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**An investigation into how small, medium sized enterprises in Mexico
value and utilise design within organisational activity**

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Abstract: *This paper focuses on the explanation of the actual context of design and designers within small and medium enterprises in Mexico. Its main objective is to discuss how design is used along the development of new products in different manufacturing companies. Likewise, it also explores how design is understood, allocated and valued by managers, staff members, stakeholders, customer, and designers.*

1.0. Introduction:

During the last years a considerable number of studies have shown that design is an asset that contributes positively to business performance and competitiveness when it is used effectively along the firms activities. Nonetheless, in new industrialized countries, it seems that the deployment of design within small and medium enterprises it is not as positive as large enterprises performed. The current study critically explored five small and medium Mexican enterprises that had approached the Mexican Design Promotion Centre, and Monterrey Institute of Technology, or had received a government subsidy from the National Council of Science and Technology to engage in the development of a new product or service. The study identified that all the cases have a lack of awareness of design and its value within the business activities. Most of the cases highlight the fact that design is used as quick fix to complete the development of new products, or give a better look to the final results. The few companies that used design within it business activities allocated design as an activity which is used on the final part of the new product development to improve the final appearance, and quality requirements of the product.

2.0. The Design Management Context:

Design can lead to a variety of positive strategic benefits. However, for these to be commercially realised, a framework of organisation and planning is necessary. Design managers (or employees who have traditionally taken on this role) have generally assumed the role as intermediary, to organise the design process and manage relationships between designers and other managers. However, since the business environment has changed, design has become more involved with the goals of other business functions, playing a more significant part of the company's strategy. As an inevitable result, the role of design has broadened with the responsibilities of the design manager expanding. Blaich (1993) defines design management as:

“...the implementation of design as a formal programme of activity within a corporation by communicating the relevance of design to long-term corporate goals and co-coordinating design resources at all levels of corporate activity to achieve the objectives of the corporation.”

Effective design management involves good communication between different organisational departments. Information appropriate to the design programme needs to be provided by production, finance, marketing and sales etc from inception of the project to its successful completion.

The successful outcome of the design project is often dependent upon (Topalian, 1994):

- Effective management skills.
- Good relationships with key suppliers and customers.
- Co-coordinating design with other tasks, particularly finance, marketing and manufacturing.
- Senior management support to ensure that adequate resources are allocated to the design project and to gain full commitment.

However, Cooper and Press (1995) argue that the term Design Management contains a fundamental contradiction. Whereas design is based around exploration and risk-taking, management is founded on control and predictability. The outcome of combining the two presents a risk that the management framework might reduce the creative scope of the designer. For those 'managing' design the danger of restricting the flair and imagination of designers is an important concern and only the systems that leave space for innovation should be implemented. It is important that design managers truly understand the way designers work so that the project is managed well without inhibiting creativity. Topalian (1994) argues that design management operates on two distinct levels: corporate and project.

A major report submitted to the UK government by Corfield (1979), argued that effective design management is key to companies remaining competitive in increasingly difficult markets. It recommends that product design should be recognised by companies as a key business function specifically identified as a board level responsibility, on a par with production, finance. For *'failure to adopt a good, strong design policy can only be interpreted as one of the steps on the road to bankruptcy for companies.'* Furthermore, the report argues that *'...companies should designate an appropriate member of their boards to take on the design function as a prime responsibility where that is not already the case.'* Reviewers of the Report have criticised Corfield for not making a clear recommendation that *designers* should be appointed to company boards.

The Design Council has for some years attempted to promote (*although informally*) the idea of designers on boards. Topalian (1980) argues in a critique on the Corfield Report, that *'...having designers on company boards may well be a step in the right direction. However, rather than being too keen on transforming designers into design directors, the design professions should concentrate instead on a more sensible approach.'* He suggests that make designers and managers better at their respective roles whilst increasing the *sensitivity and understanding between them.*

BS7000 Part 2 (1999) separates the role of design management into two distinct areas of activity and responsibility: senior management; and project management. Firstly, it argues that senior executives within the organisation should undertake the ultimate responsibility of managing design. It argues that:

“...The ultimate responsibility for the excellence of designs produced by, or on behalf of, an organisation rests with the board of directors, owner-managers or partners. It is the chief executives responsibility to ensure that this direction is followed effectively and that design makes a full contribution to corporate performance.”

