectional. The flows may be differentiated with respect to frequency and the amount of information they contain, both features provide an understanding of the total flow between various elements. It is useful to model what kind of knowledge is contained in a flow. The emphasis on flows by different agents is also a significant feature of how this can bring potential misalignment (Hansen and Kautz, 2005, as cited in Gil et al., 2008).

Knowledge Map: A knowledge map is a tool for localization of knowledge within an organization. It is similar to a map of information, but rather knowledge-oriented information. It may have a pictorial representation in the form of a knowledge network.

Hansen and Kautz (2005), as cited in Gil et al. (2008) explain that to build a knowledge map, one must perform a series of activities summarized in the following four points:

1. Drawing all the important elements of the organizational structure;

2. Describing all knowledge flows between two or more people or elements of knowledge and representing that flow;

3. Providing context for knowledge flows; and

4. Analyzing the problems identified to understand its root cause.

2.2. Development of New Products

The Development of New Products (DNP) comes from innovation. According to Escobar (2000), "innovation is defined as the transformation of an idea into a product, new or improved, in an operational process in industry or trade, or a new methodology for the social organization".

A new product can be created or made 'new' in many ways. An entirely new concept can be translated into a new article and/or service. Simple minor changes in an existing product can make another 'new' or can offer an existing product to new markets it considered 'new'. We can only consider new product for a limited period. To be able to assign that status, a product must be entirely new or have changed in a functionally significant or substantial sense. Of course, the needs and attitudes of customers in a market segment must determine the finished product for that market. The relevant dimensions-oriented product should be useful to decide which features you wish to highlight, and it is clear that the product must contain all the basic features that consumers expect to find. There are two ways for a company to have new products: (1) Acquisition—purchase of a company, a patent or a grant to produce a paper owned by a third party, or (2) Development of new products in the Research and Development (R&D) department of the company (Ariza et al., 2009). The development of a is summarized in Figure 1.

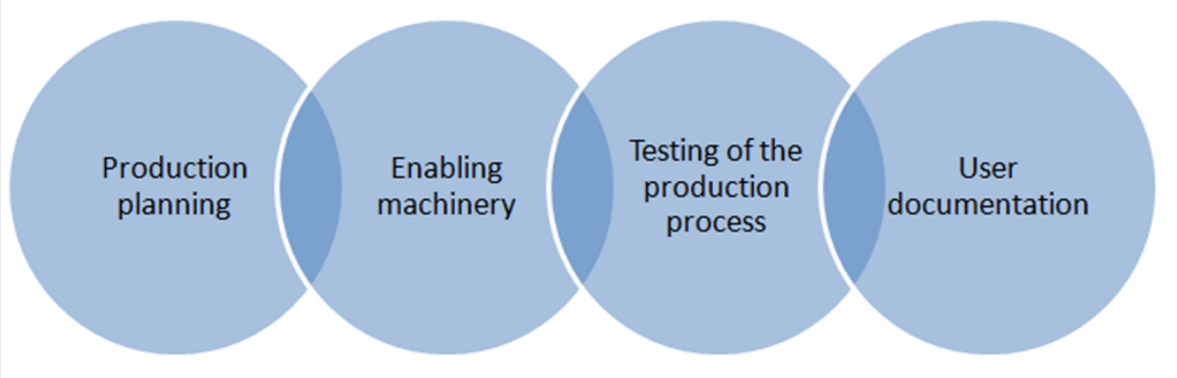

Figure 1. *Developing a New Product*
Source: *Borja and Ramirez (2006)*

Production Planning: Planning includes administrative aspects of the production schedule for the production plan, resources and infrastructure needed for production, human resources for manufacturing, training requirements, commodities and commercial components, validation and testing resources, production tooling and accessories, manufacturing process flows, and quality control procedures, documentation necessary to support the manufacture of product, packaging and packing, estimation of future product demand and planning the necessary adjustments for the production process.

Enabling Machinery: Considers all the aspects specified by the production plan, adequate physical space, installations, making changes and movements of the existing production equipment, specifying, purchasing, receiving, installing and testing new equipment, assembling or assembly line or production system.

Testing of the Production Process: Testing the line to define the system parameters of each process and operation, starting the line or system, producing beta prototypes, pre-series production or pilot production, qualifying and validating the product and its production process considering normativities, certifications and approvals that apply, putting into operation the line or the production system and its rated speed, maintaining and making improvements and having an engineering team.

User Documentation: User guide, operation and maintenance, product specifications, warranty terms and conditions.

2.3. Quality

Knowledge is a major creative force of the knowledge worker. The quality of the work of knowledge workers not only depends on their ability to create, distribute and share knowledge, but also on how the work is organized in their organizations (Mladkova, 2011), and given this, the documentation of knowledge should impact the quality of both the knowledge that is documented, and the quality of the organization.

