

Diagnóstico de la industria del mármol en la Comarca Lagunera

Diagnosis of the Marble Industry in the Comarca Lagunera

Sandoval Chávez Rebeca

Universidad Politécnica Gómez Palacio, México

rsandoval@upgop.edu.mx

María del Rosario Moncayo Luján

Universidad Politécnica Gómez Palacio, México

mmoncayo@upgop.edu.mx

Resumen

El objetivo del presente trabajo fue detectar los obstáculos de las empresas dedicadas a la industria del mármol que les impiden exportar. El diagnóstico se dividió en cinco grandes áreas: datos generales, aspectos tecnológicos, mercado, fuentes de financiamiento y capacitación. El informe se centra en la Comarca Lagunera, ubicada al norte de México, la cual forma parte de los principales productores y exportadores de mármol en el mercado internacional, y que sigue ostentando el primer lugar nacional en producción de bloques de mármol. La extracción anual alcanza más de un millón 800 mil toneladas, de las cuales 80 % son procesadas por la industria local.

Dentro de los resultados más destacables se encontró que 77 % de las industrias manejan tecnología obsoleta y/o básica, 73 % de las empresas analizadas muestran posibilidad de incrementar su capacidad de producción con el fin de exportar, y 4 de cada 10 empresas no exportan debido a la falta de financiamiento. Otro dato relevante fue la falta de capacitación en el sector, ya que 32 % del personal no recibe capacitación. Mercados, medios de

transportación y acceso a fuentes de financiamiento fueron las principales áreas de interés en cuanto a capacitación.

Palabras clave: mármol, diagnóstico, capacitación, capacidad productiva, exportación, plan de exportación, financiamiento.

Abstract

The objective of this study was to detect obstacles of the marble industry companies that preclude them from export. The diagnosis was divided into five main areas: General information, technological aspects, market, sources of financing and training. The report is focused in the Comarca Lagunera, located to the North of Mexico, which form part of them main producers and exporters of marble in the market international, and that continues boasting the first place national in production of blocks of marble. The annual extraction reaches more than one million 800 thousand tons, of which 80% are processed by the local industry.

Among the most noteworthy results found that 77 percent of industries manage obsolete or basic technology, 73% of the companies analyzed show possibility of increasing its production capacity in order to export, and 4 out of 10 companies are not exported due to lack of funding. Another relevant fact was the lack of training in the sector, 32% of staff do not receive training. Markets, means of transportation and access to sources of financing were the main areas of interest in relation to training.

Key words: marble, diagnosis, training, productivity, productive capacity, export, export plan, financing.

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Introduction

Mexico has great potential of marble as dimensionable rock. The two main marble producing areas are: the Comarca Lagunera, a wide expanse that sits on the boundary between the States of Durango, Coahuila, Zacatecas and Puebla. They are also other relevant production areas located in the States of Queretaro, Hidalgo, Oaxaca, San Luis Potosí and Guerrero.

By 2014, the total exported tons amounted to 70,016 and the imported 76,716, giving a total value in exports of \$ 60.8 million, while that of imports amounted to 57.9 billion dollars, data reporting a minimum of 2.8 million dollars positive trade balance.

These data reflect the attractiveness of the industry and the great possibility of growth in the domestic and foreign market. The concern for the present research was born after observing that in the Comarca Lagunera is have been installing foreign companies with the aim of exploiting the resource of marble in the region.

Research Basis

Theoretical Framework

Definition:

Etymologically, the term marble comes from the Greek word "marmarios", used by the ancient Aegean which means "stone of white snow and immaculate surface, glowing and bright". This definition highlights the beauty of this stone, as well as its origin.

Technical Data

The marble is a rock metamorphic composed by carbonate. In commercial terms, the marble floor has a sense petrologic, although often refers to limestone, such as recrystallized limestones, Dolomites, marble, Onyx and travertine; sometimes the term is applied to rocks such as Tuff, streamers and granite.

Each an of these rocks has features own to which is them added the following requirements commercial common and of greater relevance, referred generally to plates and parquet:

- Constant thickness with a tolerance of + 1/32"
- Perfect square
- Gloss mirror
- Without porosity
- Homogeneous bevel

The range is very wide and varied, so there are other features to consider in the business of the dimensionable rocks, for example:

- Specific weight
- Module breakdown
- Resistance to compression
- Flexural strength
- Resistance to abrasion
- Resistance to weathering
- Structural performance
- Design, selection and installation of anchors re-sizable rock and external systems of anchors.
- Static coefficient of friction

Mining geological potential

Mexico has large areas of rocky outcrops composed of carbonate rocks that offer potential as dimensionable rocks. There are very important marble-producing areas, where exploitation processes are conducted and finished product. The following map shows the main areas, in addition to regions with potential for these materials, defined from the regional geological information available.

