

MARKET SEGMENT FOR STARTING A DIGITAL MANUFACTURING

MARKET SEGMENTATION TO START A DIGITAL MANUFACTURING BUSINESS

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<https://doi.org/10.61117/ipsumtec.v7i2.339>

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Abstract - The market study represents an opportunity to identify the target customer through segmentation; in this work a research was conducted to identify the market segments to start a digital manufacturing business in the state of Tabasco, which consisted of touring the state to obtain information through interviews and surveys directed to the leaders of the organizations among which are artisans, milk producers, cabinetmakers, educational institutions of all levels, among others, as well as potential end users of the products and services, thus identifying four sectors:

- ✓ Digital crafts.
- ✓ Technological education in design and digital fabrication.
- ✓ Prototyping for manufacturing companies.
- ✓ Strategic companies with development of strategic projects.

Keywords: digital manufacturing, business, market segment.

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Key words - Business, Digital manufacturing, Market segment.

INTRODUCTION

Marketing is the grouping of resources, plans and actions focused on positioning products or services in customer preference, market segmentation is a set of procedures which are based on the study and analysis of consumer expectations and experiences, all this in order to measure the effectiveness to cover a greater number of potential customers; so it can be said that it is the fragmentation of a group with different tastes, needs, economic position and geographical area. Studying the market is of vital importance to identify customer preferences and thus be able to make the right decisions that will guarantee the success of the launching of products or services. To speak of a market is to speak of different places that can be a physical place where different products are offered or of a theoretical place where the supply and demand of products or services fluctuates; for this work a market is considered from a marketing point of view in which the following are found

geographic, consumer, product and demand-driven markets.

Therefore, segmenting the market sets the basis for marketing planning, only in this way it can be correctly determined to whom to direct the efforts and can have efficiency in the decisions to be taken during the development of strategic plans of the business to undertake, it is for this reason that to develop a strategic plan for a business aimed at digital manufacturing is of utmost importance to do market research and thus segment it by identifying the right customers.

Marketing has been evolving as follows:

- ✓ Marketing 1.0 is product oriented
- ✓ Marketing 2.0 is focused on the consumer
- ✓ Marketing 3.0 is person-centric
- ✓ Marketing 4.0 focused on the digital world, includes people in the development of products, brands become more human and offer experiences.
- ✓ Marketing 5.0 focuses on humanity and artificial intelligence.

The present work focuses on market segmentation to undertake a digital manufacturing business and aims to identify market to undertake this business in the state of Tabasco, it is of vital importance because it identifies customer segments and their needs and this will allow to offer products and / or services that respond to each segment.

DEVELOPMENT

The companies

The importance of companies is unquestionable, since they are the driving force behind the economic development of countries; just as the family is the cell of society, the company is the cell of economic activity, as Münch says [7].

According to Münch [7] the basic areas of a company are: human resources, finance, production, operations, information technology and marketing; this work is focused on the marketing area, which is the set of activities aimed at creating, promoting, distributing and selling goods and services at the most appropriate time and place, and with the quality required to meet customer needs, so that all decisions taken in different areas of the company must seek customer satisfaction in the same way, so the needs of customers must be known and seek ways to satisfy them with creativity and innovation.

The marketing area is in charge of the process of planning the company's activities in relation to the price, promotion, distribution and sale of goods and services offered, as well as the definition of the product or service based on the preferences of the customer.

It is the management of profitable relationships with the customer whose goal is to give added value to the customer and keep him loyal to the organization in such a way that sales become necessary for the customer and these satisfied customers share with them, is the management of profitable relationships with the customer whose goal is to give added value to the customer and keep him loyal to the organization in such a way that sales become necessary for the customer and these satisfied customers share their experiences to other people in such a way that they manage to attract other consumers so providing added value and providing customer satisfaction is fundamental to the success of a company and this is given through the success of a company and this is given through an exchange relationship between the company and the target customer thus providing a service that solves a problem or covers a need through the art of managing their attention and keep them interested in the product or service that is provided and here is already given the influence of the company on real and potential customers thus offering them better value for money.

