



INNOVATION  
IN REAL ESTATE  
SECTOR

CHILE 2015

**ccbc**  
CAMARA CHILENA DE LA CONSTRUCCION

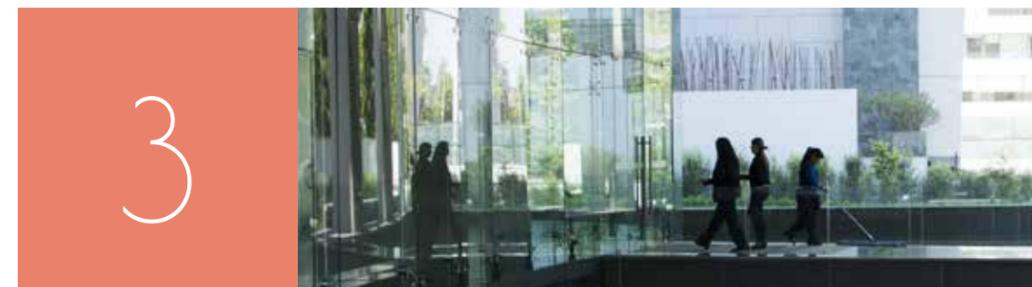
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## WORDS BY CCHC PRESIDENT



On behalf of the Chilean Chamber of Construction, I have the honor to present the book "Innovation in Real Estate", which reflects the experiences of the sector on its way to differentiate, to improve and to create new forms of management in its companies.

This is a fundamental agreement: the heart of innovation is within the company, including workers, executives and entrepreneurs. They are the ones who innovate, those who decide to incorporate research and development in their processes. The ones who end up turning knowledge into wealthness. Thanks to the courage of these visionaries, innovation is no longer just an act of implementation of good ideas. It has become a measured and systematically controlled process within the companies, which become the protagonists of the transformation at an economic and social level.

Thus, since 2009, thanks to the continued support of the Technological Development Corporation (CDT), more than 30 companies in our sector have incorporated tools and methodologies leading to systematize and manage innovations.

These tools and high-profile cases are presented in this unique document, for it is the first methodological guide developed by a national productive sector, based on specific cases.

We have to break down the myths to allow these cases stop being isolated

facts in the life of each company. We must empower senior executives, foster creativity, strengthen the generation of ideas, as well as permanently monitor the environment, and know how to spot opportunities both outside and within the company. Be open to the possibility to innovate in a collaboratively way with our clients, with our suppliers and even our competitors, managing knowledge and making it part of our patrimony.

That is our challenge, but the first steps have already been taken and firmly.

**Jorge Mas Figueroa**  
President  
Chilean Chamber of Construction

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Innovative potential  
in real estate  
and construction  
industry





# INTRODUCTION

All companies need to innovate. Innovation is change. It is to be prepared for the future. Innovation is to anticipate customer's needs, to bring value to the organization. It is to create new processes. Innovating represents many things and for this reason, companies should not neglect their innovative activity.

Although these approaches are generally willingly accepted, their implementation is not so simple. The difference between saying and doing, between formulation and implementation, in many cases makes the difference between truly innovative organizations and those fighting to provide value to the market without success.

The construction and real estate sector is aware of the need to innovate, and within it, the real estate business also requires a boost to the innovation.

This present paper was carried out prior to any project to improve innovation systems in

companies, as a way of knowing the baseline of the companies involved in the real estate industry.

## CONTEXT OF DIAGNOSIS

Since 2009, the Technology Development Corporation (CDT) of the Chilean Chamber of Construction is developing projects aimed at boosting innovation management in construction and real estate companies in Chile. To date, 30 companies have participated in this type of initiative where, for a start, innovation in each company is assessed before starting the implementation of a formal system of management innovation. This assessment is presented here, or put in a different way, the baseline of these companies is compared in terms of innovation and the potential areas of work are identified, aiming at encouraging innovation and at creating a pro – innovation and entrepreneurship culture in the companies.



Axis	Variables	N° questions
1. LEADERSHIP FOR INNOVATION	1.1. Management commitment with innovation	3
	1.2. Strategic Planning	10
	1.3. Culture of Innovation	6
	1.4. Internal Communication of Innovation	7
2. INNOVATIVE ORGANIZATION	2.1. Organizational Structure	6
	2.2. Management System	7
	2.3. People	10
3. INNOVATION AND OPERATION MANAGEMENT	3.1. Development process of products or services	5
	3.2. R & D Processes	7
	3.3. Production processes of marketing	7
	3.4. Support processes	5
4. CREATIVITY AND MONITORING	4.1. Creativity and Internal Monitoring	7
	4.2. External Monitoring	6
5. VALUATION OF INNOVATION	5.1. Internal Improvement of products or services	5
	5.2. Internal Efficiency	4
	5.3. Innovation Capitalization	9

Table 1

Axis	Mean Value
1. LEADERSHIP FOR INNOVATION	2,41
2. INNOVATIVE ORGANIZATION	2,07
3. INNOVATION IN COMPANY	2,02
4. CREATIVITY AND MONITORING	1,7
5. VALUATION OF INNOVATION	1,95

Table 2

## METHODOLOGY

Diagnosis focused on 30 real estate and construction companies. In most cases, directorates and sub directorates took part together with executives, professional staff and employees at different levels of hierarchy. Companies were free to include as many persons as they considered appropriate, each one showing different numbers of participants: from 15 to more than 50 participants in some cases.

The diagnostic tool is made up of 104 questions through which the assessment of the situation and the innovation potential of the companies is carried out. The diagnostic tool is structured around five main axes, with defined variables for each one, receiving a score from zero to four, as follows:

- 0: Disagreement.
- 1: Partially disagree.

- 2: Neutral.
- 3: Partially agree.
- 4: Agreement.

## GLOBAL RESULTS

The average valuation of the five concepts corresponds to the following Table 2.

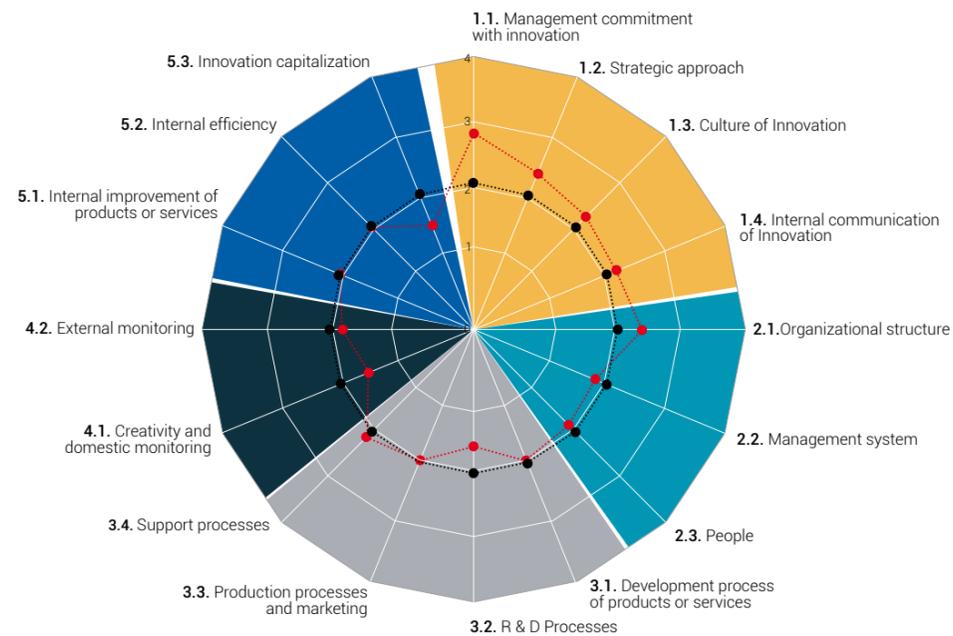
In this first valuation, the axes *Leadership for Innovation*, *Innovative Organization* and *Innovation in the Company's Operations* show the higher scores, highlighting *Leadership* among them. Although the specificity of the answer of each company can be missed when dealing with average values, it is worth mentioning the existence of a repeated pattern in every company where the axis *Leadership* receives a score over the average. A more detailed analysis shows that the commitment

of directorates and sub directorates is highly valued in those processes. Thus, the score for *Leadership* decreases in those cases in which the participation of the workers prevails over that of the directorates and sub directorates.

The axes with lower score are *Creativity and Monitoring and Valuation of Innovation*, being the latter the worst. The fact concerning the low scoring for *Creativity and Monitoring* denotes a lack of development and innovation uptake from the different parts, both external and the own workers of the company. The axis *Valuation of Innovation* is often assessed as moderate or low in companies without formal innovation processes.

Axes *Innovative Organization and Innovation in the Company's Operations* show a similar scoring to the global average of the group of companies, with an average scoring for the five axes set at 2,08 points.