PRINCIPALES ZONAS PRODUCTORAS DE MÁRMOL EN MÉXICO



Figura 1. Principales zonas productoras de mármol en México. Fuente: Coordinación General de Minería, Dirección General de Desarrollo Minero, Secretaría de Economía.

As can be seen, the zone 1 comprises the region called La Laguna, located on the border of the states of Durango, Coahuila and Zacatecas. In the municipality Tlahualilo de Zaragoza, Durango, specifically in the mountains La Campana and Tlahualilo, are located most of the towns of resizable rocks, where limestone blocks corresponding extracted to the Acatita Training, light cream, with layers up to 3 m, which by its appearance and color is very appreciated for laminated and used in the construction industry. With respect to such sites, 26

locations consisting of limestone and used as materials for the construction industry and ornamentation were located.

The rocks outcropping in the municipal area of Mapimi, Durango, are mainly sedimentary and igneous with a small area of metamorphic rocks. The former are mostly of marine origin, aged upper Jurassic to the Cretaceous, and rest on a consistent base Paleozoic metamorphic rocks like slate, quartzite and phyllite. With respect to such sites, 60 locations consisting of limestone, marble, travertine and onyx, which are used as materials for the construction industry, ornamentation and to produce calcium carbonate were located. It also has outcrops of volcanic rock, which by way of open pits developed in rhyolitic tuff spills, andesite and rhyolite, occur intermittently rock blocks are transformed into different products.

In the municipality of Matamoros, Coahuila, 26 km southwest of the city of San Pedro de las Colonias, the area of Devil's Canyon is located, which consists of limestones with moderate and susceptible recrystallization advantage in the marble industry. The geological environment of the area is predominantly sedimentary, represented by dolomitic limestone and gypsum Acatita Formation of Lower Cretaceous and the Recent alluvial deposits, located in the valleys and lower parts topographically.

In the area of Avila Camacho, municipality of Torreon, Coahuila, the stratigraphic sequence consists of marine and continental sedimentary rocks ranging from the Cretaceous to Recent. The area of economic interest is within the Aurora Formation and the site is a gap intraformacional pink salmon pink to reddish hues, good quality.

The different types of marble, and its main forms of marketing is.

TIPOS DE MÁRMOL EN MÉXICO							
							
<p>Sumineral esencial es la calcita (CO_3Ca) y existe en colores claros (blancos, cremas y grises).</p>	<p>Son rocas compuestas en más de un 90% por carbonato cálcico-magnésico.</p>	<p>Es un mineral del grupo IV (óxidos) considerado como piedra semipreciosa.</p>	<p>Piedra caliza que se obtiene de la naturaleza en forma de bloque y usa en la construcción.</p>	<p>Roca carbonatada de colores pardos, anaranjados, grises y rojizos por contener óxidos de hierro.</p>	<p>Roca ígnea volcánica ligera de consistencia porosa, formada por la acumulación de cenizas u otros elementos volcánicos.</p>	<p>$(\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4)$ Es un conjunto que engloba los minerales lizardita, antigorita y crisotilo.</p>	<p>Roca plutónica con cuarzo, plagioclasa y feldespatos alcalinos como componentes claros.</p>
TIPOS DE MÁRMOL EN LA COMARCA LAGUNERA							
							
				<p>Roca semidura, no muy pesada y frágil, es infusible, ya que se descompone en casi todos los carbonatos.</p>	<p>Roca homogénea formada por arcillas. Se presenta en un color opaco azulado oscuro y dividida en lájas u hojas planas.</p>	<p>Roca de bajo grado de metamorfismo intermedio entre una pizarra y un esquisto.</p>	
SE COMERCIALIZA	PLACA 			PARQUET 			
				<p>Suelos laminados con impresión de mármol.</p>			

Figura 2. Tipos de mármol. Fuente: elaboración propia.

Diagnosis of companies

The diagnostic term comes from the Greek word "diagnosis", which translated into Castilian means "knowledge".

Its definition is: "to consider one thing, a fact or a situation for analysis or to find a solution to their problems or difficulties." Meanwhile, the business assessment refers to activities that are carried out to see first hand what the situation of the company and its major impediments in achieving their goals.