Then, having provided the broader context and role of design management within the organisation, BS7000 Part 2 details its role at project level. It raises key management issues of what should be addressed concerning the design of manufactured products specific to the project, starting from the Concept phase through to Termination. Oddly, there is no definition of what constitutes ‘Design Management’ in BS 7000 Part 10 (1995) *Glossary of terms used in design management*. The design management process is generally considered to start with an idea (of which 26 ‘triggers’ – sources for new products or services – are listed in BS 7000 Part 2, 1999) and end with disposal, with all stages in between being part of that process. The Standard has been considerably revised and up-dated since its first incarnation in 1989 (BS7000, 1989), which described design management as ‘planning, communication, monitoring and control.’ Whilst it was generally accepted that these are all important parts of design management, it was not design management itself.

Pugh (1991) presents a more holistic view of the role of design management, based around a core of design activities within a systematic and disciplined framework. Pugh proposed that the ‘Total Design’ model in which the marketplace was given prior consideration and a thorough specification was developed all before the concept stage of design. This widely accepted model finishes at the commercialisation stage but the scope of Total Design has been extended to include everything up to, and including ‘disposal’ such as servicing, marketing and re-designs. His ‘Total Design’ model presents six groups of interactive phases, generic to all kinds of designs; within each phase there is one specific group of knowledge applied. The role of managing the design team within the process, he argues requires balancing both ‘static’ and ‘dynamic’ modes of operation. Pugh adds:

“...Thus, to be able to manage design in its broadest sense, bearing in mind the type of product variations, it becomes vital and necessary to structure a business to take account of such variations – provided, of course, that they are recognised. To achieve this recognition, resources must be organised to maximum effect.

Recognition within such a framework has proved to be a useful tool in elucidating design and design management.”

Oakley (1990) provides a broad and comprehensive overview of design management and in particular the role of design at a strategic level. Through synthesising the work of over forty leading authorities, Oakley examines the business context of design, and how embracing it throughout many different applications, design can enable the organisation to secure a competitive advantage. He summarises key points that emerged from the contributors:

- Designers as visionaries: that designers can provide an inspirational role and help to direct the organisation in new directions. *‘They alone may provide creative clues to the possibilities which are available to a business.’*
- The need for interfunctional collaboration in design work: For success in any design programme, in particular the development of new products, it is vital that commitment and involvement is secured from key participants. *‘The dangers of treating design as an isolated, out-of-the-mainstream activity cannot be overstated; at best such an approach leads to disinterest and lack of commitment, and at worst it may give rise to total rejection of design results.’*
- Importance of both project and policy aspects of design. There needs to be commitment from top management to embrace the value of design and communicate it throughout the entire organisation. *‘There is some tendency for the project aspects of design management to receive the greatest attention and the policy considerations to be largely neglected. In many cases, this is the reversal of what ought to be happening. To many managers focus their attention on the running of individual design projects and completely fail to consider why the projects have been set up in the first place.’*

Hollins (1997; 2000) argues that there is a strong need for organisations to adopt a robust design management strategy in order to remain competitive; but he argues that they should now be planning ahead beyond ten years into the future. *‘This must be done through a constant supply of well-designed competitive products. To make sure organisations are moving forward in a logical manner the work on the strategic link with design must also continue.’*

Hollins presents a strategic framework that takes into account recommendations from the UK Government White Papers (1993; 1994) where companies should now adopt a ten-year horizon in their planning for new products and services. However, the framework does not clearly illustrate how

the organisation can anticipate 'change' in volatile industries, such as information technology, telecommunications and biotechnology.

The nature of a business primarily determines which functions design management are closely linked with and its relative importance as a competition parameter. A construction of a wide model based on how an organisation aims to compete, the goals that it sets itself and what procedures are needed to achieve these targets is essentially included into the development of a competitive strategy.

3.0 Mexican Context:

Since 1994, Mexico has been focused on the development of economic policies that lead the nation to face the new challenges that signed commercial agreements imposed to the economy. However, it has been appreciated that the country has not taken appropriate strategies since the World War II, when it had the opportunity to boost its economy, until now. For one side, its exportation has been dropped while imported products still increasing year by year according to the National Institute of Statics, Geography and Informatics (INEGI). Nevertheless, Mexican competitiveness, under international parameters, has been decreasing during the last years. This suggests that Mexico has been performed deficiently within its macroeconomic situation, infrastructure developed, and businesses performance. Although, these three aspects are of main importance for Mexican Government, it has been focused mostly on financial policies and macroeconomic performance.