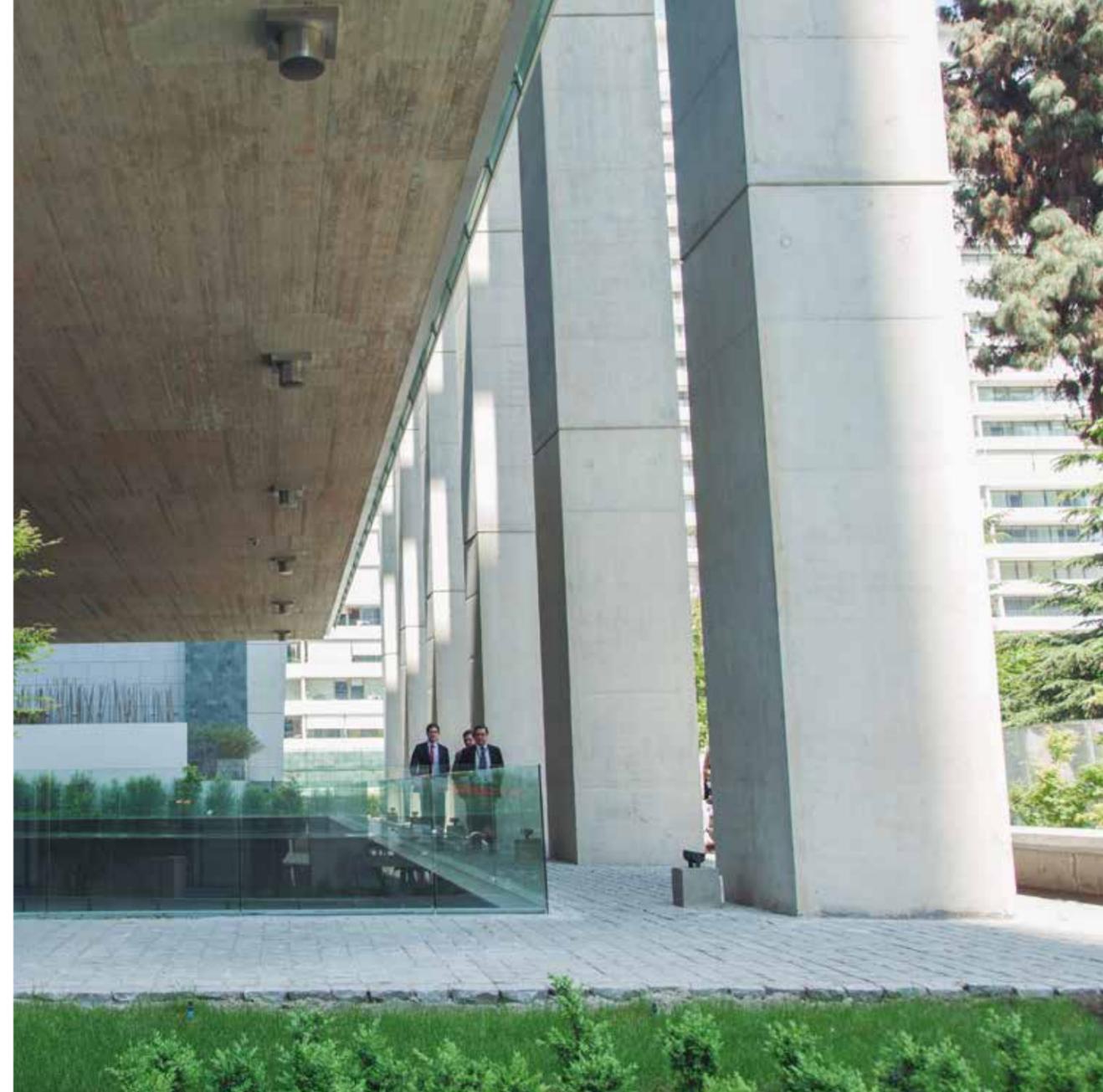
It has been noted that there is a greater dispersion among the valuations by the different participants from the same company than among the mean values of the different companies. This intensifies with the rising in the number of participants from the companies with diverse profiles, denoting differences of perception between senior management and the employees that are more involved in the operations.



Comparison of general aspects of innovation for each of the variables.

● Media de cada parámetro ● Media sector

Figure 1



## COMPARISON OF VARIABLES

Figure 1 shows the overall assessment of the 16 analyzed variables.

It shows the impact of each one of the variables on the different axes.

The "average of each variable" indicates the mean value of each variable calculated from the values obtained in the different real estate companies (16 companies) and how the "global score" is considered a fixed value of 2,08, obtained from the mean of all scores in each of the 5 axes.

Figure 1 shows that variables above the mean – with green background on Chart 1 – are:

- Management commitment
- Strategic approach
- Culture of Innovation

- Internal Communication of Innovation
- Organizational structure
- Production processes and marketing
- Support processes
- Internal improvement of products or services
- Internal efficiency
- Management system
- People
- Development process of products or services
- Creativity and internal monitoring
- External monitoring
- Innovation Capitalization

Among the variables below the mean are:

Axis	Variable	Mean	Desv. Stan
<b>1. LEADERSHIP FOR INNOVATION</b>	1.1. Management commitment with innovation	2,77	0,48
	1.2. Strategic Planning	2,45	0,46
	1.3. Culture of innovation	2,27	0,47
	1.4. Internal Communication of Innovation	2,19	0,52
<b>2. INNOVATIVE ORGANIZATION</b>	2.1. Organizational Structure	2,39	0,52
	2.2 Management System	1,88	0,37
	2.3. People	1,94	0,45
<b>3. INNOVATION IN COMPANY'S OPERATIONS</b>	3.1. Development processes of products or services	2,07	0,68
	3.2. R & D Processes	1,61	0,72
	3.3. Production processes or marketing	2,11	0,41
	3.4. Support Processes	2,30	0,37
<b>4. CREATIVITY AND MONITORING</b>	4.1. Creativity and internal monitoring	1,51	0,77
	4.2. External Monitoring	1,89	0,54
<b>5. INNOVATION VALUATION</b>	5.1. Internal Improvement of products or services	2,12	0,46
	5.2. Internal Efficiency	2,09	0,45
	5.3. Innovation Capitalization	1,63	0,44
<b>GLOBAL AVERAGE</b>		2,08	0,51

Table 3

## SOME NEWS FLASHES

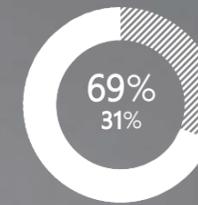
Next, some specific aspects assessed in the questionnaire. The "yes" column reflects the percentage of companies which assessment was over "2" in the questionnaire. Column "NO", reflects the percentage of companies which assessment was below "2" in the questionnaire, and therefore would not reach the average response threshold.

It is important to keep in mind that there are more questions in the questionnaire for each axis, up to 104, so what it is on display is only a fraction of the total.

### 3.2.1. LEADERSHIP AXIS



Management commitment to innovation becomes a reality through concrete actions.



Innovation is a fundamental strategic area for the company. We know what we need to innovate.



We know what we want to innovate.



We know why we want to innovate.

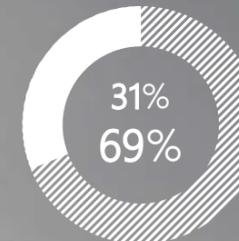


Innovation is one of the company's core values.

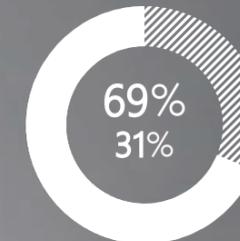
### 3.2.2. INNOVATIVE ORGANIZATION AXIS



There is a department with specific responsibility to innovate.



Innovation is part of the management system and it is a specific process of it.



The company encourages the development of key competences for innovation.

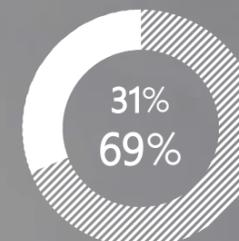


Organization structure follows the innovation objectives of the company, being flexible and adapting to meet the needs.

### 3.2.3. INNOVATION IN THE OPERATIONS OF THE COMPANY AXIS



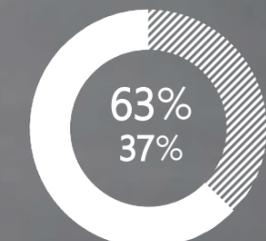
Our portfolio consists on recently created products and services.



There is a team responsible for improving the productive process.

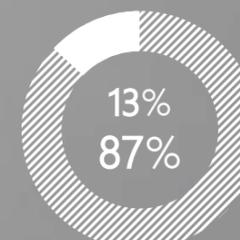


A multidisciplinary team carries out the implementation of R & D projects.

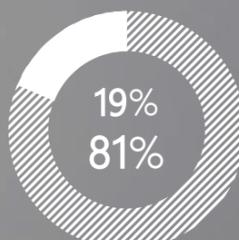


Evaluation of the expected results of new services before their development.

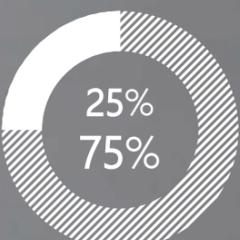
### 3.2.4. CREATIVITY AND MONITORING AXIS



My company generates new ideas from a long-term structured process.



My company plans the generation of new ideas and projects.

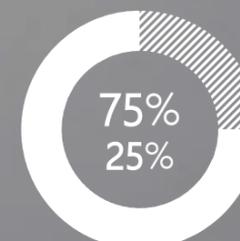


The company identifies the critical monitoring factors from its innovation strategy.

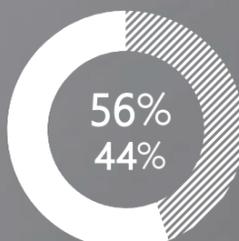


We know the external sources of information on competitors, technology and regulations.

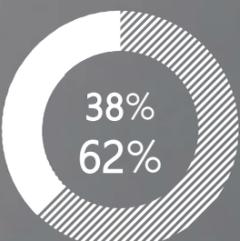
### 3.2.5. VALUATION OF INNOVATION AXIS



My company is able to assess the improvement of products or services in terms of profitability or added value which generate for the organization.



My company is able to assess the improvement of products and services in terms of expertise or acquired knowledge.



My company is a reference for clients due to its implemented innovation.



The benefits associated with innovation meet the objectives and goals internally set.

3

Innovation management methodology for companies in the construction and real estate sector.



# INTRODUCTION

Innovation management is the organization and management of both human and financial resources aiming at increasing the creation of new knowledge, the generation of technological ideas that enable obtaining new products, processes

and services or improving the already existing. In addition, the transfer of those ideas to the phases of production, distribution, and consumption. Therefore, management innovation becomes a first class management tool, which can substantially contribute to the success and development of the company.

With a modular approach responding to what we regard as the key element in innovation management, CDT has designed a dynamic, agile and easy methodology from its experience

as counselor in this kind of process for different companies and organizations in the sector. (See picture 1).

Systematic innovation management has the following phases:

Every process starts with the definition of the strategic goals of the company and its competitive strengths set in its strategic plan.

The next step aims at generating new ideas through the implementation of internal mechanisms of creativity or of monitoring in the company. The ideas suggested do not have to be technical ideas, though they should imply innovative actions for they contribute with distinguishing aspects in regards to competition and/or being a novelty, at least for the sector in which the company competes actually.

## OBJECTIVE COMPETITIVE FACTORS



(Figure 1)

After listing the ideas, **the quantitate classification criteria (filters)** will be applied, resulting from the objectives and competitive factors set in the strategic plan, creating a portfolio performance **and projects**, which in principle, may be liable to be carried out.