Market segmentation

As Kotler [6] says the company must first decide who it will serve, and it does so by dividing the market into customer segments (market segmentation) and choosing the segments it will pursue (target market) the goal must be to direct customers to where they want to go before they know it themselves in the same way it must be socially and environmentally responsible, meeting the current needs of consumers and businesses, but at the same time preserving or enhancing the ability of future generations to meet their needs; companies should balance three aspects when designing their marketing strategies: company profits, consumer desires and societal interests in such a way that they are socially responsible.

According to Valiñas [5], activities related to the marketing of products and services involve a large number of activities, which can be divided into three main groups: those related to the product, those related to the consumer, and those related to the market.

This indicates a direct relationship between the different variables involved. For a product to be positioned in the market, there must be an interested buyer and a propitious environment where a commercial exchange can take place, and it may fall into one of the following categories:

- ✓ From a geographical point of view:
- ✓ Local and/or regional markets.
- ✓ Domestic markets
- ✓ Multinational and foreign markets
- ✓ Global markets
- ✓ Depending on the type of consumption:
- ✓ Consumer market
- ✓ Services market

- ✓ Industrial marketing
- ✓ Depending on the type of products:
- ✓ Commodities market
- ✓ Industrial products market
- ✓ Computer products market
- ✓ Manufactured products market
- ✓ Services market
- ✓ According to the type of demand:
- ✓ Available market
- ✓ Actual market Potential market
- ✓ Target market

It is vitally important that within a business venture involving digital manufacturing the following variables are considered:

Certainty in the size of the market, in this case of the 17 municipalities that make up the State of Tabasco, 5 municipalities have high expectations to undertake a digital manufacturing business, among the reasons is the proximity to the state capital, this allows to acquire the required inputs, there is little competition in this sector by the little dissemination of this technology in Tabasco, among the segments that are identified is the carpentry, this activity can improve exponentially through the use of a cnc router machine tool, Another market segment are the artisans who can implement new strategies that allow them to grow their business through digital manufacturing obtaining digital crafts as products, in the same way that was identified is the educational institutions that are interested in adding value and teach in real contexts or milk who require molds for their cheeses since the production of artisanal cheeses in the region has increased and in the same way customized packaging of the same.

With all the above, the size of the market can be calculated in almost all cases; that is, the approximate number of people that make up the available market. In other words, the approximate number of people who can buy the products resulting from the technological innovation of productive activities.

Clarity in establishing action plans, knowing members of the target market. Given the potential that exists in the municipalities under study in relation to timber and the boom that federal government programs are bringing about so that vulnerable and low-impact communities can grow, the following is being considered

promoting the cultivation of timber plants which will allow the development of business plans to undertake with wood as an abundant raw material.

Identification of the consumers in the market, knowing the consumers will give certainty in market decisions to be taken. By clearly identifying the market, the work of carpenters, builders, contractors, cabinetmakers, society is enhanced, thus giving added value to their work with digital manufacturing technology.

Recognition of consumer activities and desires, consumers have been modifying their consumption habits due to new opportunities for commercial exchange, greater growth and competitiveness in the markets and the use technology, which plays a very important role in integrating artisanal processes with digital manufacturing.

Simplicity to plan, planning is simplified by conceptualizing the activities for a specific market group. how to do this? By applying the administrative process (plan, organize, integrate, direct and control) in the planning of market segmentation to undertake a digital manufacturing business, the results of this research could be obtained.

Using the demographic variables it is possible to calculate the size of the market. The target group is the consumer from a demographic point of view, i.e. it does not include any psychographic, geographic or user position variables.

Business entrepreneurship as an alternative for boosting the economy

Entrepreneurship is one of the ways in which we can get ahead, through motivation and talent, we can develop unique skills that make us implement ideas and goals that we have set, these ideas to be original become innovation. Entrepreneurship is a necessary phenomenon to stand out and increase competitiveness in the market and at a social level, it develops the process of self-employment in the face of the deterioration of labor markets as Hernandez says [14].

