Designing Innovative Products in Mexican SMEs.

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Introduction

The current context of world wide trade has driven Mexico to sign a number of commercial agreements with international partners. However, the new market opportunities which these agreements afford will accrue only to those companies that are able to offer superior products. In order to be competitive, manufacturing enterprises need to pursue innovation in their products and the way they generate them. Such activity will allow Mexican SMEs (small and medium size enterprises) not just to take advantage of these agreements but to defend and increase their market share.

At the heart of product innovation there is design. Design is a strategic tool that supports companies in their efforts to develop successful products. In a survey carried out by the authors, it was found that as industrial design is a new discipline in Mexico, the main barrier to integrating industrial designers into the new product innovation and business activities of manufacturing SMEs, is a lack of knowledge of the discipline by the managers and directors of those enterprises.

Aware of the low performance of Mexican enterprises, the government created the Mexican Design Promotion Centre, MDPC, whose main objective is to promote the use of design as a core competence; mainly by SMEs, as this sector generates most of the employment for the work force in Mexico. Although the performance of the MDPC has been successful, a new product design methodology is felt to be needed to better support the product development process service that the centre offers to Mexican enterprises.

This paper presents a summary of a survey carried out regarding innovation and design in Mexican SMEs, and a conceptual framework of the industrial design methodology inside the new product development process activity. This framework has been tested within a real project of the MDPC and the results are felt to have been positive. The framework is expected to be replicated in other projects before being fully integrated into the workflow procedures of the centre.

International Competitiveness

Although the current context of worldwide trade has opened the doors to Mexican enterprises, the trade balance has not been positive for Mexico. The Mexican Institute for Geography and Statistics (INEGI, 2003) argues that in 2001 the country imported 6% more than it exported, and again in 2002, the trade balance was such that imports exceeded exports by 7%. Unfortunately, this tendency seems to be likely to worsen in the coming years.

In addition, Mexican competitiveness, measured against international parameters, has been decreasing during the last three years (World Competitiveness Year Book 2002). In 2002 Mexico ranked number 41, slipping back five positions from its 36 position in 2001. A similar situation happened in year 2000 when Mexico went down from its 33 ranking. In order to determine the competitiveness of a nation, there are three factors to be measured: first, the macroeconomic situation of the country; second, the infrastructure developed by the country; and third, the performance of the business enterprises of the country.
Although the overall Mexican competitiveness situation is something to give concern, the enterprises business performance must be considered from the perspective of the design discipline. According to Borja de Mozota, (1998) the design activity inside different industries is able to improve perceived customer values, and thus can help generate the macroeconomic differentiation critical for competitive advantage between nations. From this perspective, a good performance from the design activities of Mexican enterprises may also have a positive impact on the country’s infrastructure, economic situation, and, in consequence, those companies’ business performance.

A major number of studies have been carry out on the importance of innovate, Peters (1998) Drucker (1997) among others, some others mainly Bruce et al. (1999), Filson et al. (2000), Cawood (1997), have study innovation from the design perspective, particularly in the context of the small and medium enterprises (SMEs). However, in the actual situation of Mexico, there is no research documented on design and innovation in SMEs, and hence the importance of carrying out a study in this area.

The context of Mexican manufacturing SMEs

According to the Ministry of Economy (2002), Mexican business activity is divided into three main sectors: a) Industrial, b) Services, and c) Commerce; each one of these has a number of firms which are classified by size -in reference to their number of employees. Table 1, below, shows this classification.

<table>
<thead>
<tr>
<th>Size</th>
<th>Industrial Sector</th>
<th>Commercial Sector</th>
<th>Service Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro</td>
<td>Up to 30</td>
<td>Up to 5</td>
<td>Up to 20</td>
</tr>
<tr>
<td>Small</td>
<td>From 31 to 100</td>
<td>From 6 to 20</td>
<td>From 21 to 50</td>
</tr>
<tr>
<td>Medium</td>
<td>From 101 to 500</td>
<td>From 21 to 100</td>
<td>From 51 to 100</td>
</tr>
<tr>
<td>Large</td>
<td>More than 500</td>
<td>More than 100</td>
<td>More than 100</td>
</tr>
</tbody>
</table>

Table 1. Classification of Firms

From government Statistics, INEGI (1999) we find that there are 2,844,000 businesses registered in the four size categories. From the total of Mexican firms, the Micro, Small, and Medium enterprises (MSMEs) achieve together 99.7% of business activities in the country. Table 2, shows these numbers.