Putting an idea selected from a draft into practice will imply creating a small document containing: a brief

description of the opportunity, state of the art, technical – economic objectives, working plan and budget, as well as possible financing sources, all in a brief manner.

The thorough analysis of drafts will lead to the decision of implementing those, which best suit, the opportunity and viability criteria.

**The implementation of projects** involves applying planning techniques and projects control, as well as searching for funding sources.

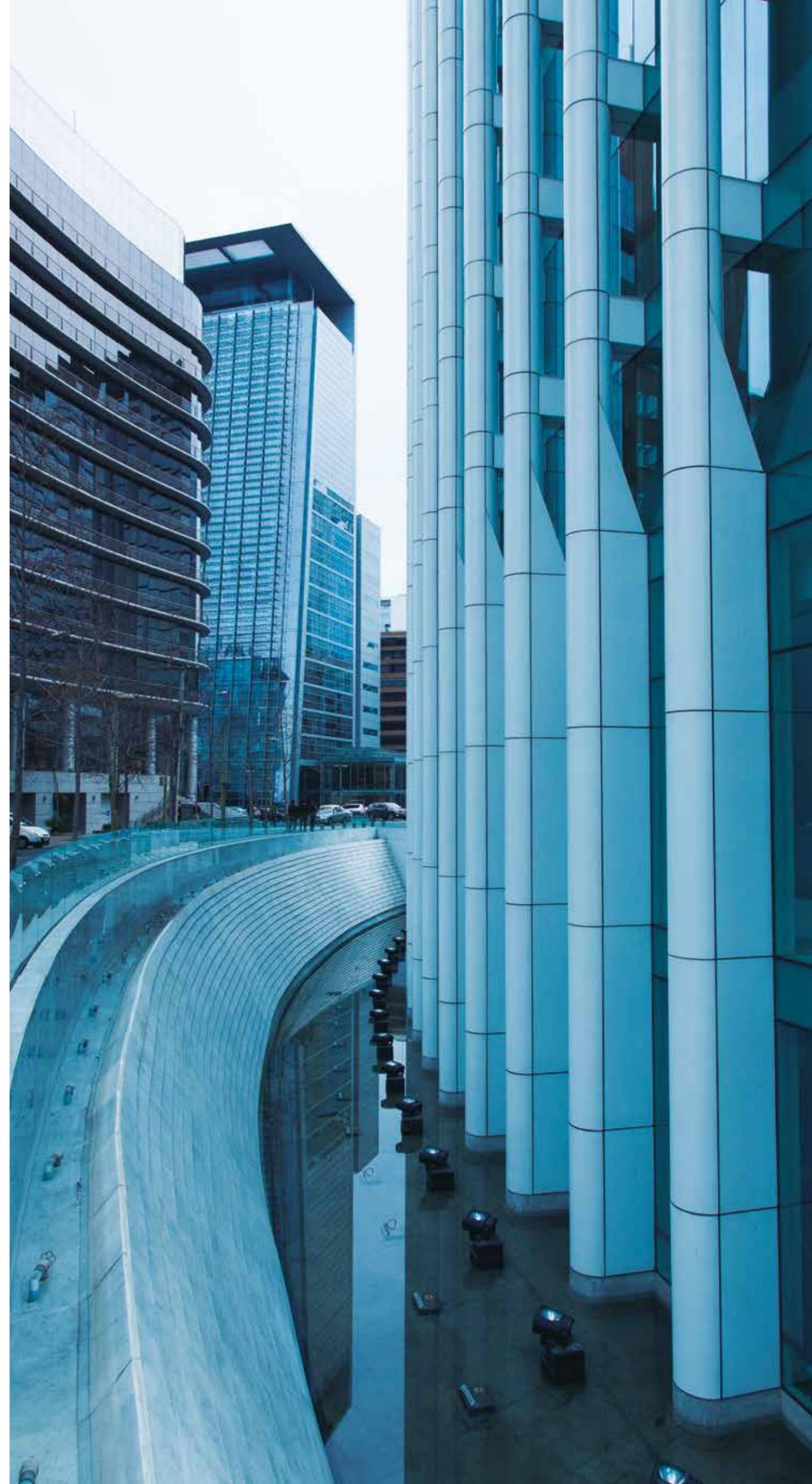
Innovation assurance, establishing a protection system for the results, operating the project from a commercial and economic point of view, as well as knowledge management generation are aspects

The comprehensive analysis of drafts will lead to the decision of starting those that best suit the opportunity and viability criteria.

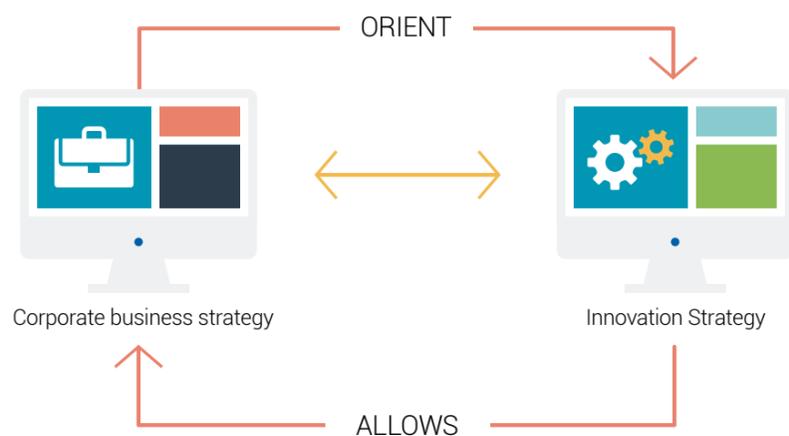
that likewise will be taken into consideration in the phase of projects implementation.

Implementation of the model above shapes four big dimensions to take into consideration in innovation management:

- A. Strategic Dimension
- B. Identification of ideas to be developed
- C. Projects Development
- D. Exploitation of Results



# A. Strategic dimension



Innovation is considered, with an ever-increasing emphasis, as one pillar of the strategic plan of a company, for it contributes to the development of such plan. Implementing innovative actions not linked to the strategic plan, leads to the use of vital resources for the achievement of results that may not be relevant for the activity of the company.

Some aspects are addressed during the implementation of a management innovation system in a company, such as:

- Objectives and scope of the innovation strategy.
- Creating a strategic technology plan.
- Relation strategic plan / strategic technology plan.
- Self – diagnostic tools.

## OBJECTIVE:

The use of innovation as a supporting factor for achieving the strategic objectives of the company.

# B. Identification of ideas to develop

## B.1.

**Creativity and innovation: creativity techniques, design and development of new products and services.**

Innovation will have a greater impact in our competitive position the more it contributes to differentiate us from the competition. Nevertheless, it is not simple to come up with radical or disruptive innovations when our way of thinking is much too influenced by the management of known problems in environments that are also known.

During the implementation of a management innovation system in a company, some aspects are addressed, such as:

- Creativity fitting in the detection of innovative ideas.
- Creativity techniques in the industrial environment.
- From the creative idea to the development of a new activity.

## OBJECTIVE:

Development of creative skills existing in every person, putting such creativity at the service of identifying new opportunities for innovation.

## B.2.

**Technology monitoring, benchmarking and competitive intelligence.**

There are diverse factors that trigger the implementation of an innovative action. One of the most important and best known is responding to the opportunities and threats of the environment.

Creativity is an increasingly valued ability in the company...as long as it leads to an innovation.

## C. Projects development

### OBJECTIVE:

Learn to systematize the detection of environmental opportunities and threats, so we can adapt and even better, be able to surprise it.

During the implementation of a management innovation system in a company, some aspects are addressed, such as:

- Objective, scope and expected results from a technology monitoring system, from benchmarking activities and competitive intelligence.
- Tools readily available for operating technology-monitoring systems, benchmarking and competitive intelligence.
- Use of the tools mentioned above for generating innovative ideas.

### C.1.

#### Management of technological and innovation projects.

An innovation project cannot be managed in the same way as any other activity, even though common tools can be used. Innovation projects have particular features: lack of definition of some of the aspects of the development, uncertainty in relation to the results, objectives and longer development lead-times than the ones from conventional projects.

It is, therefore, needed:

### OBJECTIVE:

To develop a system for planning and controlling the implementation of innovation projects.

To establish a management system that meets the needs of this kind of projects. During the implementation of a management innovation system in a company, some aspects are addressed, such as:

- Specific needs in the development of innovation projects.
- Tools readily available for planning and controlling innovation projects.
- Coordinating innovation projects with other projects from the company.

### C.2.

#### Financing Innovation

Financing innovation is a decisive aspect for most companies, for in many cases, there are elevated risks and, it could even be the case



Participation of the company in a cooperative project allows it addressing subjects that are more complex or learn about those that there is not enough knowledge, as well as sharing both technologic and economic risks.

On the other hand, the fact of taking part in cooperative projects allows the enhancement of relations networks putting us in contact with companies and entities with different corporate culture.

that such financing do not meet the company's need. In order to alleviate this problem, it is important that the company's top management have available a budget for managing the persons responsible for the innovation and for the development of the priority projects. It is also important that the company know the non-reimbursable financial instruments that the State has placed at its disposal to leverage the risks associated to the innovation projects.

#### OBJECTIVE:

Get to know the different possibilities offered by the State for financing innovative actions and learn how to use them.

During the implementation of a management innovation system in a company, some aspects are addressed, such as:

- Aims intended to be achieved by the managements with the granting of various existing aids.
- Available funding in the different state institutions.
- Access to existing aid: existing regulations, application and management.

## D. Exploitation of results

### D.1.

#### **Innovation assurance: patents, property and competitiveness.**

One of the greatest advantages of an innovative company is taking the market by surprise with new products and services not yet developed by the competition. Therefore, it is necessary to establish the right measures in order to keep such advantage as long as possible.

#### OBJECTIVE:

Learn to establish a result - protection system guaranteeing the maximum amount of benefits resulting from the innovation activities.

During the implementation of a management innovation system in a company, some aspects are addressed, such as:

- Modalities of protection of innovation results
- Current Legislation.
- Process and cost of results protection in Latin America, Europe and the rest of the world.

### D.2.

#### **Exploitation of innovation: innovation and business strategies.**

Innovation only makes sense if it aims at obtaining quantifiable economic benefit. Sometimes, exploitation of innovation results may require a change in the business model. However, it is very common to approach the implementation of innovation projects without having first undertaken an impact analysis both from the commercial point



of view and in relation to the improvement of our competitive position as well.