Digital manufacturing as a business alternative Once the digital manufacturing market was segmented, a non-probabilistic analysis was carried out at the national level where the different business **models** were analyzed and studied. business models at

manufacturing digital manufacturing at Mexico, identifying three groups:

Private sector; whose business model is attention, service, advice and consultancy in the development of technological innovation projects.

- FabLab Yucatan.
- Yucatan Textile Laboratory.
- IOT FabLab GDL.

Educational sector; focused on education in digital manufacturing; business incubation; project development and technological research.

- FabLab Anáhuac Querétaro.
- FabLab CICATA.
- FabLab Tec de Monterrey.
- Fablab UANL.
- FabLab IBERO Puebla.
- FabLab Analco Puebla.

Cooperative society sector; dedicated to promoting new opportunities in the handicraft sector.



Figure 1. FabLab Anáhuac - Querétaro.

Source: Team's own.



Figure 2. FabLab UANL.

Source: Team's own.

The overall goal of digital manufacturing is to streamline the product development cycle, reducing the time it takes to go from idea to prototype. This approach also enables companies and entrepreneurs to generate new designs and products quickly and affordably. In addition, this process improves production flexibility, allowing companies to adapt designs and products to meet customer demands. By embracing digital manufacturing, companies can take advantage of local development opportunities and access design tools that were previously only accessible to large corporations.

At the Instituto Tecnológico Superior de Macuspana it is of vital importance to work with the students on the entrepreneurship of different businesses according to their professional profile, since it is a tool that will help them to develop their professional skills.

The program provides them with the training and the project with which they can develop a company upon graduation.

On the other hand, the Instituto Tecnológico Superior de Macuspana has an academic body called "EMPREDURISMO Y FABRICACIÓN DIGITAL" (EMPREDURISM AND DIGITAL MANUFACTURING).

composed of 1 professor of systems engineering, 1 professor of industrial engineering, 1 professor of mechatronics engineering and 1 professor of business management engineering, which is formed by an interdisciplinary team that develops interdisciplinary projects, and with the research project "design and digital manufacturing" a market study was conducted, which allowed to identify the following segments:

- ✓ Digital crafts.
- ✓ Technological education in design and digital fabrication.
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Potential market.

It is made up of industrial, handicraft, manufacturing and service companies, as well as the livestock, fishing and government sectors at different levels. According to the INEGI census [15] in 2019 registered 128,327 companies between large and SMEs in Tabasco, of these it is estimated to take a percentage of 1.73% for digital manufacturing services, which represents being able to serve 225 companies.

Target Market.

It is composed of all educational institutions, of which 2,040 are preschools, 2,120 elementary schools, 703 middle schools, and 230 high schools, IDIFTEC, CECYTE y CBTIS, 81 institutions from level higher education

including technological institutes and universities, for a total of 5,174 educational institutions in Tabasco, of which it is estimated to serve 22% of the educational institutions. As part of the contribution that the Instituto Tecnológico Superior de Macuspana, wants to make to the development of Tabasco, a study was conducted to identify areas of opportunity to strengthen companies and entrepreneurs to promote new forms of business, through innovation of production processes that allow them to be more competitive, This is derived from a business model based on production and digital economy, which in turn creates the possibility of opening global opportunities, that is, to position themselves in a different market than the local one, also involving the adoption of technology, which requires skilled labor.

In order to carry out the analysis, a survey instrument was used to collect information and provide a guide to focus on the most relevant aspects that can be included in the

planning of the future business. The aspects that were considered were:

- ✓ Products or services offered
- ✓ Organization
- ✓ Infrastructure

The first academic staff of the Instituto Tecnológico Superior de Macuspana, composed of professors Ángel León Ramos, Margarita Quevedo Martínez, Rosa Margarita Reyes de la Cruz and Gibran Miguel Lechuga Notario, is participating in this project.

An interview was designed for the directors of the organizations visited and a survey for potential target clients, as well as an electronic questionnaire to be applied in the most remote locations.

It is worth mentioning that this project was financed in its first two stages by the Tabasco mixed fund (CONACYT-State Government).