Juran (1990), as cited in Gutierrez (2005)) states that, "Quality is a product suitable for use". So quality is the absence of deficiencies in those characteristics that satisfy the customer. The American Society for Quality (ASQ) mentions that, "Quality is the totality of details and features of a product or service that affects their ability to satisfy given needs". ISO 9000:2000 – "The totality of features and characteristics of a product or service that bear on its ability to satisfy the needs expressed or implied preset". The concept of quality has undergone an evolutionary process allowing it to migrate from purely technical features of a product or material to the set of features, depending on the particular needs of the users (Del Rio, 2008).

To ensure the quality, the characteristics of a product or service are reflected in a document called 'standard', with an agreement of all groups (manufacturers, users, authorities, associations, professionals, and others) interested in that product. Therefore, certification is the result of a process that evaluators or auditors of the certification review the conformity of the product or the management system in accordance with the requirements of the standard. If issued as a public document, the certificate attesting to the outcome of the review (Bureau Veritas Group, 2003).

2.3.1. ISO9000

The ISO-9000 series is a set of standards of quality assurance made by the European Community directive. ISO-9000 does not imply a higher quality product, but they offer a standardized way to evaluate and certify the quality assurance system of the companies. The standards were developed in 1987 by the International Standards Organization (ISO) in conjunction with the European Community for standardization (Jauregui, 1996).

The ISO-9000 system is the backbone on which quality of the most successful companies in the international trade is based. The implementation of these standards is voluntary and its use ensures consistent quality and increases the credibility and trust among customers and providers, the use of these standards provides a competitive edge and facilitates the integration of production chains (SIICYT, 2006).

This international standard specifies requirements for a quality management where an organization: (a) needs to demonstrate its ability to consistently provide product that meets customer and applicable regulatory requirements; and (b) aims to enhance customer satisfaction through effective application of the system, including process for continual improvement of the system and the assurance of conformity for the customer and applicable regulatory requirements. The term 'product' applies only to the product intended for, or required by client (ISO, 2000).

All requirements of this international standard are generic and are intended to be applicable to all organizations, regardless of type, size and product provided. Where any requirement(s) of this international standard cannot be applied due to the nature of an organization and its product, this can be considered for exclusion (ISO, 2000).

There are different groups of specific ISO standards, among which are: the IS0-9001 that is one of the standards for the management and quality assurance, the IS0-9002 is a model for quality assurance in production and installation and associated services, the IS0-9003 is a model for quality assurance in final inspection and testing, the ISO 9004:2000 is a system of quality management guidelines for performance improvement, the ISO-10000 are guides to implement quality management systems/technical reports application of statistical techniques in ISO 9000. ISO 14000 is a series of international standards that specify requirements for preparing and assessing a management system to ensure that the company maintains environmental protection and prevention of pollution in balance with socioeconomic needs (UJCM, 2011).

2.3.2. Documentation of Procedures According to ISO 9001:2008

Some standard definitions related to documentation of procedures are:

- Quality Manual is the document that establishes the quality policy and describes the quality system of an organization in the document.
- Procedure indicates the guidelines to be followed by a department or several departments to meet a requirement of the standards implemented.
- Statement of work is a document that defines how to perform.
- Activity record is a document that provides objective evidence of activities performed or results.
- Objective evidence is information whose veracity can be shown based on facts obtained through observation, measurement, test or other means.

The guide for writing procedures based on ISO was taken from Jauregui (1996) and ISO 9000-2008. The following points should be included in developing procedures:

- Distribution of the procedure (which areas use the procedure);
- The procedure goal (set the method for the development of procedures);
- Scope of the procedure (applicable to all procedures developed in the company and to document the quality system);
- Development (details of the activities of the procedure);
- Responsibilities and authorities of personnel involved (each department is responsible for writing the procedures applicable to the relevant section of the Quality Manual);
- Definitions (terms commonly used and known only by the company);

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- References (procedures or information relating to the procedure);
- Records (applicable registration procedure, if applicable); and
- Approvals (approvals of the personnel involved and authorizing the procedure).

3. CONCEPTUAL MODEL

The development of a new product is based on prior knowledge of similar products that the company has created and how this process has evolved, offering innovative products with features demanded by the market. It boosts the quality of both the product and the company. Carlile (2002) mentions that much of what they produce has a base organization in the specialization of the different types of knowledge.

Figure 2 shows a proposed model to identify the key knowledge in the development of new products under ISO documenting and building on knowledge maps.