#### OBJECTIVE:

Learn how to exploit, in an optimized way, the results of the innovation activity, both from the commercial point of view and its impact on the competitive position.

During the implementation of a management innovation system in a company, some aspects are addressed, such as:

- Development of business models based on innovation.
- Development of exploitation systems of technological projects results.
- How to always keep in mind the voice of the client during the development of the innovation process.
- Development of new technology - based companies.

#### D.3.

##### Generation, conservation and management of knowledge in the company.

If we wish the existing and generated knowledge in our company be a distinguishing factor from the competition, we should be able to manage it, in other words, to encourage it and make it our company's patrimony.

During the implementation of a management innovation system in a company, some aspects are addressed, such as:

#### OBJECTIVE:

Identifying how and when useful knowledge for our business and existing systems is generated to make it our company's patrimony.

- Identification of knowledge in the environment of technological project development.
- Identification of differential knowledge and its impact on our competitive position.
- Existing tools and systems for the conservation and sharing of knowledge.
- Knowledge - based business model.

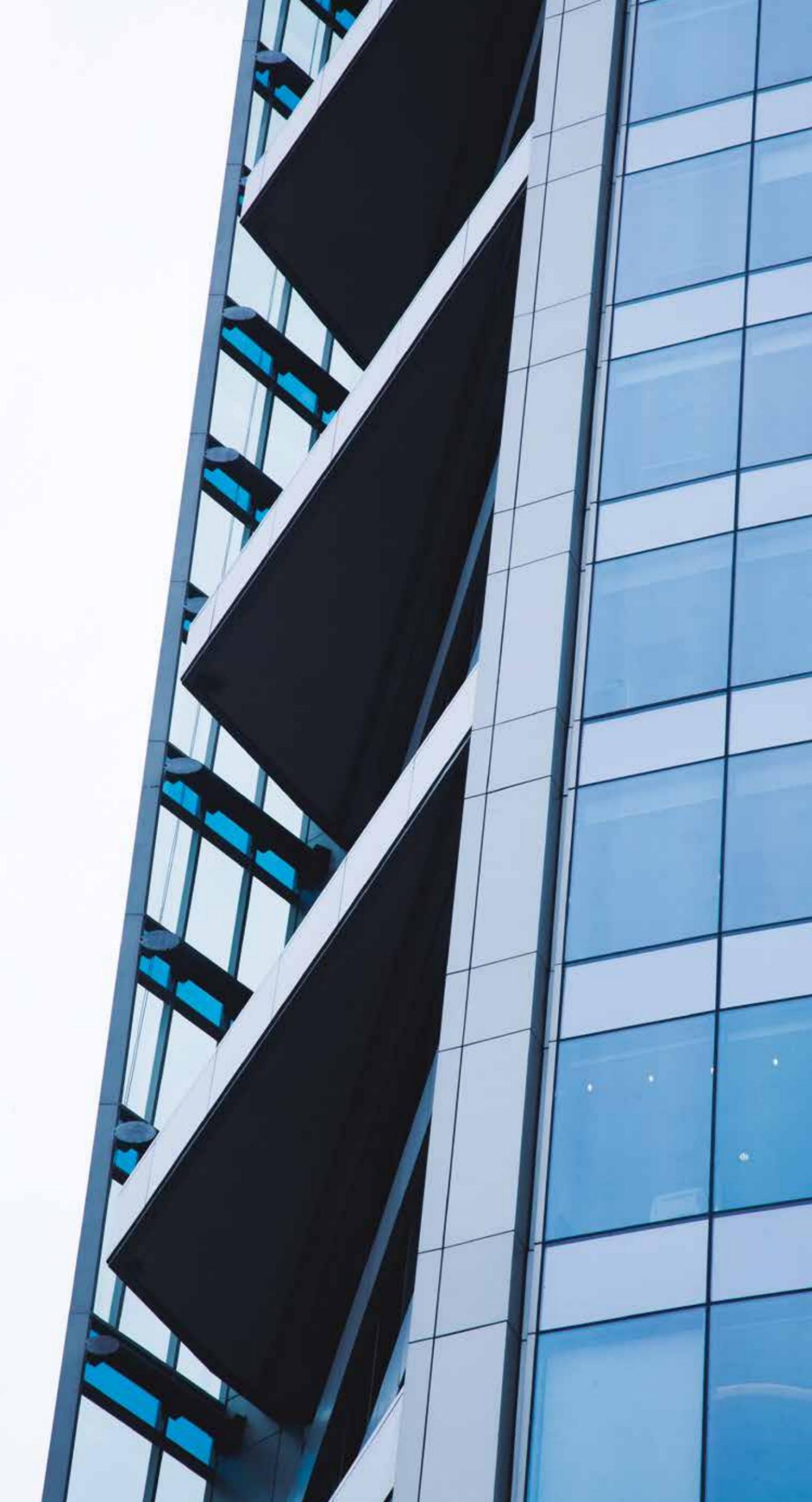
Knowledge cannot be managed by itself. What can be managed is the knowledge creation process.

Knowledge management should consider both tacit and explicit knowledge, as well as their possible interactions.

# 4

Innovation  
cases





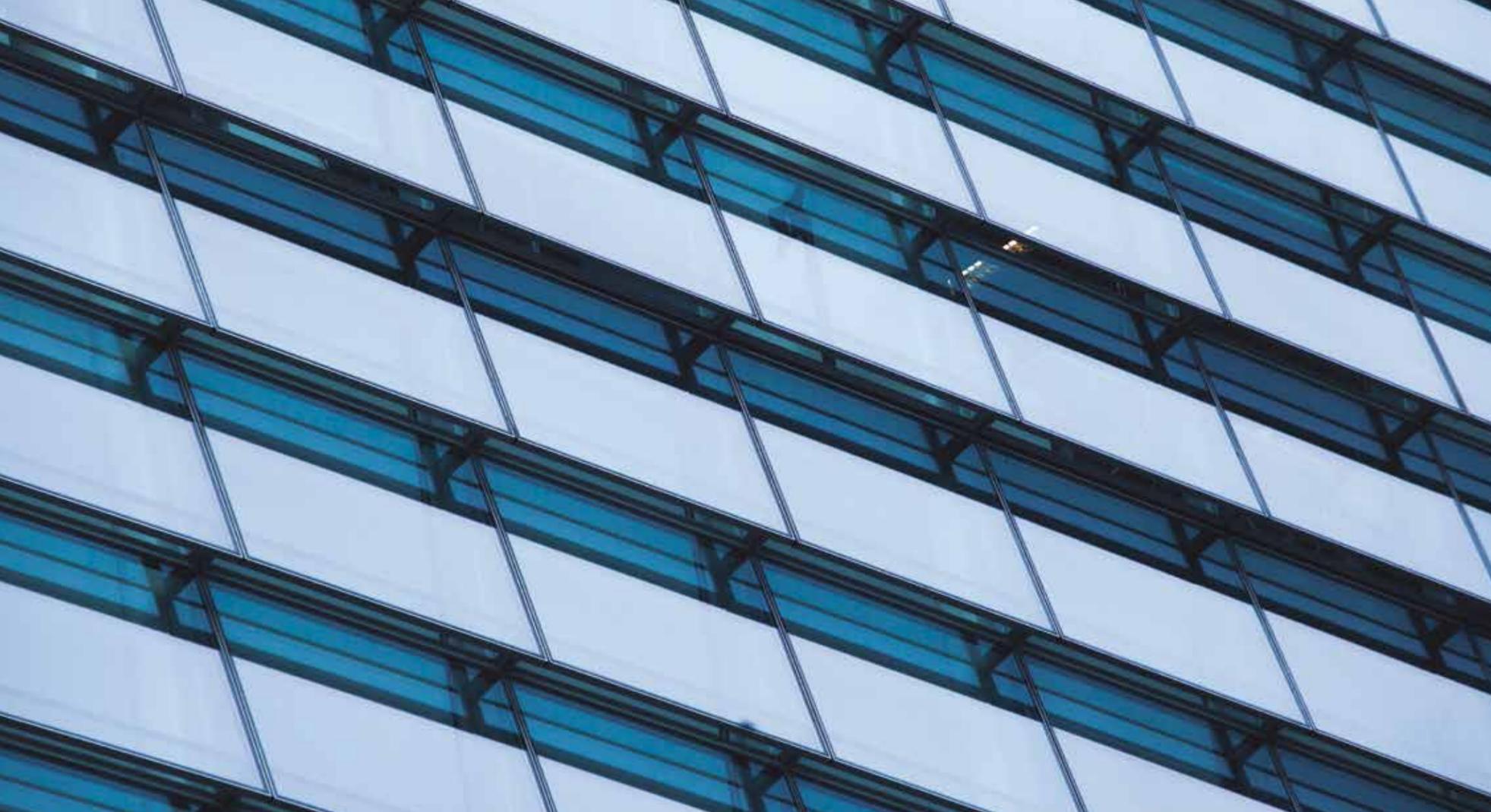
- Case 1 -

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# INDUSTRIALIZATION IN CONSTRUCTION

Productive need

The reality of the sector, with labor shortage and the increase of construction projects, has forced the search for technical optimization solutions. Innovation is paramount. Industrial processes with mass - produced prefabricated elements seem to be one of the alternatives. Shortening lead times and reducing costs are its main advantages. Aiming at improving productivity. A real need for the market.



The path to industrialization emerges as an alternative to provide a solution to the construction Reality.

Experts agree on the idea that the industry has developed, but there is still important room for improvement. Organizational culture seems to be the main obstacle because the industry is very reluctant to change and adopt technology. "If it does not feel the urge to optimize processes, it will prefer the system that already knows. Innovating, changing production methods will always make you uncomfortable. It takes rethinking and taking risks", points out René Lagos, CEO of René Lagos Engineers.

The path to industrialization, to mass produce construction elements in controlled environments with accuracy and deadlines appears as an alternative to provide a solution to the construction reality. There are various advantages and they all aim to optimize the construction process. If cost is the main barrier, today the market provides competitive solutions. Although there are other solutions, the prefabricated elements are the main result of this

alternative. There are many experiences however isolated. The key to make its result more profitable is in relation to a main concept, standardization.