The procedure carried out to develop this research was as follows:

1. We analyzed and determined which organizations would be visited, taking into account the economically active population, number of companies, and communication routes.
2. Contact was made with the companies to schedule the visit, and a link was established with the Secretariat of Development and Competitiveness of the State of Tabasco to find out the locations of artisans and entrepreneurs in the 17 municipalities.
3. Visits were programmatically scheduled to educational centers, manufacturing and artisanal companies, business fairs and productive development.
4. Interviews and surveys were designed to find out about potential users; they were designed to find out the position of artisan entrepreneurs, principals, regarding the adoption new technologies in their processes.
5. Interviews and surveys were conducted, where facilities and equipment were observed to identify needs and opportunities to enhance productivity. Visiting 17 municipalities in the state of Tabasco.
6. The information was integrated and analyzed using a custom-developed web platform to process the information collected. Market segments were identified based on the preferences of the people surveyed.

To gather information, 300 people were surveyed (entrepreneurs, businessmen, artisans and educational institutions of all levels) in the State of Tabasco, considering the 17 municipalities that comprise it.



Figure 3. Craft Fair. Source. Team's own.



Figure 4. Craft Fair. Source. Team's own.



Figure 5. Collaboration with SEDEC. Source. Team's own.

DISCUSSION AND ANALYSIS OF RESULTS

The definition of marketing proposed by Münch [7], which encompasses the creation, promotion, distribution and sale of goods and services to meet customer needs at the right time and place, is important starting point for understanding the nature and scope of this discipline. Market segmentation, as mentioned, is a fundamental approach in marketing and is widely recommended by experts such as Kotler [6] and others.

However, in the area of market segmentation, there are different approaches and strategies, and this is where an interesting discussion may arise. The following are some of the areas of debate that could arise around this definition and approach:

Relevance of segmentation: Some critics may question whether market segmentation is always necessary or effective. Is it applicable in all industries and situations, and are there cases where a broader, non-segmented marketing strategy might be more effective?

Emphasis on the customer: Münch's definition [7] places a strong emphasis on satisfying customer needs. Some might argue that in certain contexts, such as B2B (business-to-business) sales, customer satisfaction may be less relevant than other factors, such as efficiency and cost.

Segmentation complexity: Market segmentation can be a complex and costly task. How detailed should segmentation be? How many different market segments can a company effectively address? What is the return on investment in terms of time and resources devoted to segmentation?

Evolution of digital marketing: With the proliferation of digital marketing and personalization capabilities, some might argue that segmentation has become even more crucial but also more challenging.

How can customer information be used ethically and effectively in a world where data is a major concern? Effectiveness of segmentation categories: Fernandez's work [4] mentions three segmentation categories: geographic, market type, product type, and demand type. Are these categories always the most appropriate or relevant for all companies and situations? Are there other segmentation approaches that might be more effective in certain contexts?

Marketing strategy integration: Research mentions the importance of integrating all marketing activities. Some would argue that strategic alignment and consistency across all areas of marketing, from promotion to distribution to the product itself, are even more crucial in today's age of instant communication and transparency.

After analyzing the authors' contribution to this research and having gathered information from entrepreneurs, companies, artisans, and educational institutions of all educational levels, they expressed great interest in digital design and manufacturing to boost the competitiveness of companies and in the academic training of students to increase their skills so that they can be more efficient in the labor field.

The results of the research provided the following market segments for the digital fabrication business in Tabasco:

- a) As shown in Table 1 there are the following municipalities with the highest average demand for digital manufacturing services:
 - 1) Macuspana
 - 2) Centla

- 3) Jonuta
- 4) Paradise
- 5) Nacajuca

It should be noted that these municipalities have in common the work of artisans, this being their economic activity.