Mexican industries lack of internal and external resources and tools to achieve the competitive level that is required to compete globally. Government argues that in order to be competitive, enterprises need to pursue innovation in their products and the way they generate them. Consequently, small and medium enterprises (SME) are key to develop innovative products because their core competence lays on this fact. Then, they would be able to take advantage within the market, and at the same time increase their market share.

3.1 The context of SMEs:

According to INEGI (2004) there are 2,844,000 firms registered within the Mexican business activity. From that total number, 99.7% of businesses are represented by Micro, Small and Medium enterprises. Thus, MSMEs represent the largest number of businesses; then, the biggest source of employment, and economic activity. By SMEs government refers within the Federal Official Diary (DOF) to those businesses that have certain number of employees in proportion to the sector in which they are based (DOF, 1999). The increasingly changes of the world economic provoked that by the year of 2004;

Mexican National Financial Bank (NAFIN) launched an on-line resource for entrepreneurs and employees. This organisation modified the parameters in which the definition was settled into one closer to the new challenges suffered by local companies (Table 1).

Table 1 Description of the Micro, Small and Medium Enterprises

Size	DOF			NAFIN		
	Industry	Commerce	Service	Industry	Commerce	Service
Micro	1 to 30	1 to 5	1 to 20	1 to 10	1 to 10	1 to 10
Small	31 – 100	6 – 20	21 – 50	11 – 50	11 - 30	11 – 50
Medium	51- 250	21-100	51 – 100	51- 250	31- 100	51- 100

(Source: Instituto Nacional de Estadística, Geografía e Informática, 2004.)

As indicated by different research (Corona, 1997; Frias-Peña, 2005; Olalde, 2001) these firms have to overcome a series of barriers to develop new products or services. In Mexico, the barriers basically rely on the policies adopted by Governments, and the own firms' performance and management. Although, the most critical problem that affect them is their own management which is allocated at the strategic, corporative and operative level. Some of the most common problems are; lack of expertise and assembly, and low level of entrepreneurship; lack of information on markets and businesses, lack of marketing and other skills needed to support the NPD, low financing, low labour training, and low level of research and development; lack of tools for technology and innovation, low level in employees skills, and unstructured organisation.

As maintained by the Ministry of Economy (2007), few firms concern on produce their own products. First of all, because they have to face all the barriers that presuppose have a businesses. Secondly, due to they are not able to implement several mechanisms that are required to produce their products. Consequently, it has been ascertained by specialist (Cooper, 1979; Cooper and Kleischmidt, 1995; Millward and Lewis; 2005; Swink, 2000) that the most effective way to bring quantifiable results in the short term, as well in the long term is through the investment in the new product development (NPD).

3.2 New Product Development and Mexican SME's:

It was mentioned before that Mexican SMEs focus their efforts in more approachable activities, and the ones that bring results in the short term. Thus, NPD represent one route for them to harness product innovation and apply their manufacture in new directions. This option enhances the maintenance of competitive and healthy product portfolio, as well as the opportunity to sustain a competitive advantage in the long term (Bruce and Cooper, 2000). It captures a range of different types of innovative activities leading to the production of new services or product from radical innovations to simple modifications and adaptations of existing products.

Many studies have been developed under the idea that there are different factors that triggered the NPD success (Cooper and Kleinschmidt, 1995; Ulrich and Eppinger, 1995; Ulrich and Pearson, 1998). A large body of knowledge and literature have highlighted two proposals; macro level and project level activities. One relies on the idea that businesses need to have a holistic and broad view of their activities. Then, it can be discovered actions that may not be apparent at the project level, and yet are important for success (Cooper and Kleinschmidt, 1995). Under this situation the NPD depends on the businesses process, organisation, strategy, culture and commitment; and the capacity to reflect its own performance and characteristics within a manageable framework. Contrary, project level focuses on the better implementation of actions that provokes a success performance. Every company has to undertake suitable actions to tailor its activities; hence they should understand their key activities in order to implement accurately methods and tools that help to leverage their performance (Ulrich and Eppinger, 1995; Ulrich and Pearson, 1998). Consequently, it is agreed that in Mexico most of the companies should focus at the project level.