<table>
<thead>
<tr>
<th>SIZE</th>
<th>NUMBER OF FIRMS</th>
<th>PER CENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Micro</td>
<td>2,722,365</td>
<td>95.7</td>
</tr>
<tr>
<td>Small</td>
<td>88,112</td>
<td>3.1</td>
</tr>
<tr>
<td>Medium</td>
<td>25,320</td>
<td>0.9</td>
</tr>
<tr>
<td>Subtotal</td>
<td>2,835,797</td>
<td>99.7</td>
</tr>
<tr>
<td>Large</td>
<td>8,474</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>2,844,000</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 2. Number and Percentage of SMEs in Mexican industry

From table 2, it is seen that the MSMEs sector contains the largest number of firms; it can be calculated that 2.8 million businesses are inside it. Thus, the MSMEs sector is critical to employment and wealth creation in Mexico. According to the INEGI, (1999), the overall MSME sector conforms to the three main economic activities: 1) Industrial with 12%; 2) Services with 36%; and 3) Commerce with 52%.

From the information given, it is seen that there are 340,000 Mexican manufacturing industries, representing 12% of the firms falling within the International classification of SMEs. Given this percentage and the low level
of performance of the industrial sector, the Mexican Government (2001) has become aware of the need to develop several mechanisms to increase such firms’ competitiveness in productivity, exports, and innovation, etc.

**The survey**

A survey was carried out in 294 small and medium Mexican enterprises from the industrial sector in order to obtain quantitative data on the factors that drive Mexican SMEs to innovate by developing new products, and the involvement of industrial designers in this process. Other objectives of the survey were to clarify what Mexican businessman mean by *innovation* and *industrial design*, whether they use a new product development strategy, and upon which circumstances those enterprises base their competitiveness.

The resulting data shows that a high 32% of businessman considers innovation as “something new”. In second place, with 14%, managers link innovation to the noun better. Other words mentioned to describe innovation were “creation” with 12% and “change” with 12%. From the total, only 2% related innovation to the word design. A very large number, 75% consider innovation a *very* important element in their business activities. The remaining 25% consider it important. When asked “where do Managers apply innovation inside their business activities?” 51% state that “in the products they manufacture”, followed by “the service they offer” with 37%. The above data allow the authors to state that innovation is considered a core element by the Mexican Directors to their business activities. Sadly to say, very few see industrial design as a way to innovate.

Regarding what is considered to be the trigger to developing new products, the main reason answered was to made additions to the portfolio lines of the products they offer, with 16%. The second trigger considered was to answer to market competitors, with 14%; followed by product replacement, with 13%. The International Institute for Management Development (2002) considers R&D activity as a way to measure companies’ competitiveness, in the survey, 12% considered R&D activity as the trigger to developing new products. Finally the marketing strategy and the marketing demand reached almost an equal percentage, at 11% and 10% respectively. Twenty three per cent of the companies said they did not have a particular trigger to developing new products. As we can see, the *addition to product lines* is the principal factor cited to developing new products in the Mexican SME sector, although reaction to competitors’ presence and thus the need to defend their market share is also a core activity in the market arena.

Baxter (1995) and Cooper (1993) argue that a key element to designing a successful product is to incorporate a new product development strategy into the business strategy of the company. Regarding this issue, while 65% of Mexican managers have implemented a strategy for their NPD activity, some 35% have not done so. As the main goal of a strategy is to identify market and product opportunities, those who have not implemented a NPD strategy are unlikely to be successful in launching new products.