#### **INDUSTRIAL IRONWORKING**

After the deficit of ironworkers, the industrial process of such task represents an important solution for the sector. There is a variety of advantages mainly focused on more technological process, with less variables to control and with less disperse results. It also allows reducing the execution deadlines as well as the direct and indirect costs. With the industrial ironworking, we aim at material control – with better measurement and accurate manufacturing of the ironwork indicated in the blueprints – in compliance with current regulations, avoiding overproduction and errors. The efficiency of the human, logistical and constructive resources.

#### **PREFABRICATED ELEMENTS**

Even though prefabricated elements, especially precast concrete and ironworking, can be produced in site, they exhibit their best performance when manufactured in a factory. The product moves along different assembling stations in a controlled environment with strict quality control on every stage, in a mass produced process. Time saving goes around 30 to 40%.

#### **CONNECTIONS**

Despite such alternatives, the construction process increasingly turns into an assembly process with a considerable reduction of work force, but it still requires some jobs regarded as handicraft.

Connection main role is to manage a continuity of all elements to ensure an ideal structural behavior.

On René Lago's opinion, this aspect conveys one big doubt when implementing this solution. "Chile is a seismic country and the problem regarding the precast concrete products is that they are units that have to be connected among themselves and must operate seismically. That is not an easy connection. It is the Achille's heel of precast concrete, therefore, this has to be solved in a satisfactory manner", he notes. In this area, second – generation connections are currently being developed with new engineering, which will allow reducing costs and labor in site.

The main advantages of industrial processes, with mass – produced prefabricated elements are the reduction of time and cost.

By incorporating seismic isolation system, the stress levels seismically induced can be reduced around 6 to 8 times, leading to a building that requires a design with smaller strength in which prefabricated solutions work extremely well.

#### **STANDARIZATION**

According to experts, the proper optimization of a project should take place when the constructive solution is implemented in a comprehensive way; when architecture, engineering, the construction specialties and the construction company coordinate from the genesis of the work. The current fragmentation of tasks restricts this possibility, especially when trying to standardize.

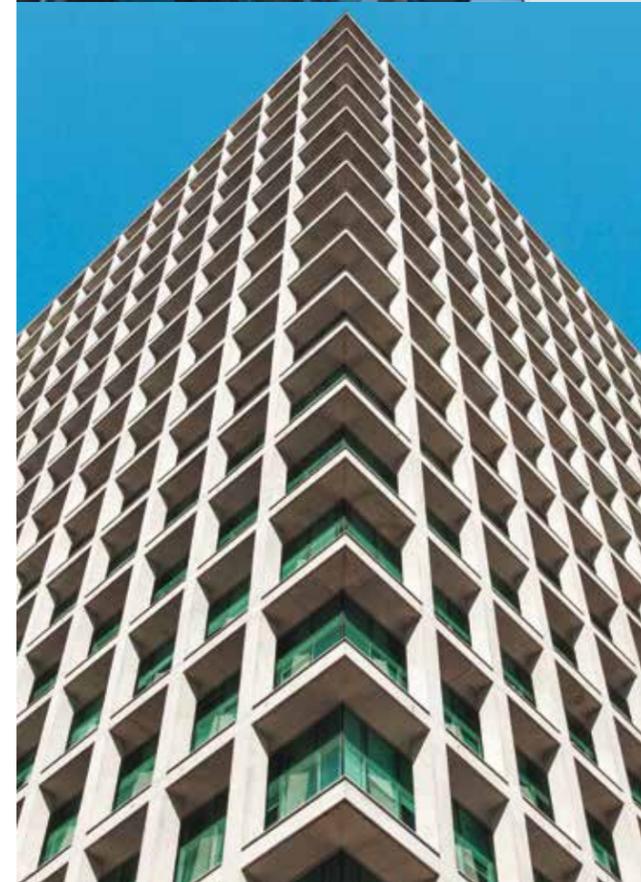
Given the diversity of requirements in projects, standardization nowadays does not tend to model construction, but to stages, which – among other things – are limited due to transportation and load.

Design also plays a key role, even though the best-case scenario is to coordinate with the other constituents right from the start. Architecture cannot lose its distinctive hallmark.

#### **CULTURE OF CHANGE**

All told, if changing processes are not properly managed, the expected results will not be achieved. "A common element in all engineering and construction companies is that when investigations are carried out to develop new solutions such knowledge tends to be held by the experience of those who participated. Advances are not spread and when job rotation occurs the production of knowledge if not properly registered, there will be no internal diffusion. The individual knowledge does not turn into collective knowledge. It gets, lost", said Lagos. To prevent this from happening, companies need to rethink their internal organization and empower a staff to be in charge of monitoring and

recording these processes, so that the experience remains and be extended to the rest of the institution.



# MODULAR BATHROOMS

## Bet on productivity

A construction and real estate Chilean company manufactures modular bathrooms that supplies fully finished to the works, including plumbing fixtures and fittings. A new commitment at the service of productivity.

The system of modular and prefabricated bathrooms supplied to the works, almost ready to be connected and ready to be used, has been in use for more than 15 years in Germany and in several European countries. The idea reached our country seven years ago after a trip made by one of the partners of the construction corporation Ingevec within the framework of a Technology Mission organized by the Technology Development Corporation (CDT) of the Chilean Chamber of Construction.

Like any innovation, its implementation was not easy. In the beginning, there was some disbelief by the company partners, so they had to conduct a thorough investigation, which continued with the search for a strategic partner. With that resolved

and after a pilot plan, in early 2011, a manufacturing plant started operations which was called Volksbath Chile.

"We believe that the future of construction should consider innovative solutions that add value to the final product. The modular construction of toilets is a system that provides benefits that are perceived along the entire value chain, from site to the end customer, through the architects who see their work facilitated, to clients who receive a high quality uniformed product throughout the process and with a shorter warranty period", explained one of the company's executive.

The steps from fabrication to installation of the modules are described below:

## 1 Module Assembly

Once the project has been planned and developed together with the engineering department, and the characteristics and size of the bathroom (which can reach more than 20 m<sup>2</sup>) are defined, the process begins with the assembly of what would later be the walls, ceiling, doors and openings.



## 2 Installation

Upon completion of the module skeleton, starts the laying of pipes, the electrical wiring and the installation of switches, plus water connections and sewage.



### 3 Control

Mounting the exterior partition walls and carrying out a thorough quality control, which is repeated in every step.



### 6 Packaging and Shipping

The modules are closed with the final gate, which is covered with a protective plate and are carefully packed so they can be stored for several weeks, if necessary.



### 4 Interior Finishing

Once supply lines are placed, interior finishing begins where the walls are first covered, and then the floor.



### 7 Onsite Assembly

Modular baths are transported by crane to the slab, in the case of buildings. The module can be installed vertically in the slab or even laterally through the facade of the building, if conditions permit. Assembly and installation last approximately 25 minutes per module.



### 5 Assembling devices

After installing sinks, furniture, toilet, mirror and lamps several test runs are conducted.



### 8 Connection

The modules are mounted on the stage of structural work, prior to the execution of each floor slab. The module is placed with all decoupled connections. To connect with the rest of the work, it has the appropriate outlets (splices, outgoing, and others).



## 9 Bathrooms working

Bathrooms can be fully functional, while the structural work takes place in other parts. The modules are ready to await the advance of other items such as partitions, within enclosures around them. Chile Volksbath recommends keeping them packed until the final stages of completion.



## 10 Testing

As connection works progress, performance tests and revision are carried out for final delivery.



# Advantages of the modular system

Volksbath Chile, explains that modular bathrooms provide the following advantages over traditional systems:

1

### TIME SAVING:

As modules are delivered readily for assembly, they provide a significant reduction of time.

2

### BEST QUALITY:

Due to continuous checking and control, the modules have their quality guaranteed by the factory, reducing the incidence of after-sales problems.

3

### SAFER PLANNING:

All the production process can be planned, controlling the quality beforehand.

4

### COSTS REDUCTION

Costs are comparable with conventional systems, however, to rule out uncertain factors such as the coordination of the workers or warranty obligations each involved subcontractor saves time and effort by reducing the total project cost.

5

### UNIFORMITY IN THE PROJECT:

Since the system is produced in series, terminations and facilities are in uniformity with the installed ducts in exactly the same position for similar modules.

6

### IMPACT ON PRODUCTIVITY

It requires fewer personnel in site since the items are outsourced, so there is a reduced exposure to accidents. In addition, it requires less space and management of warehouse and administration work is facilitated.

[www.ingevic.cl](http://www.ingevic.cl), <http://volksbath.com>

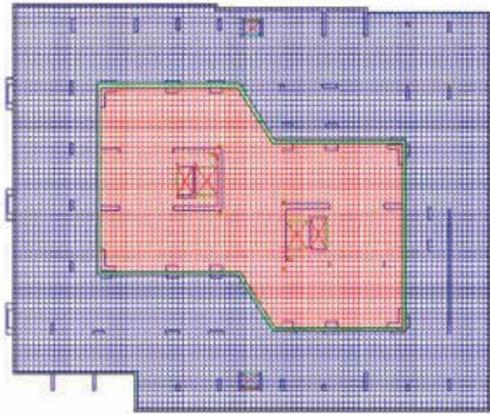


- Case 2 -

# THE POWER OF ISOLATION

The tallest seismically isolated residential building in America

Thanks to a seismic base isolation system made of 24 natural rubber isolators, the developers of this 75 meters high construction hope to reduce by 80% the accelerations that the building would be transferred to from earthquake, providing greater safety and comfort to the users of this future housing construction.



Project Outline: Blue represents the not isolated area corresponding to near 3.700 m<sup>2</sup> of underground, while red refers to the isolated area of 1.400 m<sup>2</sup> (base plate where the devices will be placed). Green refers to the 50 cm expansion left to avoid collision between the two buildings. Courtesy of René Lagos Engineers.