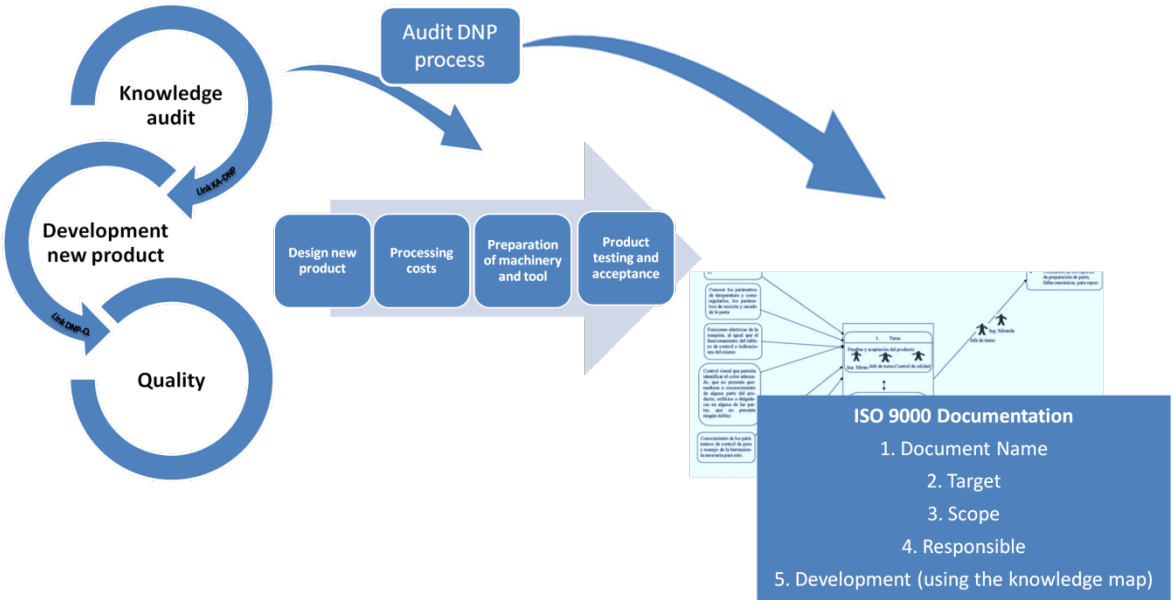

Figure 2: *Model to Identify Key Knowledge in Developing New Products, Documented Under ISO and Based on Maps of Knowledge*

Knowledge audit is based on the analysis of knowledge held by the company and required for future; also, the development of a new product requires prior knowledge existing in the company, and all improvements or innovations that the company generates impact the quality of organizational processes and the processed product.

The development of a new product requires the combination of knowledge and skills necessary to perform useful actions that solve problems or meet needs. The solution to these problems or needs are based on a combination of experience, formal or explicit knowledge, specific skills and

knowledge or tacit uncodified organizational members (Dosi, 1988, as cited in Marsh and Stock, 2003).

Link KA-DNP

Link KA-DNP is the union of the Knowledge Audit (KA) and the Development of New Products (DNP). Knowledge generation starts from an initial investigation and goes through the following stages of development until the product is released:

1. Developing a stock of knowledge on the technologies that the organization can deploy.
2. Providing a stock market-based knowledge, dealing with customer needs, behavior and future opportunities.
3. Creating a stock of knowledge of the administrative, technical and management processes through which current and new products can be identified (Suarez and Escorsa, 2001).

Also, an audit of knowledge, once put into practice to reduce the time and complexity of DNP cycles, shows the state of knowledge for the DNP and consequently the positive impact on quality.

The DNP effectively improves an organization's ability to remain competitive in an uncertain environment. It requires the creation, capture, collection, exchange and application of knowledge and experience. The ability of an organization to 'learn'—knowledge must be used in the problems and opportunities as they arise and are generated through continuous assessment of how those responses have had an impact on the organization and its operating environment (Lemon and Sahota, 2004).

Link DNP-Q

Link DNP-Q is the process of DNP and its impact on Quality (Q). Quality is an important component which reflects the degree of superior efficiency of the daily service operations performed by welfare organizations and their customers. Products and services and the perception of quality are influenced by the quality of information handled before, during and after the delivery of the product or service. Desirable features include information on the accuracy, accessibility, adequacy, availability, reliability, security and opportunity (Torres and Vasquez, 2009).

KA promotes the knowledge about quality that already exists in the organization. In this case, DNP influences the existing information management necessary for this process to be carried out in the shortest possible time to achieve market satisfaction.