When developing new products, one of the main barriers that Mexican managers must overcome is the lack of financial resources, which 49% of them see as a hindrance. As in many developing countries, access to education is a priority, in the case of Mexico, the lack of skilled staff is considered by managers to be another barrier: this issue reached the second place with 14%. The third barrier mentioned by 12% of the directors, is that they face difficulty in getting financial resources from the local banks. In addition, the survey showed that 6% consider the lack of creative staff as the main obstacle.

Seniors academics such as Kotler (1996), Hayes (1989), and Lorenz (1986), have argued that companies have moved from competition based on price to competing through quality, and the time has come to focus on design. However, while 43% of Mexican directors consider quality as their main capability, on the other hand, price seems to be considered the right strategy for 26% of them; and once again, only 12 percent consider design as a strategic tool.
One of the main goals of the survey was to get real data on what Mexican managers mean by “design”, and in particular by “industrial design”. For 19% of managers, design means “creation”. “Appearance” or “style” reached 13%; while “process” and “presentation” were ranked equally with 8%.

Regarding industrial design, 31% link it to the new product development activity, 12% state that it is concerned with industrial development, and 10% to manufacture. Another answers links industrial design to a creative process, and it is also seen as a solution to customer needs. Twenty five percent of respondents do not understand or know what ID is, and, sad to say, only one manager sees it as a way to add value to his company products. About the barriers to involving industrial designers in the new product development activity inside SMEs, a substantial 54% say that they do not involve these professionals because managers and directors do not know about the discipline. Eighteen per cent state that the directors or managers decide the style of the product. Other answers were that industrial designers are not needed in their companies’ business activities. As the data shows, industrial design in Mexico is still neglected by the owners and managers of many enterprises. This situation has several aspects, but two are critical: a) a poor promotion of designers as creative problem-solving professionals that add value, and b) a low understanding of this discipline by the entrepreneurs of the SMEs.

It appears that the particular situation of design described almost twenty years ago by Philip Kotler and Alexander Rath (1984) is still ongoing in developing societies as Mexico.

Integrating a new product development methodology

In 1994, the Mexican government decided to create the Mexican Design Promotion Centre (MDPC), as a tool to support local enterprises to become more competitive, develop better products and business offerings, and, if possible, export them. The MDPC has five main areas of activity: a general directorate, and engineering, marketing, industrial and graphic design divisions; each of which works as a specialized business unit. The four divisions interact between them when the design project requires it. The centre does not carry out design itself, but works as a promotion centre, linking independent or freelance designers with the companies that need a design solution. During a design project, a follow up activity is carried out by staff of each of the divisions.

In Figure 1, Mexican Design Promotion Center workflow chart.
The success of the MDPC has been such that, at times, the interaction between areas does not occur, and this situation has driven each area to perform as a small design centre in itself, performing marketing activities, feasibility studies, business plans, and sometimes the core activity of each other’s discipline. The centre has a workflow chart that is used as an internal guide, shown in figure 1. However, the centre does not have a documented or a written down new product development process for the industrial and graphic design divisions.

In the past it has been argued that each design project has its own complexity, and therefore does not follow any specific new product development methodology. However, as the number of clients is increasing, a methodology to improve the services that are offered by the design divisions is becoming increasingly necessary, especially as in 95 percent of new product development cases, customers only look for the support of the centre when their enterprises have been losing market share or are already being left out of their distributor’s sales portfolio.

In order to contribute to the activities of the Mexican Design Promotion Centre and to address the context of the Mexican SMES described above, a framework for a new product design methodology was developed by the authors based on a literature review, professional experience, and with the cooperation of the MDPC. (Figure 2 shows the framework proposed). The main goal of the framework is to structure the marketing and design interactions during the product design activity of the new product development process and then, if successful, integrate it into the MDPC workflow chart, to be used as methodology to develop new products.