4.0 Methodology

For the purpose of this study the most suitable research methodology was explanatory multiple cases studies. It is due to the objective of the study was to understand how five companies in Mexico think and use design within their activities. The research question was answered through the exploration of single phenomenon bounded by time and activity. Data collection was undertaken via detailed structured close questionnaires, semi-structured interviews which were triangulated with documentation, direct observation, archival records, action research and the evaluation of physical artefacts. Managers, project managers and industrial designers were specifically directed to answer questions concerned with the use and role of design along their activities, specifically on the NPD

The case studies were selected through a private list of companies registered with the Mexican Design Promotion Centre (CPD), Monterrey Institute of Technology (TEC), and the National Council of Science and Technology (CONACYT) of Mexico. The cases studies selected in the research were determinate by fulfilling the following requirements: [1] being national companies; [2] being small or medium size companies; [3] based on the manufacturing or commerce industry; [4] private businesses; and [5] use designers (in-house or external) in the development of new products.

Close questionnaires with pre coded answers category were used to quantify straightforward the use, role and nature of design within the cases studies. Hence, it was possible to capture how managers, staff, stakeholders, customers and designers use and interpreted design within the company's activities. The questionnaires were refined through the data collected in the literature review. The results were

measured and understood according to Likert scale. While the questionnaires were applied, semi structured interviews and ethnographic techniques, documentation, direct observation, archival records, and evaluation of the artefacts, were triangulated. Hence, it was possible to have a clear understanding about the way in which respondents think about their social work, and organization culture. The design of the interviews was basically obtained from the basis of the first questionnaire.

5.0 Findings

An overview of the five design projects are displayed in the design management taxonomy (Table 2). The taxonomy addresses also the most basic details that should be considered in a project management. Thus, it allows company comparisons to be made. The success variable was defined using the companies own criteria, and this ranged from meeting the design objectives in the brief to develop new businesses.

As suggested by Oakley (1990), Jevnaker (1995) and Bruce, et al. (1999) design projects carried out by SMEs are only effective if they are performed by efficient methods of sourcing, briefing and evaluation. Although the complexity of project varies from case to case, and the project success can not been evaluated in all of them yet, it was clear that none of the design projects was evaluated through financial terms. The three main design management activities were:

- **Sourcing:** This category refers to the company's method to source designers.
- **Briefing:** It refers to the company's or the hired design consultancies means to brief the designers through verbal or written methods.
- **Evaluation:** It refers to the company's system to evaluate the design process. Due to limitations of time and resources, customer satisfaction and design outcome evaluation were not performed in all the cases. Ideally the success of the product has to be evaluated on the market arena.

5.1 Analysis of the taxonomy

From the sample, it was discovered that one third of the case studies reported enough resources to hire in house-designers that contribute to support their new product development. According to the data exposed on the taxonomy overview can be deduce that the cases in which internal designers are hired have to produce products that constantly required innovation, and the complexity of their projects need special abilities. Likewise, it is clear that business have different ways in which they use and think design. However, all the companies had a patent idea about how design can help them to accomplish their aims. Although, they do not know how design should be implemented and used along their

operational activities to succeed the project. Thus, the sourcing method relied mostly on personal recommendations; three of them used as an intermediary the CPD; and just two had a previous design experience.

Table 2 Taxonomy of the case studies as design projects.