As in most fields, there is a multitude of diagnoses for companies; Some of them focus only on studying the processes of production and consumers, or even in the sales process, among many others. These diagnoses are made through specific methodologies that allow all those specific details of the company, which places it as a necessary and recommended tool.

The vast majority of business diagnostics can be collected and classified into two groups, which differentiate from each other depending on their characteristics and applications.

- Integral diagnoses: they are mainly known for the large number of business variables that can be applied, for example, the diagnosis of competitiveness, ie, a test to identify opportunities, weaknesses, advantages and threats of a company. And all this based on the evaluation and consideration of many variables that the consultant in question has rated and included in the analysis.
- Specific Diagnostics: are characterized by more specific focus on those processes, ie, studying different aspects of the market, financial statements or management processes, and other related production and consumption.

To achieve an effective business assessment, regardless of whether it is a specific or comprehensive diagnosis must take into account the following four processes:

1. Evaluation. With it a parameter for assessing the current situation or arouse interest in the company, focusing on those points on which the diagnosis is desired, for example, consumers, section, production process, etc. Financial is established.
2. Detailed view. At this point the team or person responsible for this diagnosis are especially focused on collecting all possible information about the particular system of the company in which you are interested. This process is made possible by taking pictures, tables, graphs, interviews and all kinds of resources that allow see first hand the current situation.
3. Calculations. At this point and with the information that has been collected in the previous phase, it is time to establish the degree of scope in terms of the parameter has wanted to fix.
4. Conclusions. all information obtained is analyzed and studied to evaluate and understand the reasons that prevent reaching those parameters that were set at the time. By knowing the problems will be much easier to find solutions.

Business prospects for diagnosis:

- Financial. It covers the entire accounting department and company management evaluates all numbers and studies what your current situation. Know your investments and sources of financing, among others.
- Consumers. From here all the data related to customer behavior and their treatment are evaluated.
- Internal process. It focuses primarily on the study of the production processes of the company, determining its quality and effectiveness.
- Personal and capabilities. It makes a comparison between the capabilities possessed by the active employees of the company and which should theoretically have to achieve high levels of efficiency.

Training

Training is a planned and based on real needs of a company or organization, oriented towards a change in knowledge, skills and attitudes of collaborative activity.

For the general objective of a company is fully achieved, the training function that works contributing to the company is required a personal adequately trained, trained and developed to carry out its tasks. Training is the educational function of a company or organization for which present needs are met and future needs are anticipated.

Organizational training process focuses on creating positive values and establishing a culture of total productivity (productive spirit), from which the staff is committed to evolutionarily modify their thinking, to act in terms of quality and productivity in their personal and working lives. That way you can summarize the benefits of training:

- Leads to higher profitability and more positive attitudes.
- Improved knowledge of the position at all levels.
- Raise the morale of the workforce.

- Help staff to identify with the goals of the organization.
- Create a better picture.
- Fosters authenticity, openness and trust.
- Improves heads-subordinate relationship.
- Assists in the preparation of guidelines for work.
- It is a powerful aid for the understanding and adoption of new policies.
- Provides information on future needs at all levels.
- Speed up decision making and problem solving.
- Promotes development to promotion.
- Contributes to the formation of leaders and managers.
- Increase productivity and quality of work.
- It helps to keep costs down in many areas.
- Promotes communication throughout the organization.
- Reduce stress and allows the management of areas of conflict.

Benefits for the individual that impact positively on the organization

- Help the individual in decision-making and problem solving.
- Nurture confidence, assertive position and development.
- It contributes positively to the management of conflicts and tensions.
- Forging leaders and improving communication skills.
- Increase the level of job satisfaction.
- It allows the achievement of individual goals.
- Develop a sense of progress in many fields.
- Eliminates fears of individual incompetence or ignorance.

Benefits in human relations, internal and external relations, and policy making

- Improved communication between groups and individuals.
- Help the new employee orientation.
- Provides information official regulations in many fields.
- Makes viable policies of the organization.
- It encourages group cohesion.

- It provides a good atmosphere for learning.
- Converts the company in a better quality environment to work and live in it.

The problems most often require immediate training are "3 C":

1. Work quality

- Working low quality or not appropriate to plan.
- Decrease or reduced productivity or efficiency.
- Low competitiveness
- Errors or faults

2. Work environment

- Unmotivated, unpleasant or controversial; work stoppages
- Arrears
- Absenteeism
- Accidents
- Lack of care with materials, equipment and infrastructure.