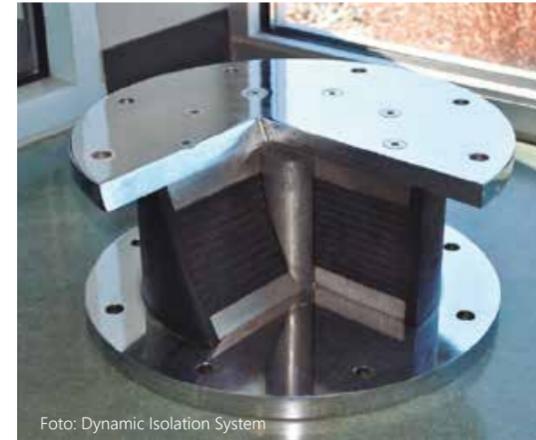


Foto: Dynamic Isolation System

Ñuñoa Capital Building will have an estimated height of 75 mt. above ground level and will feature two 28 stories towers, plus four undergrounds. According to its developers, it will become the tallest base - isolated residential building in America. Courtesy of RBA.

The Ñuñoa Capital Building is emerging as an innovative construction: it aims at becoming the tallest seismically isolated residential building in America. The project by Empresas Armas features a multidisciplinary team in which René Lagos Engineers also participates as main chief estimator along with Ruben Boroscheck and Associates (RBA), which advises on seismic isolation related matters.

The construction site, located on Avenida Irarrázaval, will have an estimated height of 75 mt. over ground level. It will feature two 28 - story towers, plus 4 undergrounds. "It was a tremendous challenge to us". We began thinking about it four years ago, but several events such as the 2010 earthquake and regulation changes led us to rethink the typical Chilean housing model, which in general, features many walls and is quite rigid," says Christian Quijada Martínez, Architecture and Engineering General Manager at Empresas Armas.

He says that the sum of several variables, such as restrictions on skilled labor, rising costs and input price volatility, among others, led to the evaluation of the model in terms of design.

"To further speed the construction process we come to these models of more slender towers with a structure similar to what could be an office building, and in addition, we decided to apply seismic protection," he explains.

Although it was initially planned to include seismic protection systems in the project, there were doubts on which might be the most suitable method.

"We formed a multidisciplinary team, carried out previous assessments and reached to the conclusion that the best alternative in terms of cost and time, was the base isolation of the structure, excluding other solutions, such as tuned mass dampers, viscous dampers and viscous wall dampers," adds Christian Quijada.

### SEISMIC BASE ISOLATION

The seismic isolation concept is to incorporate a highly flexible system in the horizontal direction, allowing the oscillation to be detached from the structure of the ground motion. According to Rodrigo Retamales, civil engineer at the University of Chile and a specialist in seismic protection at RBA, the isolation system functions as a "mirror" that reflects the energy of the earthquake preventing it from entering the structure, making its seismic response considerably lower. "The construction is practically free from distortion between floors and accelerations observed in its structure are extremely low, with reductions that can reach around 70-80%", he explains.

To the expert, this is a simple concept that has been used in engineering applications for about 30 years, mainly in the United States and Japan, where the first isolated buildings date back to the early 80's, extending their use mainly to hospitals and government buildings.

Rodrigo Retamales adds that in the case of Chile, the first building with seismic isolation system was the control room of Los Bronces mine, in the late 80's. Then the building for social housing in Comunidad Andalucía would be added (raised in 1992), the Marga-Marga (1997) bridge and the new La Reina Military Hospital in 2001.

Such precedent became important for the multidisciplinary team, as for work in Ñuñoa Capital it would be helpful to have that information; however, a similar project to this was not found neither in the Chilean market nor in South America. "In the United States, there was some experience in regards to isolation but at low altitude, while in other seismic countries like Japan this system began to be implemented, especially after the Kobe earthquake of 1995. Even so, there are no more than 40 constructions of this type; Ñuñoa Capital would be the first with residential character of this height in America, with baseline isolation", adds Christian Quijada, from Empresas Armas.



Gentileza Dynamic Isolation System

24 natural rubber isolators (16 lead core) will be used for the base isolation system. In the image, an example of one of those devices. Courtesy of RBA and DIS.

#### BASE PLATE AND DEVICES

Ñuñoa Capital is a project of two 28 - story independent towers connected at ground level by four undergrounds, each with an approximate area of 1,000 m<sup>2</sup>, with a height of 2.70 mt. between floors in the undergrounds and 2.55 mt in the floors. There will be undergrounds of 64 mt long and 41 mt wide around the isolated plate, plus a few 4-story blocks on ground level for offices.

In this space, there will be a large concrete slab (basal plate) of approximately 2 mt. thick, 41 mt. long and 32 mt. wide, under which the isolators will be installed. "A very thick slab is placed over these devices to make them work as a whole, avoiding tensile forces among them. This factor (traction in the isolators) is a problem when isolating tall buildings, and we wanted to avoid it at all costs", explains Mario Lafontaine, New Technologies manager in René Lagos Engineers.

In turn, isolated foundations will be installed below each device. "Each one has its own foundation or, in some cases, two of them share the same foundation, with dimensions that will depend on the load (axial and shear) transmitted by each isolator. Additionally, foundation beams were used rigidly enough to avoid twists on the concrete brake shoe, which could affect the isolator performance during a severe earthquake due to high eccentricity with which axial load decreases", details the expert.

Regarding space, the devices will be placed on the ends of the walls and columns to avoid unnecessary transfer of forces. "Following this concept, a relatively uniform distribution is obtained with a distance between the elements that ranges from 6 to 9 mt. This distribution was possible due to the structural design of the building, despite being for residential use; its structure is closer to that of an office building", explains Lafontaine.

## DATA SHEET

### ÑUÑO A CAPITAL BUILDING

**Location:**

Irarrázaval Avenue 1989 Ñuñoa

**Client:**

Real Estate Capital SPA Armas, Ñuñoa.

**Architect:**

Architects and Engineers SA, Armas

**Builder:**

Constructora Armas. Ltda

**Structural Engineering:**

Rene Lagos. Engineers

**Seismic Protection:**

Rene Lagos Engineers and Ruben Borosheck & Associates Ltda.

**Built Surface:**

Approximate 43,000 m<sup>2</sup>.

**Year built:**

Under construction (2013-2015)

The project will feature 24 natural rubber isolators manufactured by US company Dynamic Isolation Systems (DIS), An internationally renowned firm for its achievements in relation to seismic isolation in the world. The devices are made of flexible rubber, with strain capacity over 600%. Their performance, according to the manufacturers, is not affected in the long term. Out of 24 devices, 16 are lead core (LRB), while the remaining 8 are not (RB). Due to the dimensions of these elements, the logistics issue becomes ponderous. "We must be very well coordinated with the construction team. The stage of excavation and foundation should be set when they arrive, because they are not elements that can be installed afterwards", explains Christian Quijada.

While devices must be tested prior to installation, this process will not be carried out in Chile since there are not suitable laboratories of performing this kind of testing. That is why it is assessed to carry them out in Taipei (Taiwan) or in San Diego (United States).

#### ISOLATION

Experts say that a building like Ñuñoa Capital, without isolation, could have a roof- level deformation of the order of 1 in relation to the base, which would result in damage to partitions, facades and walls, among others. Furthermore, this flexibility in the building would mean amplification of acceleration in height with the consequent damage to everything inside (furnishings, vertical transportation system and equipment), while isolated, it will perform nearly like a rigid body, markedly decreasing the deformations between floors and therefore the

probability of damage to structural elements.

"The current regulation forced us to design the building with a larger force than the isolator actually transmits to the superstructure. This was an indication that the current legislation on isolation did not take into account such tall isolated buildings. In the public consultation version, this

aspect has been corrected, following the global trend", says Mario Lafontaine adding that isolators also help in relation to comfort, something very relevant in the case of a housing complex as Ñuñoa Capital will be. "In the past earthquake, many buildings did not suffered major damages, but had problems in terms of locked doors, broken elevators, false ceilings collapsing; fallen LCD and damaged wall partitions. In an isolated building, it is possible to reduce the probability of nonstructural damage, providing, by the way, more comfort for people by reducing the perception of an earthquake", says the expert.

## STUDIES AND SOIL

In order to develop this type of project, one important aspect is to study the soil on which the project will be implemented, because this aspect directly influences on the height of the building. In the case of Ñuñoa Capital, located in the homonymous commune in an intermediate seismic zone, soil is type B (very dense or very firm), according to the

Supreme Decree No. 61 of 2011 classification. As for the studies made for this project, there was one developed on seismic risk by RBA, which although it was not meant for all isolated structures, it had to be carried out because of its importance.

"This study seeks to quantify all possible seismic sources and know with more accuracy what the seismic demand for the building is", explained Lafontaine. "The Chilean regulation features a map of the country where the different seismic zones are identified in a very general way, which together with a study of soil mechanics estimated the demand on the structure. That would be enough for a traditional project, but for this particular project, things that were not taken into account before were analyzed, such as the possibility of an earthquake originated in the San Ramon Fault", he adds.

The fault referred by the Ministry of Housing and Urban Development (Minvu) was a premise that had not been considered which laid bare a potential threat of earthquake in eastern Santiago.

"The seismic isolation codes indicates that if there is a building within 10 km from a potential active fault, a specific design spectrum has to be developed for the building site", points out Rodrigo Retamales indicating that, in this case, Ñuñoa Capital would be around 8 km. from the fault.

"These facts forced us to make a probabilistic seismic hazard study aimed at determining the demands to be considered for the seismic design of this building, taking into account subduction earthquakes, intraplate earthquakes and shallow earthquakes as it might occur in San Ramon fault", explains the expert.

This being one of the first studies of its kind, it took about a year for its development by the research team and, according to those interviewed, it is still being reviewed.

The Ñuñoa Capital project is 100% designed. "We hope that this month the process of excavation and piling begins. Four underground should be ready by the end of this year. The devices should

be in Chile by December (seals foundation)", confirms Quijada. According to the principal, the construction process of the whole place will last until the end of 2015.

Regarding the isolation system itself, for the experts this is an idea that provides great benefits and they hope it can become massively known, as the concept becomes part of the "DNA" of architects, engineers, construction companies and people related to the sector. In any case, they are optimistic because, in general, the issue of seismic isolation has succeeded in doing so, especially after the earthquake of February 2010.

[www.empresasarmas.cl](http://www.empresasarmas.cl)  
[www.renelagos.com](http://www.renelagos.com)  
[www.rbasoc.cl](http://www.rbasoc.cl)  
[www.dis-inc.com](http://www.dis-inc.com)



Regarding the isolation system itself, for the experts this is an idea that provides great benefits and they hope it can become massively known, as the concept becomes part of the "DNA" of architects, engineers, and construction companies.