Audit DNP Process

Because innovation is often the recombination of existing resources and capabilities, capacity development is cumulative and is limited by past experiences. In addition, the organization has more experience in areas of past learning, so that you can receive, assimilate and apply new knowledge more easily when it is related to prior knowledge. These processes lead to mutually reinforcing pattern whereby investments are possible solutions in areas where learning has

occurred in the past (Schumpeter, 1934; Dosi, 1988; Penning and Harianto, 1992; Cohen 1990, as cited in Marsh and Stock, 2003).

Improving the process of DNP is not about quick fixes, it is the application of best practices in product development. It can be seen as a journey (i.e., continuous process improvement) and not as a destination, and this is supported by the current analysis of the information held in this process (Cormican and O' Sullivan, 2004).

Chan and Lee (2011) discussed the importance of KA as the first step in determining how knowledge is managed in the business processes of an organization's critical mission. The process of quality management is the main subset within the business process that is critical to an organization.

At the time of audit, the DNP process generally includes the task of the new product design, production development costs, start-up of machinery and tools, testing and acceptance of the product. The state of knowledge is depicted in a knowledge map. It contributes significantly to more efficient documentation of information on the quality process of ISO 9000:2008, which generates a document that is summarized as follows:

1. Procedure to develop document name: work instruction and manual specification, among others.
2. Purpose of the procedure.
3. Scope of Procedure: Limitation of areas, people, resources, etc., are involved.
4. Responsibility: Determine who is responsible for this procedure.
5. Development: Detailed description of the procedure, which includes a map of knowledge to indicate which part of the procedure is being documented.

4. IMPLEMENTATION OF THE MODEL

To implement the model discussed above, the proposed methodology consists of three general steps and a series of steps that include various aspects such as work procedures on the DNP, products and key process, knowledge audit in DNP, analysis results, preparation of the final report to display the results of the audit of knowledge through documentation under ISO relying on knowledge maps.

For the development of this methodology, elements from other existing methodology (Perez-Soltero, 2007) and the methodology proposed by Jauregui (1996), among others, were taken to promote the development and implementation of a quality system according to ISO 9000.

If knowledge is collected and indexed considering modeling from multiple perspectives, you can find people who have a particular resource of knowledge (or part thereof), and all the resources of knowledge that a certain person can have, or all activities that can support a particular resource of knowledge (Kingston, 2001, as cited in Perez-Soltero, 2007). Figure 3 shows the general methodology followed.

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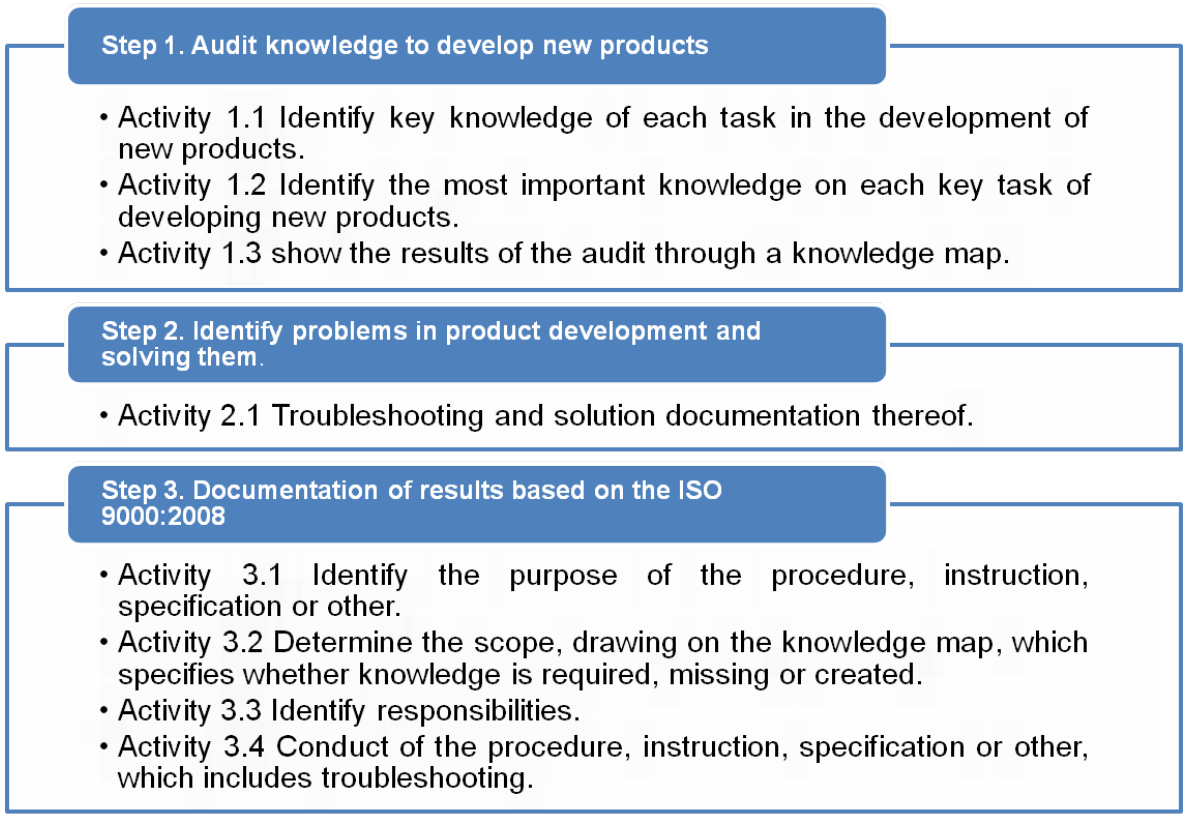