	Design Project 1	Design Project 2	Design Project 3	Design Project 4	Design Project 5
Company product	Office furniture	National Council for the coffee promotion	Produce corn products	Assistant devices to handicapped people	Lightweight and transport vehicles
Design Resources	External designers	External designers	External designers	External designers	In-house designers
Project	Single and modular desk	International exhibition pavilion	Equipment to manufacture tortillas and business identity for the new firm	Active wheelchair and rolling walker stand	Lightweight vehicle
Trigger	To keep and increase market share	To get new clients	To introduce a new business	To introduce a new business	To introduce a new business
Design Goal	1) Keep manufacture cost 2) Redesign single and modular desk	1) Improve business 2) Improve product-user interaction	1) Improve business 2) Improve product-user interaction	1) Improve product-user interaction	1) To design, manufacture and produce a lightweight vehicle.
Briefing	Verbal / written	Verbal / written	Verbal / written	Verbal /written	Verbal /written
Sourcing	Previous design experience/ CPD	Business link/ CPD	Recommended/ CPD	Recommended/ TEC	Recommended/ None
Evaluation Method	1) Product benchmark on the design mix; 2) Customer satisfaction.	1) Customer satisfaction	1) Customer satisfaction	1) Product benchmark on the design mix. 2) Customer satisfaction	1) Design performance when it is integrated to the overall project.
Evaluation Criteria	1) Meet manufacture cost and process; 2) Achieve design goal; 3) Customer satisfaction.	1) Design must meet customer requirements; 2) Customer satisfaction.	1) Design must meet customer requirements; 2) Customer satisfaction.	1) Achieve design goal; 2)Functionality and ergonomics; 3) Customer satisfaction.	1) Produce a prototype that fulfil ergonomics parameters, functionality, and customer satisfaction
Success	Yes	Yes	Yes	Yes	Not known yet
Success Criteria	Business Improvement	Business Improvement	Business development	Customer satisfaction	Not in use yet

Small projects were more likely to be successful than large projects, due to these are less complex and risky, require minus skills and specialisation from designers, and the financial resources that are required to introduce the projects within the market are not as significant as the others. Likewise, in both cases it has been discovered that there is a lack of awareness about the strategic use and value of design within the businesses activities. Therefore, design implementation and use was poor because the lack of awareness of employers, and lack of skills from designers (in house and external). As well as, it is adopted as quick and easy way to solve immediate problems of the companies when they want to launch a new product within the market.

Whilst the taxonomy provides an overview of the design outcomes of the projects and the type of activity, the context in which firms are operating, their company culture, and the way in which they experienced the use and think of design are not explored. Consequently, three cases are going to be explored deeper to provide enough details to have a contextual overview in which it can be allocated design.

6.0 Case studies

This part focuses on highlight three cases from the five cases studies to point out the different experiences of small companies attempting to use design within their businesses processes. Case 1 stressed that bad experiences of the use of design can affect future projects and the final results of it. Likewise, it was argued that in this specific case design is though by the employer as the last quick remedy to update the company's products from new trends, new foreign competitors, and new customers needs.

Case 2 emphasized that design is a key asset on the operational business process of the company. The employer understands the benefits of design however the full impact of design has not been explored yet by the company due to time and budget limitations. The previous experience of industrial designers in similar projects was a key issue to achieve the design objectives.

Case 3 underlined that complex projects are risky and expensive; it is of main importance to have skilled designers that are specialised to convey the necessary technical issues to support the product development. Although, design is used within the businesses activities, it does not mean that it is used adequately and though as a strategic tool to improve the performance of the product development process.

Case 4 mentioned that design plays a strategic role as the interaction between the new products and the users is high requirement for the commercial success of the company. The company is a NGO run by a group of handicapped people who also uses those devices in their daily life. The president of the company is a handicapped person who is committed to produced them and move formally from being an ONG to an innovative SME.

Case 5 underlined that in complex, risky and expensive projects, it is of main importance to have in-house designers that are specialised to convey the necessary technical issues to support the product development. Although, design is used within the businesses activities, it does not mean that it is used adequately and though as a strategic tool to improve the performance of the product development, and the company.

Case 1 Single and modular desk

Company Product:	Office furniture
Company Years:	19 years
Company Size:	71 employees full time and 10-15 part time
Design Output:	Used industrial designers to introduce two new designs, single and modular desk models.
Design Background:	No in-house designers; one project manager which work for the CPD that has an award in industrial design; two designers from an external consultancy that have an industrial design background.

Aims

The business is dedicated to design, produce and manufacture office furniture. Throughout the last years the company has been experiencing a decrease in its sales and loose in its market share. According to the outlet manager the poor performance encountered by the firm is due to the office equipment is not updated to the necessities of the users. Likewise, new foreign competitors have been entering to the Mexican market and gaining market share.

Sourcing Methods

The owners and directors of the company contacted the CPD in order to be canalised with an experienced design studio from its data base. The CPD suggested a specialised design consultancy based on its experience working with similar materials that it uses. Although, owners and directors were not so confident due to they had a previous experience working with a large businesses consultant whose service were expensive and focused on the manufacturing process instead the product itself.