- Case 3 -

## A NEW FACE

Innovation in  
social housing

Innovation, design, seismic safety and comfort are the axes, which are structuring the development of new social housing projects. Use of space, materials optimization and application of seismic protection mark the construction of these new housing developments. The aim is to improve social housing, as much as possible, without exceeding the budget for it. Energy efficiency also takes center stage, as well as environmental planning, connectivity, creation of opportunities for recreation and recovery of neighborhoods. They are the first steps.



Proyecto Quinta Gaete, Constitución. Constructora Boetsch.



Not everything is innovation and technology. Community life today represents a fundamental value for the creation of these works.

The earthquake of February 27, 2010 represented an important opportunity for the development of housing complexes, especially those of medium height, considering the use of seismic isolation technologies.

The reconstruction, also allowed innovating in designing, improving concepts that were not so developed. Not everything is innovation and technology. Community life today represents a fundamental value for the creation of these works. Planning and creating meeting points, typical of the neighborhood community and recreational areas encouraging the full development of activities is key. It is as important as connectivity, especially with the workplace.

The improvement of social housing and neighborhoods are tasks implemented little by little. Plans are designed to revitalize neighborhoods and for the improvement of new and existing housing. However, much remains to be done. International

experiences lead the way in this area, especially in France. The aim is to give a new face to this type of housing.

#### DESIGN AND SOLUTIONS

To start analyzing the current scenario of social housing, it is necessary to clarify that it is not only a challenge in terms of its design and construction, but at the same time, there is a political, economic and especially social dimension, that seeks to be translated into a physical built fact. At this level, one of the first warnings issued by Carlos Coronado, architect and teacher at School of Architecture, Construction and Design at the University of Bio Bio, regarding the architectural design of this type of project, is that "the resources families count on to have access to social housing are always limited. They should be used in an effective way. As architects, we try to collect these claims and address them from the design itself by eliminating

the need for complex further improvements. We seek to improve the quality of life of people living in social housing and the neighborhood where they will be built. For this sake, the definition of strategies is associated with the efficient functioning of the house regarding the use of the resources that families have and need in their daily lives "(source: Sustenta BIT Magazine No 17).

Regarding the structure itself, although designs vary depending on the space optimization and each project's needs, what is sought - experts agree - is an economic solution or one that suits the budgets, but that delivers high levels of comfort. Thus, the objective focuses on composing a simple structure that provides the possibility to maintain a continuous thermal envelope depending on the position of each of the units within the set. "Eliminating, mostly, thermal bridges and exposing the least amount of surface outward in order to reduce energy losses and, in turn, allow on the inside the expansion of useful surface for the

future of each family unit. We focus on maintaining optimal sunlight that allows making the best use of sunlight during the day, but taking care that during the summer months no internal overheating occurs", says Coronado about one of his projects that won the contest: "A house for new challenges".

To get to these solutions, the design should be integrated from its conception. In addition, as Vera highlights, "it is in the design stage where you can take action and decisions, view and evaluate not only the technical side, but also costs."

Finally, the acoustic isolation is also important for comfort and livability. They way of distributing spaces in half height or semi-detached houses, for example, in a way that the bedroom of an apartment does not share the living room wall with another. Leaving the stairs of duplex detached from the dividing wall with the adjacent housing department, so that the vibration on the stairs do not be transformed into noise for the neighbors,

“The number of social housing incorporating seismic isolation technology increases, which although involves an initial cost that is included in the value of the building, has the advantage that tends to minimize the effects of an earthquake, with the consequent reduction in repair costs. ”



etc., are some of the situations that special attention should be paid to.

“There is a number of problems associated with social housing that are not well resolved. Consequently, rather than seeking to implement state-of-the-art technology, it is much cheaper and effective to solve what is going wrong at the moment through good design”, concludes Sergio Vera. Architecture, therefore, should aim at promoting good communal living and at the use of common spaces in social housing, improving the house interiors, the distribution of departments, the facade, etc.

In this regards, the proposal incorporates the concept of habitability and considers single units of 62 m<sup>2</sup> and duplex of 63 m<sup>2</sup>, both in compliance with the Supreme Decree No. 49, which regulates the minimum characteristics of the houses of the Housing Solidarity Fund, to improve standards and size of the housing projects.

A situation that, according to the text of the ICH and the PUC, did not improve with its predecessor, the DS No. 174, which featured lower housing standard and size. The new design, for both simple housing and duplex house seeks to incorporate in their designs some house conditions, such as the possibility of having a garden on the first floor units or having more privacy, resulting from a separation between public and private spaces, in the case of the duplex houses.

The proposed building features a seismic isolation system that has been adapted to the budget for social housing through a mixed system incorporating elastomeric isolators, frictional sliders and cranks in the building base, focusing on the isolators, the most expensive elements among the strategic points of the structure.

#### SEISMIC ISOLATION

Another example in the application of seismic isolation systems is the village 26 of September, in the municipality of Santa Cruz in Libertador Bernardo O'Higgins Region. In this property, the earthquake of 2010 resulted in two dead people and destroyed buildings blocks. Three years after the event, the Minvu began rebuilding the housing project in the same ground, with the advice of DICTUC through the project “Serviu Technical Assistance Program, O'Higgins Region”, which featured stages of design and construction supervision of such housing.

The project incorporated the application of a seismic isolation system combining friction elastomeric isolators with sliders under a structure of reinforced concrete frames. A technology designed by the engineering company, derived from DICTUC SIRVE SA, as part of this counseling work that also included Videla y Asociados SA, as

specialty designer, coordinator and adviser of the bidding process and technical inspection. “In this new proposal, the architecture and engineering that requires a social housing is incorporated, so the project was a double challenge,” says Nelson Mela, Project Engineer of Seismic Protection Engineering Area SA USED. It is worth mentioning that Libertador Bernardo O'Higgins region was strongly damaged by the earthquake of 27 F. In the city of Rancagua, the Housing Complex the Parks (184 apartments), Villa Cordillera (1,816 apartments) and in Santa Cruz, the Housing Complex 26 of September (339 apartments) were seriously damaged, resulting in their necessary demolition.

The project involves the construction of eight blocks with a total of 192 social housing, called Villa Nueva Paniahue housing complex located in the municipality of Santa Cruz, in Paniahue, land owned by Serviu at the corners of the streets Arthur Prat and Gobernador Nibaldo Mujica. Empresa

Constructora 3L S.A is in charge of the works. The surface of each department will be of roughly 58 m2 "More and more buildings incorporate seismic isolation technology, which although involves an initial cost which is included in the value of construction, it has the advantage that tends to minimize the effects of an earthquake, with the consequent reduction in repair costs. That is the way MINVU is managing the updating of the UMR 2745 standard, which regulates the design of buildings with this technology in order to meet the advances that have been achieved in this area at a national and international level", says the former Minister of Housing and Urban Development, Mr. Rodrigo Perez. The project involves the full implementation of each of the stages involved, such as preliminary work, structural work, finishing and installing, setting up the sporting court, and considers remodeling the old dressing rooms associated with this courts that will be transformed into a community center, along with that paving

areas and developing electric urbanization. The design of the seismic isolation project includes the installation of a system shaped by elastomeric isolators and frictional sliders in a single horizontal plane located on the foundations of the building. The system was developed specially for this project, considering the specific conditions that a social housing building can offer. Among these, stand out the low axial loads on devices and minimal thinness of the structure in height, which would result in a lower possibility of lifting the sliders. According to experts, the incorporation of the isolation system would reduce accelerations and forces acting on the building in about 80%, managing to improve comfort and safety of people, reaching a new standard on the construction of social housing in Chile.

In the case of the houses of Santa Cruz, "it is a mixed system of seven elastomeric seismic isolators of 75 cm in diameter, together with 21

frictional sliders (per block of buildings)". Nelson Mela from SIRVE SA points out that "In this project, due to the special conditions of social housing and seismic isolation, individual monitoring and specific controls are required in order to achieve an efficient execution of projected designs, the proposed costs and stipulated deadlines.

To achieve these objectives, we have a professional and technical team ready", said Rene Guerra, general manager of Videla y Asociados SA.

In Chile, in 2007, via Supreme Decree (DS No. 14), Minvu started the Recovery Neighborhoods Program, which seeks to "implement an intervention strategy at a neighborhood level in order to contribute to the improvement and revitalization of public spaces. It will also improve the social network of neighborhoods facing problems of urban decay, such as connectivity and integration with the rest of the city, paving

deficit, absence or poor quality of community facilities, as well as landscaping, lighting, and other works. Recovering the trust and the participation of residents in the process of improving their immediate urban environment. "

This year, the number of neighborhoods adds up to 168.



Proyecto Quinta Gaete, Constitución. Constructora Boetsch.

To improve housing, Minvu has established a series of subsidies integrated in the Protection Program Family Heritage (PPPF) seeking to stop the deterioration and improve housing for vulnerable families and emerging sectors.

This benefit aims at vulnerable families that belong to emerging groups who own or assignee social housing built by the state or by the private sector with or without housing subsidies, located in urban or rural areas. Along with the mentioned above, this year an amendment to PPPF (DS 255) was implemented by adding the chapter Technological Innovation Projects, which focuses on providing subsidies to develop projects that contribute to energy saving and promote environmental sustainability, like the reuse of gray water and incorporating photovoltaic panels, among others. For sustainable construction works, the amounts considered for grants range between USD 1800 and USD 2300.



- Case 4 -

# ROOFS FOR LIVING

Innovation in real estate product

An alternative that seeks to gain space and provide new services to buildings, in addition to providing greater security, privacy and better views are the functional, livable or eco-recreational ceilings that would help to avoid the generation of heat islands, reduce noise emissions that focus on the first levels of buildings and generate added value to real estate.



Le Corbusier made the concept of fifth facade known, namely a utilitarian roof. A concept rescued in cities like New York under the name of "roof garden".



Traditional buildings, without green areas on top absorb solar radiation, which then is sent out as heat. This is how temperature has increased in Santiago at about 4 ° C warmer than the surrounding areas of the city. The building in height factor plus the lack of green areas (less than 9 m2 per inhabitant) generates heat islands and therefore poor quality of life. The image is from European Investment Bank, Luxembourg.

Courtesy of Sika.