Figure 3: *Methodology for the ENP and Document Audit Under ISO Relying on Knowledge Maps*

Step 1 – Audit Knowledge to Develop New Products: At The audit design tasks of the new product development are: costs, start-up of machinery and tools, validating the capability of the equipment, testing the product acceptance which will result in the current situation. Knowledge activities are: identifying key knowledge of each task in the development of new product, identifying the most important key in the understanding of each task in the development of new products, and show the results of the audit through a knowledge map.

Step 2 – Identifying Problems in Product Development and Solving Them: As in any process, you have to face situations that diminish the proper functions of the system, so this step will identify all the situations that do not contribute in any way to comply with the plan, detecting what machinery and / or equipment, human resources or external situations which do not allow the company to develop the plan. For this, the following activities are performed: troubleshooting and documenting the solution of the problems.

Step 3 – Documentation of Results Based on ISO 9001-2008: Finally, the third step is to document the results of the previous two steps based on the guidelines of ISO 9001-2008. Knowledge maps make it easier to identify the knowledge which significantly contributes to the good use of knowledge. This step performs these activities: establish the purpose of the procedure, instruction, specification or other, determine the scope, drawing the knowledge map

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which specifies whether knowledge is required, missed or created; determine responsibilities, and procedure development, instruction, specification or other, which includes troubleshooting.

5. CASE OF PULP COMPANY

The model and methodology were implemented in Celulosa Moldeada del Pacifico SA de CV (CEMOPAC), a company in Northwest Mexico dedicated to design and produce all kinds of molded pulp packaging (cardboard any derivative) which is convenient given the ecological impact besides its low cost. It currently holds the production of new products such as 18 and 12-egg trays in different colors: blue, magenta, yellow and natural, just as cup holders, and any shipping carton.

It is noteworthy that the proposed model can be applied to organizations that are developing new products or systems. The company which carried out the implementation meets the conditions for model validation and methodology.

A detailed description of the application of the model according to the steps of the methodology is given below.

Step 1 – Audit Knowledge to Develop New Products

A series of activities were undertaken to determine the state of knowledge. These activities are as follows:

Activity 1.1: Identify key knowledge of each task in the development of new products. Based on observation, review of company documents and interaction with managers of each area, key knowledge is determined by task (Table 1).

Identify key knowledge of each task in the development of new product	
Task	**Key knowledge**
Design new product	Knowledge of technical drawing, CAD (computer aided design), metrology, materials, physics, mathematics, system of units, software: AutoCAD, SolidWorks, Pro-E, UGNX, catia, among others.
Processing costs	Knowledge of digital design products and new product dimensions, weight, color, raw material costs, size of the order, if continuous product, single season or occasion. Understand the values, strategy and plans of the organization or project, understand the meaning of profitability and cost-efficient, understand the implications of generating and fundraising.
Preparation of machinery and tool	CNC (computer numerical control), CAD (Computer Aided Design), CAM (Computer Aided Manufacturing), tools (drills, drills, chisels, rhymes, etc.), knowledge of industrial design, metrology, materials, physics, mathematics, unit system, software: autocad, SolidWork, pro-e, UGNX, catia, among others. Knowledge about parts and molds, trainers, transferors. Handling precision welding, tool handling various materials such as Araldite. Operation, operation and monitoring of the MPS-1200FE2 molding machine and additional equipment, pumps, tanks, flows. Knowing unscrewed points, explain the operation of the electrical connections and sealing the suction piston for changing molds. Handle various measuring instruments such as gauges, and tools. Find out the amount for the preparation of dough, cardboard, newsprint, other paper, gallons of water and food coloring (if applicable), operation of slurry preparation tank, duration has created the paste, delivery times of the paste; when ready.
Product Testing and Acceptance	Knowing parameters as temperature and regulate the parameters of suction and

	drying of the paste. Electrical functions of the machine, like the operation of the control and display panel thereof. For a product to be accepted must pass a visual inspection to identify the right color, which does not have any burns or darkening of the product, or holes on either side, it shows no bending. That the product has the proper weight control, it varies depending on the product, it should be within the ranges established.