Briefing Methods

Designers were briefed verbally during the three meetings held. Although, external designers encountered divers problems at the briefing stage because directors were not collaborative. Likewise, there were required two visits to the firm's factory to get full information of the technical aspects of the product, and the production cost.

Evaluation of Design

Two evaluation criteria were considered since the project started: a) keep the existing manufacturing cost and process; and b) customer satisfaction. The design agency hired fulfils the goals and expectations of the brief delivering new office furniture with the product cost expected and improving the design of the single and modular desk. The evaluation of the customer satisfaction was carried out through the performance of a focus group activity. The results demonstrated that both new designs were 2 to 3 times better than the original one. The methodology used was a Likert scale ranking answers from excellent, good, average, bad to very bad. The close questionnaire was divided by categories. Although, the evaluation was quantitative, the results have a small percentage of subjective criterions.

Observations

It has been highlighted along the Case 1 that a bad experience on design can provoke waste of time and limitations in the brief stage. On the other hand, when a specialised agency is hired and it delivers positive results which are above the expectations of the client, like this case, design becomes an asset for future projects of the company. It is important to highlight that the use of market research and feasibility study allowed designers to triggered new concepts that later on became new products.

Case 4 Active wheelchair and rolling walker stand

Company Product:	Assistant devices to handicapped people
Company Years:	11 years as Non Governmental Organisation (NGO)
Company Size:	9 full time staff and several volunteers
Design Output:	Use industrial designers to introduce an active wheelchair and rolling walker stand that meet the user necessities of the Mexican market.
Design Background:	This NGO did not have any previous experience with design. So,

following a recommendation of its business consultant, it hired three industrial designers with more than 20 years of experience and a group of undergraduate students to develop concepts that fulfil all the requirements needed by the Mexican users.

Aims

The organisation wants to encourage handicapped people to have a normal life through the use of active devices. During the last years the establishment tried to design, and produce user-centred, affordable, interactive designs that offer better mobility and the opportunity of having more independent life. According to INEGI, 10% of the Mexican population is handicapped and they required assisted devices. The introduction of both designs will represent to target the 15% of the total percentage of handicapped people.

Sourcing Methods

The company approached the business consultant division of the Monterrey Institute of Technology to develop a business plan and feasibility study. This consultant division suggested the organisation to be assisted by the design division of the same institution in order to boost ideas. Although, it is worth to mention that this NGO had not previous experience working along designers.

Briefing Methods

Designers were briefed verbally at the first stage, although all the times designers were developing their own data collection. The organisation was an active participant toward the project life. Likewise, external designers were committed to deliver the best solutions even though their experience was not deep within this design field.

Evaluation of Design

It has to be pointed out that it was difficult to have an evaluation of the design project at the stage in which the case study was finished. At this point, designers developed the product concept, renders of the proposals, and control drawings to develop a 1:1 Alfa prototype. It was expected that in the following months the product should be fully developed. Likewise, an evaluation of the project versus the previous developed chairs was not possible to be performed at this time. But the staffs of the organisation consider that the visual elements give a clear idea of the product proposal. It is worth to mention that the delay on the production of prototype is due to the organisation is helped by the Mexican governments to develop its own manufacturing plant.

Observations

Even though, the organisation had no previous experience working with industrial designers, its commitment to develop new products was over standing Staff involved was proactive in all the activities, but above all, sourcing and briefing designers. Regarding the product designed, the design team focus on develop interesting concepts based on the idea to bring additional benefits for the final user.

Case 5 Lightweight vehicle

Company Product:	Design, produce and manufacture vehicles with hybrid-electric propulsion system
Company Years:	8 years
Company Size:	13 full time staff and 2 external employees
Design Output:	Use industrial designers to boost the production of the prototype.
Design Background:	The firm had no previous experience working with designers. But the general manager was suggested by a close friend that it was necessary the use of industrial designers. Then, it will be possible to achieve the minimum standards on the development of the car.

Aims

The firm aims are focused on solve the chronic pollution problems generated by vehicles in Mexico City. Therefore, it is devoted to design, manufacture and produce lightweight and transport vehicles with hybrid-electric propulsion system. Its core business is based on the production of the hybrid energy source which is sourced by a model of batteries; an internal combustion motor gasoline and an electronic energy storage system.