3. Changes present or projected

- Incorporation of new technology, infrastructure, equipment or machinery.
- Changes in procedures.
- Staff turnover (promotion, voluntary retirements, retirements, layoffs, relocations, reassignment of functions or roles).

In addition to the above mentioned manner, the training is mandatory, same character that is seated in the Federal Labor Law in Articles 3, 25, 153 and 159.

Research Design

- Problem: the Laguna region despite having large deposits of marble and one of the main producing areas of the same, no development should and export levels accommodate the installation of foreign companies in the region to market the product outside the country.
- Project objective: identify current needs with industrial companies dedicated to the branch of marble that prevent export of the same.
- Specific objectives
 - a) Gather information about the needs for export.
 - b) Diagnosing the situation of the industries.
 - c) To investigate possible solutions
- Type of research:
 - For its goal is a diagnostic investigation, according to their level of measurement is mixed and according to its purpose is exploratory.
- The diagnosis was divided into 5 main areas: general data, technological, market, funding sources and training.
- Determination of sample: total population.
- Data used: marble industry in the Laguna Region.
- Development of instrument called "Diagnosis of the marble industry."
- Piloting instrument.
- Validation of the instrument by Alpha Cronbach.

- Instrument was applied.
- Instrument applied statistical program was captured.
- Statistics were developed.
- Was obtained statistics, tables and graphs and proceeded to interpretation.
- Analysis of results

Analysis of results

Qualitative paradigm

According to the target of diagnosis was selected the specific type, characterized by focus on those more specific processes, ie, studying different aspects of the market, financial statements or management processes, and other related production and consumption . In this case, general information, technological, market, funding sources and training.

General data

Know information such as how many years has your company, if you have vision, mission and objectives, if you have defined goals for the short, medium or long term, which helps to know the degree of consolidation of the company and its organizational culture.

Market

Whether the companies have market surveys or export plan to enable them select markets with the greatest potential and accessibility for their products, which channels most appropriate marketing are set or add marketing policies, setting sales targets and profitability.

Technological aspects

Organizations must not only look at the present opportunities to benefit from technology, but also anticipate future changes. A company that focuses only on current benefits can overlook the possibilities of implementing changes that could affect future profitability or survival. Organizations that have been based on five-year strategic plans implemented in the past, now they find that they have to re-examine these plans every 12 to 18 months. Organizations should also determine the appropriate scope of the changes and manage internal cultural changes necessary to successfully integrate new technologies.

Financial sources

It is how an entity can cleave funds or financial resources to carry out its goals of growth and progress. Every business requires financial resources (capital) for their activities, develop or expand their current functions, as well as initiate new projects involving investment.

Access to adequate financing of trade is a key to achieving good results on export item.

The need for funding may arise before shipment of the goods, when the company needs to acquire inputs and perform the tasks of transformation, or after it.

Training

At present, training in organizations is vital because it contributes to the development of both personal and professional collaborators.

Therefore companies must find ways to give their employees the knowledge, skills and attitudes required for optimal performance.

Training offers the following benefits: causes an increase in productivity and quality of work increases the profitability of the organization, develops high morale among employees, helps solve problems, reduce the need for supervision, it helps prevent accidents improves the stability of the organization and flexibility, and enables staff to identify with the company.

Quantitative paradigm

The answers given to the questionnaire "Diagnosis of the marble industry" were captured in Excel format and then analyzed by computer statistical software, which allowed evidence capture and in turn provide the statistical information for the diagnosis (in total twenty) that He conformed each field (total five), as shown in the following table. With the data were drawn graphs on the average obtained in the surveyed industries.

According to these data, companies in this industry have an average of 18 years after being installed, the most recent one of two years and the oldest one of 33 years. Moreover, on average each has 33 workers, 98 being the highest number people; 77% of companies do not belong to any trade association.