Municipalities	Importance of the Manufacturing Sector Digital	Use of design and innovation	Use of services	% Average estimate of the request
Balancán	80%	50%	70%	19.99%
Cardenas	77%	64%	60%	20.00%
Centla	55%	90%	92%	22.00%
Center	40%	90%	93%	20.53%
Comalcalco	55%	86%	52%	19.00%
Cunduacán	83%	30%	29%	19.06%
E. Zapata	55%	90%	80%	17.00%
Huimanguillo	50%	60%	68%	18.00%
Jalapa	55%	80%	63%	17.60%
Jalpa de M.	49%	82%	69%	16.00%
Jonuta	41%	70%	65%	22.00%
Macuspana	90%	95%	98%	44.24%
Nacajuca	44%	91%	90%	21.50%
Paradise	60%	89%	90%	22.00%
Tacotalpa	57%	85%	86%	12.40%
Teapa	65%	86%	90%	19.66%
Tenosique	72%	40%	47%	11.50%

Table 1.- Estimated demand by municipality Source: Team's own

- b) In general, the people surveyed are interested in: Digital manufacturing, prototype development, digital design and training courses that allow them to enhance their productive activity digital manufacturing.

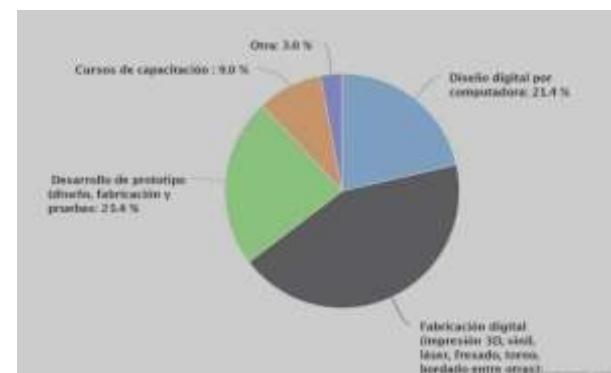


Figure 6. Graph of activity preference Source: Team's own.

- ✓ Digital crafts
- ✓ Technology education in design and digital fabrication
- ✓ Prototyping for manufacturing companies

Strategic companies with strategic project development.

CONCLUSIONS

This research was of great importance because it clearly identified four market segments with the potential to develop a value-added digital manufacturing business that can showcase technological innovation in new ways of doing business.

In a globalized world, it is necessary that higher education institutions contribute to the strengthening of the different productive sectors, allowing them to acquire new forms, strategies or methods to compete and position themselves in the global market, in addition to reducing the digital gap that exists between developed countries with respect to countries, this in the short, medium and long term will be a driver of skilled labor.

It is interesting that with the research it was possible to know the production conditions of the artisans, from the one who makes a chair in a traditional way, to the one who makes a piece with bone, on the other hand, there is the lack of businesses that provide other businesses with parts, molds or cuts, there is a good opportunity to promote entrepreneurship that allows students of the 9 careers that are taught within the Instituto Tecnológico Superior de Macuspana, generate that change, where for example a craftsman who takes 1 month manufacturing a door in the traditional way, can reduce that time and with the use machinery and computer aided design software can make the door in less time and with more details, it is not an easy task, since it requires investment and paradigm shifts, but it is well worth it.

Two future lines of research are considered to continue contributing to Tabasco's companies and institutions:

- ✓ Innovation in digital handicrafts: Digital handicrafts are an evolution of traditional techniques that integrate technological tools for the creation, promotion and distribution of handicraft products. This includes: Computer Aided Design (CAD): to create accurate models that can be manufactured by 3D printers or digital embroidery machines.
- ✓ Entrepreneurship education: Entrepreneurship education should equip artisans with tools to compete in the digital marketplace. This includes:
 - a) Business management: Financial planning, pricing and market strategies.

- b) Digital marketing: Use of social networks, e-commerce platforms, etc.
- c) Intellectual property: To guarantee artisans the rights to their creations.
- d) Sustainability: Integrate eco-friendly practices in digital and traditional processes.
- e) Integrated projects and workshops To promote education and innovation, programs such as: Craft design hackathons could be implemented:
- f) Collaborative events where artisans, designers and technology developers work on innovative products.
- g) Hybrid workshops: Practical classes that combine traditional techniques (weaving, carving) with digital tools (design software, 3D printing).
- h) Business incubators: Spaces where artisans can develop, launch and scale their ventures.

ACKNOWLEDGMENTS

We are infinitely grateful to all the digital manufacturing organizations we visited and to the productive sector and educational institutions that received us with great enthusiasm and kindly answered the interviews and surveys applied.

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