Table 1: *Identifying Key Knowledge of Each Task in the Development of New Product*

Table 1 shows the key knowledge used for each task for developing a new product. Once this activity is done, it is necessary to carry out Activity 1.2.

Activity 1.2: Identifying certain or all key knowledge assets in developing a new product, identifying which of these assets are the most important/relevant to the process which are represented on a knowledge map. This case presents only the results for the task of testing and product acceptance due to article and space constraints. This was performed similarly for the other tasks using a 5-point reference scale with 5 being the most important and 1 the least important, defining the importance of knowledge for the product, task and product acceptance testing (Table 2).

Determine the most important knowledge of the task: testing and product acceptance To which can use a scale of 1 to 5, where: 1 = not applicable or no impact 2 = little impact 3 = average impact 4 = considerable impact 5 = high impact	
Knowledge	Importance in the process
Operation of the cellulose molding machine (MPS-1200-FE-2)	4
Knowing parameters as temperature and regulate the parameters of suction and drying of the pulp	5
Electrical functions of the machine, as well as the operation of the control and display panel of the same	3
Visual inspection to identify the right color, which does not have any burns or darkening of the product, or holes on either side, it shows no bending	5
Knowledge of the parameters of weight control and management of the necessary tool for this.	5

Table 2: *Importance of Knowledge for the Product, Task and Product Acceptance Testing*

Table 2 shows the results for the classification of knowledge depending on their importance of the task for testing and product acceptance. It was classified by the head of the task, in this case, the maintenance manager responsible for production. The results include high impact knowledge of the parameters and how to regulate temperature, suction parameters and drying of the paste; visual inspection to identify the right color; ensuring that there are no burns or holes on either side or no bending; and knowledge of the parameters of weight control and management of the necessary tool for this, followed by knowledge of the molding machine operation (MPS-1200-FE-2); and finally the mean impact knowledge of electrical functions of the machine, like the operation of the control and display panel thereof. Once Activity 1.2 is done, we proceed to Activity 1.3 which shows the results of the audit through a knowledge map.

Activity 1.3: Review and approval of the knowledge map by the head of the task. Table A1 shows the main generators of knowledge, the lack of it and the users of the knowledge generated (see Appendix).

Step 2 – Identifying Problems in Product Development and Solving Them

It identifies the main problems faced by task of testing and acceptance of the product and how they have been solved; due to space restrictions, only one problem is discussed in Activity 2.1.

Activity 2.1: Troubleshooting and documentation of the solution for the problem, stuck in mold tray conveyor (P1), mold and dry conveyor (B1) and tray forming (FM), this problem affects the acceptance of a product (Item 5 – Troubleshooting in Appendix).

In this case, the detection of problems was conducted by reviewing the daily report log for the last two months prepared by the shift manager, information obtained from discussions with the employees responsible for the development of products, and talks with Engineer, Orlando Miranda, Head of maintenance in line 3. Based on the revision of log for the last two months, most persistent problems were detected, same as confirmed by the maintenance manager and employees. The maintenance manager was the one who determined the most persistent and important problems to be solved.

Step 3 – Documentation of Results Based on ISO 9001-2008

The goal of this step is to document the information obtained on the basis of the guidelines of ISO 9001-2008. In this case, the task will be for testing and acceptance of the product, which will be a series of activities, the end result is shown in a document under ISO.

Activity 3.1: Identifying the purpose of the procedure, instruction, specification or other. Determining the task target and acceptance testing of the product, which in this case is whether the product is within the acceptance parameters set.

Activity 3.2: Determining the scope, drawing the knowledge map which specifies whether knowledge is required, missing or created.

For this activity, the knowledge is used showing what specific knowledge is being documented and thus showing additionally a guide to the user of how much information you have in your hand and what you need to know more in detail about the task, in this case, the task of testing and acceptance of the product.

Scope: Applies to any product produced in the production line 3, with reference to Figure A1 and indicates how much of the map is documented.

Activity 3.3: Identifying the responsibilities. Once the above activities are developed, it was determined who is responsible for the task of testing and acceptance of the product that is developed. For this case, those responsible for the task are: quality operator, shift manager and maintenance engineer.

Activity 3.4: Conduct of the procedure, instruction, specification or other, which include troubleshooting. Finally, it shows the document that captures the task of testing and acceptance of the product and includes the solution to the problem stuck in mold tray conveyor (P1), mold and drying conveyor (B1) and tray forming (FM), that the product is not accepted, this document is drawn from the way they would for ISO 9001-2008. As it can be seen, using knowledge maps to support the documentation of information under ISO is an advantage because it allows us to define and characterize the information based on their relevance.