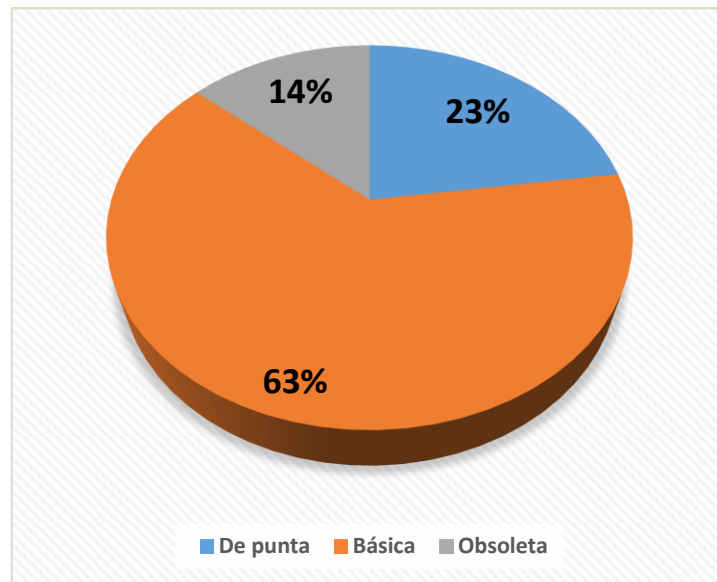


Figure 1. Quality of the technology used in the marble industry. Source: Made by myself.

As shown in this chart, 77% of industries use outdated and / or basic technology, something confirmed by responses from industrial to the question: "The level of technology used is currently ...", where 45% said it was insufficient.

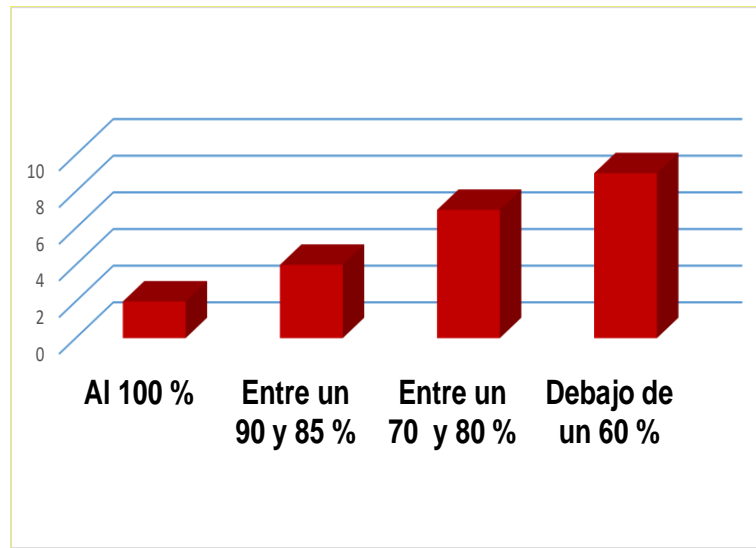


Figure 2. Percentage of installed capacity which works in the marble industry. Source: Made by myself.

According to the graph above, 73% of companies in the Laguna region dedicated to the exploitation of marble report the possibility of increasing up to 30% its production capacity, which could be exported.

On the other hand, the average production capacity by 315 tons monthly industry reports, the youngest of 30 tons and 950 tons the largest.

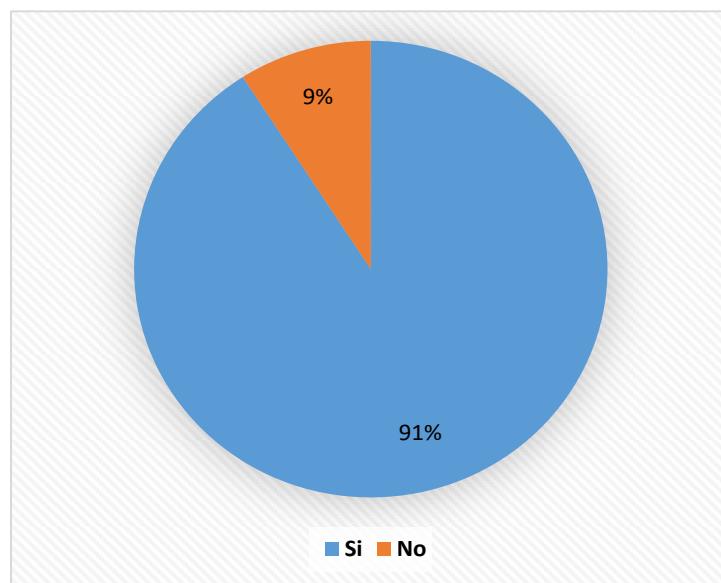


Figure 3. Companies of the marble industry interested in exporting. Source: Made by myself.

As shown in the above graph, 9 out of 10 companies belonging to the industry are interested in exporting, but currently only 59% of them exported or exported and 41% have an export plan.