![New product development framework](image-url)
To test the pilot framework, a real design project was needed, and with the support of the Mexican Design Promotion Centre a small office equipment manufacturer was selected. This company has been losing market share and profit, mainly because of the poor sales through the distributor’s outlets. One of the main reasons that store-distributor managers advance is that the office equipment developed and manufactured by the company “looks old”. In addition, new foreign competitors are entering the Mexican market and beginning to gain market share. Store managers also mentioned that the materials used by competitors are more “attractive”; in addition they stated that local and external competitors “fulfil customer needs” regarding the size, form and shape of office equipment for the new information technologies.

The framework consists of eight stages: at the first stage, industrial designers define the design problem and carry out a feasibility study; then, at the second stage they focus on the marketing research activities. These activities cover: company business goals, end user profile, customer profile, market tendency, benchmark on competitors, market and target price. During the pilot study, it was found that the interaction of market research with the feasibility study allowed industrial designers to generate new ideas for new products, verifying that designers are able to be the trigger for new ideas that later become product concepts. In addition, the involvement of designers into the activities of these two first stages allows the designers to understand the design problem in depth and spend more time analysing it, and thus to explore and develop more innovative design solutions.

The framework suggests at the third step, that the activities of translating the market research, the design problem, and the results of the feasibility study should be incorporated into the brief, allowing designers and other team members to be informed on what are the product requirements and how to incorporate them as product attributes.

In the fourth stage, the design proposals were developed, and presented as rendered images to the company directors who, in a fifth stage, evaluated the success possibilities of the product concepts proposed -according to their experience and market knowledge. At this fifth stage, the concept products are tested and then selected. Other product possibilities based on the results of stage one and two are also considered as possible triggers.

As stage six suggests, with the feedback from company’s directors and potential users, designers redefined the product concept, the design brief and the design prototype, then a new proposal is generated. The activities of stage seven include the presentation of those proposals as rendered images (Figure 3) or even prototypes which at stage eight are once more tested in a focus group activity.

During the project it was found that some design proposals needed to be reconsidered, as well as some technical changes that ought to be done regarding the assembly process. This situation sent back to stage six the design proposed. However, changes to the design concept itself were not found to be necessary; the modifications were all relating to the technical aspects of the resulting designs.

After these technical revisions, industrial designers made control drawings of the final concept. Then, with the engineering staff of the company, a full size desk office prototype was manufactured. We found that some little adjustments were necessary, something that was recognized only with a full size physical model.

Done the necessary improvements, the product design moved to a full production and market launch. Parallel to this manufacturing activity, a design evaluation was carried out. The method to evaluate the design process proposed by the framework was a review of the design brief versus the product. The results showed that a major control over the production cost was necessary, particularly as the company’s directors did not want to reduce their profit level. However, as all the company’s competitors have moved to a more added value product segment, the company found itself in a market segment where price was important but not the only competitive factor.
For the authors, the design promotion staff, and the company's directors, a final product evaluation was necessary to verify its positive impact over the existing products manufactured by the company. For this activity, an internal benchmark was carried out. The results show that in overall terms, the new product was assessed to be almost 2.7 times more successful than the previous design in meeting the design brief. The factors measured were: functionality, ergonomics, quality, manufacturability, cost, price, durability, aesthetics and ecology concern.

In practice, of course, although, a good design is necessary to compete for and defend local market share, the package, delivery, point of sales, after sales service are, among others, critical factors for a successful business.

Conclusions

In order to increase their competitiveness Mexican enterprises should innovate in the products and services they offer. Although small, the Mexican industrial sector is fundamental to the employment and wealth creation of the country. One way to improve the competitiveness of this large work force sector is through integrating design into their business activities, particularly industrial design, when developing new products. However the survey showed that industrial design is an unknown discipline. The effort to recognize it as a potential core competence is a matter of concern to the industrial designer society and to the managers and directors of those enterprises looking for better ways to compete in a global market.

The methodology proposed in this paper showed a positive impact on the business activities of one Mexican firm, and is planned to be replicated in other manufacturing companies. The objective of this framework is to increase the probability of a market success for any new product developed. In addition to this goal, the methodology is expected to support the Mexican Design Promotion Center in helping local SMEs to be more competitive.
References


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