6. CONCLUSIONS

Knowledge audit can be used as a strategy to enable the organization to improve its processes and method of carrying them out since identification of key knowledge is crucial when developing a process. It is said that this process will develop in a better way, because awareness of the existing knowledge helps in identifying the missing knowledge required to perform it more efficiently and the knowledge generated is obtained when developing the process which can be used as experience in the future.

Based on the proposed model and its application in the company under study, it is concluded that the adoption of quality standards and auditing knowledge has great respect for the fact that the knowledge audit shows the key to understanding the performance of an activity, allowing the adoption of quality standards leveraging the knowledge detected in the activity. At the time of document information on quality standards, the company decides what is recorded and what is not; however, a knowledge audit shows what knowledge is crucial, which leaves it to you to decide what truly is worth documenting.

Knowledge audits reduce resistance to change. Best practices are applied to performance of an activity for continuous improvement where all members of the organization can appreciate the benefits of drawing their experience, contributing to the welfare of the working environment and the organization itself.

A thorough knowledge of the processes underlies the organization to carry out actions to improve them, and to be a factor contributing to the achievement of success. Based on the audit results produced, strategies can be defined to exploit the existing knowledge, decrease the missing knowledge and make better use of the knowledge generated by the organization.

The company decides the information to be documented for certification under ISO 9001:2008. If the information is based on implementing knowledge audit techniques such as knowledge maps, the organization could document knowledge of greater importance and relevance.

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1. Target

Determine if the product is within the parameters established acceptance.

2. Scope

Applies to any product produced in the production line 3, with reference to the knowledge map to the task of testing and product acceptance, same as shown below and indicates how much of the map is documented.