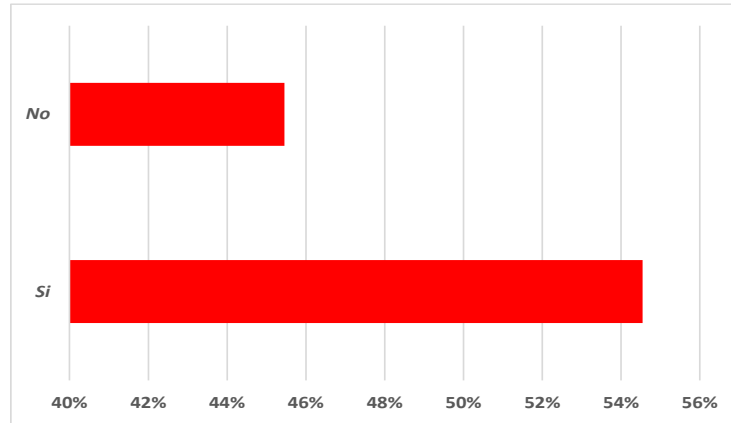


Figure 4. Companies in the marble industry that have a credit line. Source: Made by myself.

Financially it shows that 55% of companies have a line of credit to date, and that the same percentage has existing credit. Accordingly, the same companies that export are made with a credit line, which confirms the importance of having a funding source.

Table 1. Degree of preparation of personnel employed in the marble industry. Source: Made by myself.

	Básica	Bachillerato	Carrera Trunca	Licenciatura	Maestría
Directivo	0	26%	0	59%	15%
Operativo	79%	17%	4%	0	0

As shown in this table, 59% of staff employed in the industry has only basic instruction; the lack of preparation directly affects the levels of business productivity. Moreover, the proportion of managers as opposed to the operating is 1 to 1, high and unjustified figure under that technology is outdated and insufficient, without automation. Efficient ratio would be 1 to 50.

Table 2. Areas where train companies in the marble industry. Source: Made by myself.

No Capacita	32%
Producción	43%
Administración	11%
Embarques	6%
Mantenimiento	4%
Calidad	4%

Here you can see that 32% of staff working in this industry does not receive any training and only 4 out of 10 employees are trained in the production area.

Moreover, 77% of respondents expressed their desire to receive training in the following areas:

Mercados y medios de transportación	27%
Tecnología	9%
Acceso a alternativas de financiamiento	21%
Capacitación	15%
Tramites gubernamentales	16%
Fiscal	12%

Conclusions

Although the lagoon region is one of the main areas with lots of marble deposits and an industry dedicated to its operation, companies in the region-on average 18 years old-still not been able to realize a export plan. The reasons why most of these companies export not have to do with lack of staff training, lack of technological resources and the lack of information on the different sources of funding and market. Undoubtedly, this has been a factor in the growth of businesses in the region members of this industry.

Based on the data obtained from this research, it is recommended that companies dedicated to the field of marble:

- They support incubators, universities and Banking first and second floor for the sources of financing and solve their technology needs, capital and export procedures.
- Improve their organizational structure (32% of companies do not have a defined organizational structure and 18% have no mission and vision).
- Invest in training, under which this is one of the main capitals of the company that go hand in hand with productivity, efficiency and quality.
- Make a detailed study of the original function of each machine to know its productive capacity.

Bibliography

Coordinación General de Minería. Dirección General de Desarrollo Minero. "Perfil del Mercado del Mármol (diciembre 2012). Publicado por la Secretaría de Economía.

Diez Vial I., De Castro G.M, Montoro Sánchez M.A. Economía de la empresa [Libro electrónico]. España: Paraninfo; 2014 [Consultado 04 de octubre de 2015] Disponible en:

https://books.google.com.mx/books?id=uBINBQAAQBAJ&pg=PA88&dq=organigrama+de+una+empresa&hl=es&sa=X&ei=XsGQVZ_fMML2yQS2i47ICQ&ved=0CBoQ6AEwADgK#v=onepage&q=organigrama%20de%20una%20empresa&f=false

Fuentes M., Cordon Pozo E. (2014). Fundamentos de la administración de empresas. España: Pirámide [Consultado 04 de octubre de 2015] Disponible en: <https://books.google.com.mx/books?hl=es&lr=&id=JtaUBQAAQBAJ&oi=fnd&pg=P1&dq=fundamentos+de+administracion+&ots=c1XYKoLXHS&sig=ccf9Z2OHDObmBxYjwwQ8ZzHACYg#v=onepage&q=fundamentos%20de%20administracion&f=false>

Instituto Nacional de Estadística y Geografía. Módulo de Balanza Comercial de Mercancías de México. [Consultado 21 de octubre de 2015].

Werther WB, Davis K. (2007). Administración de Personal y Recursos Humanos. México: McGraw Hill.