Sourcing Methods

The company approached CONACYT to get funds to continue the development of its technology. This company never approached any design consultancy or division in any institute. However, it was suggested the use of industrial designers to achieve the development of the prototype. Therefore, it was hired two industrial designers which were undergraduate students.

Briefing Methods

Designers were brief verbally along the project. Although, it is worth to mention that they were hired when the project was at the prototype stage. Consequently, they were focused on solve problems that engineers could solve within the development of the cab of the driver. However, the designers' background helped them to produce a brief in which they could write down some important specifications for the prototype.

Evaluation of Design

Within this specific project diverse evaluation (informal) were held. Due to the characteristics and complexity of the project every week were conducted meetings of all the areas to show their advances and as well how it would be assembled the results of all of them. It has to be pointed out that one evaluation of the prototype was held but design was not considered at all. Indeed, the few evaluations of design were done subjectively and based on the necessities of the engineering area.

Observations

The major constrains affecting the case study are its limited financial resources, lack of expertise and experience. Likewise, it has an over ambitious project in relation to its size and resources of the firm which provokes the company's ineffectiveness. Design is used to fulfil specific number of tasks, so designers are limited to solve mostly physical and tangibles problems. Some results delivered by designer have been astonished; consequently, every time the activities of this area have been increasing. Although, it still misunderstood, and not used as key important within the NPD process.

The first observation is that a small number of companies consider design as an asset to improve their businesses because they are more concentrated on overcomes a series of barriers to develop new products. Even though, these organisations have similar size and structure, they posse different problems that range from the strategy, to operative activities. Consequently, it can be understood why just one third of the cases studies have enough resources to hire designers to support their new product development, and the remaining two thirds contracted external design consultancies. As well as, it was identified along the cases that companies adopted design as a tool to give quick solution in the short term. Alternative, companies that have in-house designers use it to solve specific problems that no one hired form other areas of the company could solve. The designers engaged are specialised with one are of design, thus, they have limited and capabilities along the NPD. Likewise, the concept of design adopted within the business is fuzzy, and is mainly focus on the physical and quantifiable part of design [renders, design plans, models]. On the other hand, organisations that did not use design within their activities, and hired a design consultancy, improve their final product, but they are unaware of the use of design and the advantages that it delivers to the new product development and the overall performance of the business. Likewise, it has to be emphasised that design can me misunderstood if the design implementation done by the consultancies was not the proper for the business aims.

7.0 Conclusions

It is evident that design is sub-used, sometimes misunderstood and delegated to become a quick and cheap solution to face the fierce competition in the Mexican market among the case studies. The explored cases highlighted two different ways in which a firm can embrace and use design within its activities. The first way concerns the use of in-house designers. They hired a designer to solve specific problems. Designers selected are specialised on precise activities; thus, they have limited skills and capabilities along the NPD. Then, the design concept applied within the business relies on the design background of designers. So, it is not applied within the businesses as an asset that can improve the overall result of the final product and the own performance of the business. The second way to adopt design is through the use of external design consultancies. Then, those enterprises are merely observers of the application of design within their activities. They are not able to understand it, and be aware of the immense advantages that it can bring if it is well used to champion their products. Both cases, demonstrated that design, even not used properly was helpful to fulfil their objectives. Then, it was an asset for the company. Thus, it is necessary to generate a number of actions that allow the companies to apply design in the long term. Hence, it can be used as a tool to improve the performance of the business and to hold competitiveness in the long term.

A number of actions were developed to increase the awareness of design and its uses along the company. It is recognised that design can boost the performance of the company's NPD. But, it is necessary to consolidate it within the firm's activities. Therefore, under the corporation's conditions it is necessary to implement design at the operational level, and in the future, move to the tactical level. Design can be implemented at the operational level as an activity that manages different ranges of skills, tools, methods and techniques from the different areas that are involved within the company. Consequently, an appropriate design concept has to be developed, as well as a framework that helps the organisation to generate a system in which it implements more efficient and effective actions. It has to be ensured that diverse activities can be adequate and evaluated within the firm. So, employees can be able to modify it according to the necessities of the company. Thus, employees with time will be able to increase the number of tools and methods to improve their performance.

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