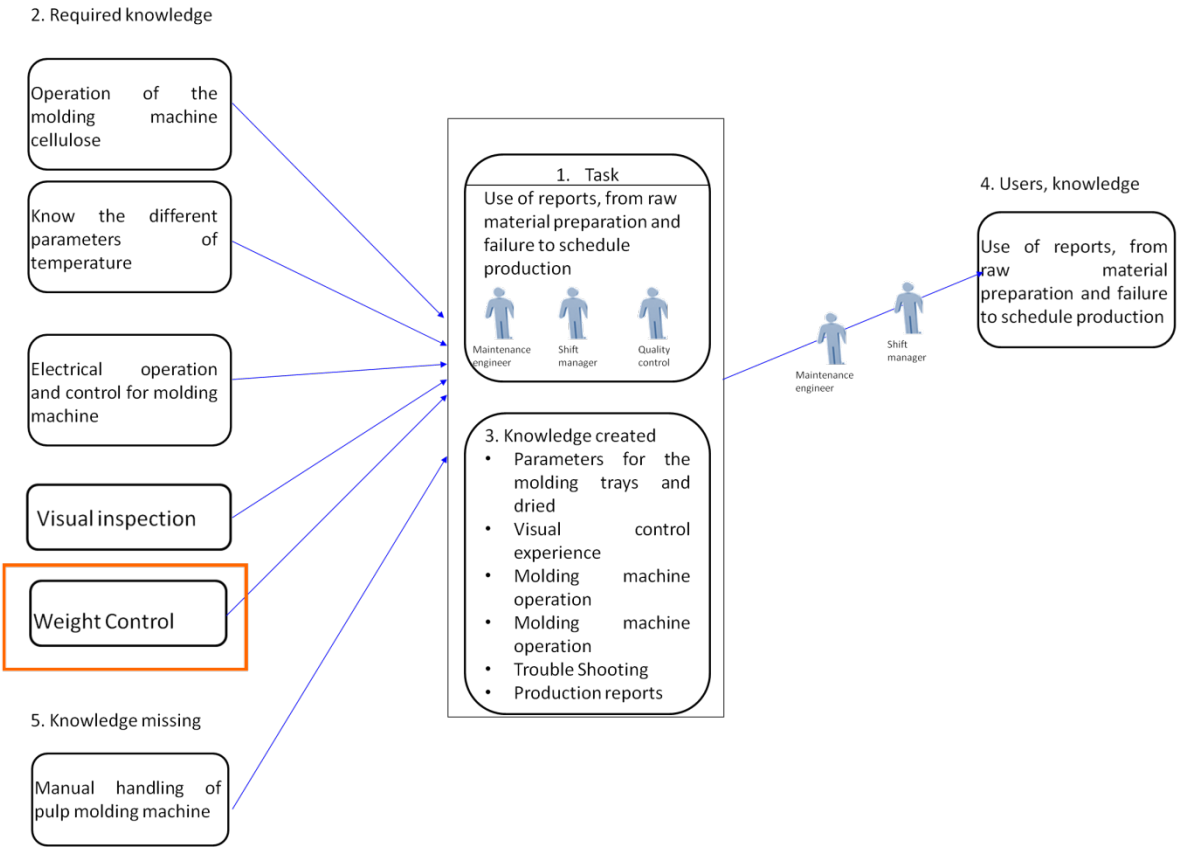

Table A1: *Knowledge Map to the Task of Testing and Product Acceptance*

3. Responsible

Operator quality
Shift manager
Maintenance Engineer

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4. Development

For documentation of knowledge use the above map, thus marking what specific part of the map is automatically documenting and showing which remain to be documented.

For a product to be accepted must pass a visual inspection to identify the right color, showing no burns or darkening of the product somewhere.


Accepted


Rejected

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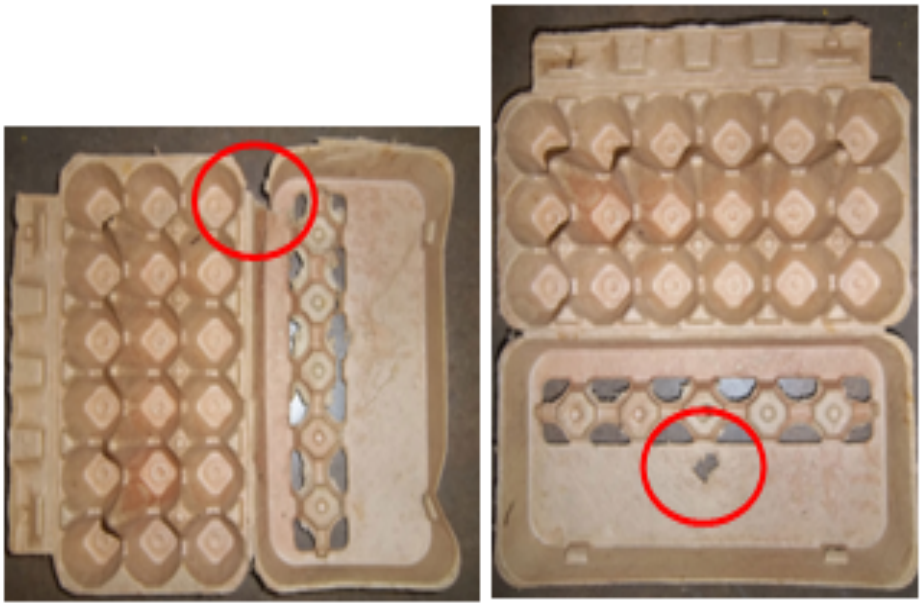
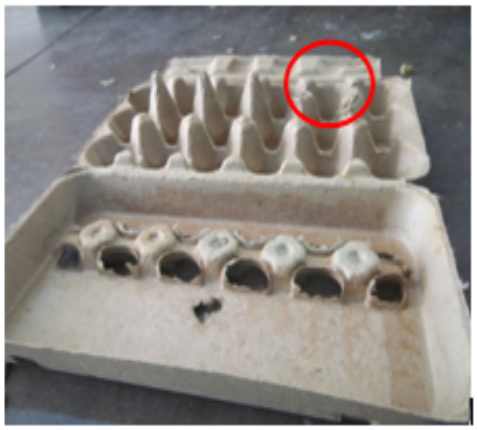
Similarly, there should be no holes or cracks.



Should be flat or thin.



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Ensure that the product has the proper weight control; it varies depending on the product and it should be within the ranges established.

5. Troubleshooting: Tray mold attached to conveyor (P1), mold and drying conveyor (B1) and tray forming (FM).

Possible causes

a. Mold covered
b. Lack of vacuum
c. Uncontrolled temperature (high or low)
d. Breaking the mold mesh in FM

Possible solutions

a. Mold covered:
1. Brush the molds
2. Sprinkle antioxidant
3. Stop machine and let cool, then wash the molds with desincrustol (acid)
4. Remove the mold, replace valves or change for a new mold

b. Lack of vacuum:
1. Check the water level in the pump
2. If the pump is embedded tartar, stop and put desincrustol.

c. Uncontrolled temperature (high or low):
1. Check sensors (when the high-temperature sensor detects automatically stops and the temperature may decrease over)
2. Measure the temperature with an infrared thermometer
3. Check fuse may have blown fuses
4. Review SSR (solid state developer) shows damage
5. Check the damage to electrical wiring
6. Check resistors for open or short circuit

d. Breaking the mold mesh in FM:
1. If the mesh is old, change it
2. Misplacement when making molds; change the placement