**Apoquindo Downtown** incorporates in its design a jogging track with approximately 70 m, a green area and the view this space provides located on the 12th floor of the building.

Courtesy of Ralei.



**Ñuñoa Metroparque** features what the company calls a "green roof", which main novelty is that it will have four barbecue areas and spacious terraces, together with a privileged view to the traditional sector of San Eugenio Park.

Courtesy of Ralei.



The **Smart Life** project introduces the new concept of space optimization, locating a pool and barbecues on the roof, which transforms into a panoramic terrace. The plan is the building be ready for the second half of 2015.

Courtesy of Deisa.



An exclusive resort in Australia, the **Rogne Bad Blumau**, which implements habitable roofs, through which you can travel from the ground to the top of the building.

Courtesy of Sika.

According to the projections from the National Statistics Institute (INE), about six million Chileans live in the city of Santiago. Given this, the value of urban land in the capital has increased, causing architects and real estate companies face the problem of how to include places of recreation and entertainment, without increasing the cost of their projects. Thus, the idea of creating living roofs was born, e.g. roofs that serve to protect not only the construction but fulfill other functions such as recreation. Ralei Real Estate Group has now taken up the challenge and builds two projects that provide "efficient ceilings".

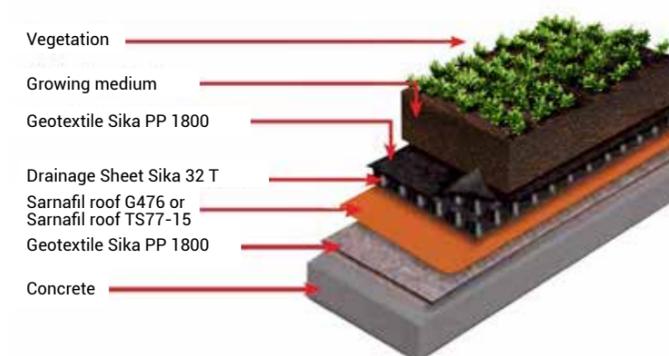
The Apoquindo Downtown and Providencia Metroparque buildings both incorporated in their design different equipment ranging from jogging tracks to barbecues up on the top floor of each building. However, this is not the only real estate company that has added to its objectives to optimize space and gain

comfort. Companies like Paz Corp and Deisa have integrated services in the roof. The first has its Smart Life project, located in Providencia

commune, with pool and barbecue area with views at its peak, and the second with four projects that include various equipment on their roofs and looking to compensate residents for a possible lack of green areas near the building.

This trend has been present in other cities for years. In 1920 the well-known urban planner Le Corbusier made known the concept of fifth facade, namely a utilitarian roof. Concept rescued in cities like New York under the name of "roof garden". In the country, habitable ceilings come to meet the need that led to the high prices of land in the most sought after places in the capital of Chile. Thus, the cost that meant including gardens and infrastructure in the first floor decreased by moving all the equipment to the top floor. A wasted space that now becomes a viewpoint of the city also brings other benefits to the ecosystem and quality of urban life. Following a photographic selection of future projects that include concept and eco-recreational ceilings that exist in the world.

[www.ralei.cl](http://www.ralei.cl)  
[www.paz.cl](http://www.paz.cl)  
[chl.sika.com](http://chl.sika.com)  
[www.deisa.cl](http://www.deisa.cl)





- Case 5 -

# LISTENING TO INNOVATE

Management system  
for improving  
property after-sales

According to a survey by Stitchkin real estate, despite the constant concern of real estate companies about after-sales services, 20% of customers still says that everything that happens after the sale, like warranty application and complaints handling, are issues the industry must improve



The key differentiator is the new owner loyalty program, offering a better experience with the brand and the purchase of their property.



Nowadays, it is not enough to ensure a good quality construction. The efficiency of the service and owner prospectus through the entire purchase process is becoming more relevant in the real estate industry. From the first contact of the interested person with whom owns the project, through the contributions to the registration of the deed, the time of delivery and even transferring that attention to after-sales. The key differentiator is the new owner loyalty by offering a better experience with the brand and the purchase of his property.

In this regard, Francisco Suric, commercial manager at Stitchkin Real Estate Management, says that when a customer enters the buying process of a green housing, for example, he goes through a set of stages that transform the experience into a tiresome and sometimes frustrating process due to the various steps to be followed. To this, the executive adds that considering this previous process, "at the time of delivering the property, which is possibly already overdue, the buyer is very angry and tired. Therefore, by the time of the after-sales the customer will be disappointed with

the purchase; that is why the real estate industry should work towards addressing customers at all stages of the process, in order to maintain their expectation most in alignment with reality. This way a quieter process of buying and after-sales could be achieved".

Then, with the goal of improving the after-sales and having the homeowner satisfied with the delivery of his new home, different strategies are developing like the one implemented by PLANOK together with its real estate and construction clients. Thus, in 2006, After-sale Real Estate System "PVI System" was created, designed to meet the different stages of this process: reception, diagnosis, implementation and compliance of an application. From the time of delivery the property, this system registers and manages the implementation of the Act of Delivery notes. Then receiving, scheduling and executing the work associated with each owner requests, automatically generates statistics and reports that allow gathering knowledge for developers on future projects.

This after-sales solution has a "web access owner's module" through which customers are served online, learning about the progress of their applications, reducing their anxiety, and secondly, eliminating care costs for the real estate company. In this module the documentation of the property, such as writing, drawings and maintenance manual is also available for each owner.

#### BENCHMARK

The interesting thing, for users, about this initiative is that the web platform generates an after-sales benchmark based on statistics on the PVI system, which compares the results of different parameters that the person wants to measure (failures, care times and repair, satisfaction, etc.) thus determine how a specific real estate company behaves compared to the rest of the industry.

Ignacio Troncoso, general manager at PLANOK, says that this service represents a "joint effort between the company and its clients that make

up the after- service Quality Circle, in which the nomenclature of issues and measures to take is standardized".

With this tool, explains Troncoso, "what we want to achieve is that real estate and construction companies achieve maximum efficiency in the exercise of learning from the best, and to help them go from where they are to where they want to be".

From the applicative and the database that this tool offers, PLANOK conducted a ranking of major after sales failures from 2012 to September 2013, based on a universe of 29,800 homes, 30 real estate companies, with more than 353,000 requirements.

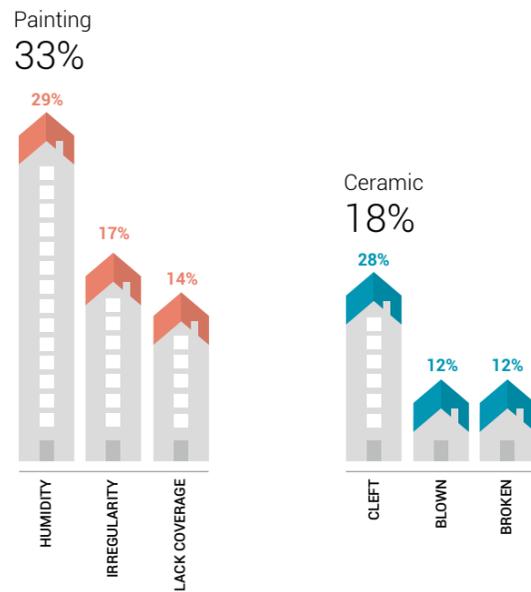
# 2012

## GLOBAL RANKING FAILURE DATE

Range:

Since 01-01-2012  
Until 25-09-2012

Source: PVI Planok



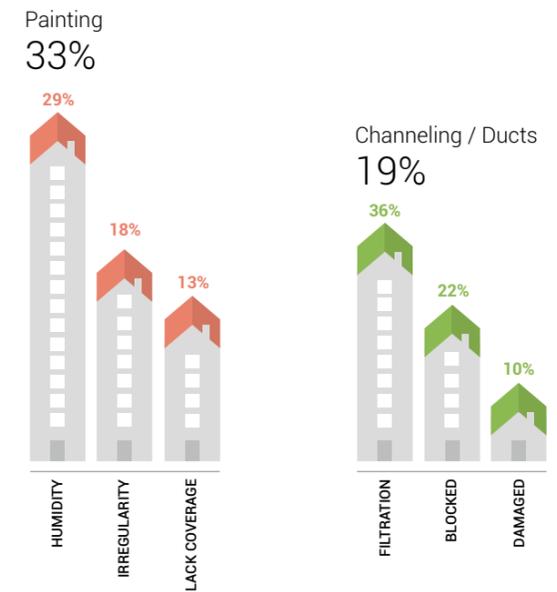
# 2013

## GLOBAL RANKING FAILURE DATE

Range:

Since 01-01-2013  
Until 25-09-2013

Source: PVI Planok



Mural Paper  
17%



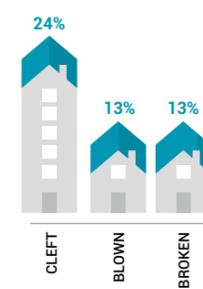
Lock  
17%



Channeling / Ducts  
15%



Ceramic  
17%



Mural Paper  
16%



Lock  
16%



Through this action, it was concluded that both in 2012 and 2013, the highest incidence of requirements presented was in regards to painting with a 33%. It was also noted that channeling went from fourth of incidents in 2012 with 15%, to second this year with 19% of the complaints presented. Following this trend, the damage of pottery found was lower than last year. Misaligned door locks downed 5% compared to last year.

The study represents an in-depth-analysis of the types of problems encountered in the property purchasing process, detailing almost all of the elements used in construction, through reports that can be shared among participants, regarding deadlines and other variables of interest to the industry after-sales managers.

Regarding the main requirement related to painting Claudia Acosta, Construction Processes Assistant Manager at Constructora Manquehue, points out that they are due to cracks, which are a normal phenomenon in a new building, caused by shrinkage of elements made out of cement, such as the meeting of secondary structural elements

with structural elements, or movements caused by earthquakes. "Such situations are not always understood by customers as part of the natural behavior of the product that do not affect in any way the stability of the infrastructure", says Claudia Acosta.

To mitigate or reduce this phenomenon, there are constructive solutions and materials, which have been implemented only in those projects where the product designers allow their use. She adds: "The information we have collected during the use of the system allows us to feedback on the new projects, based on the experience of previous project performances as a way to improve the quality of new products."

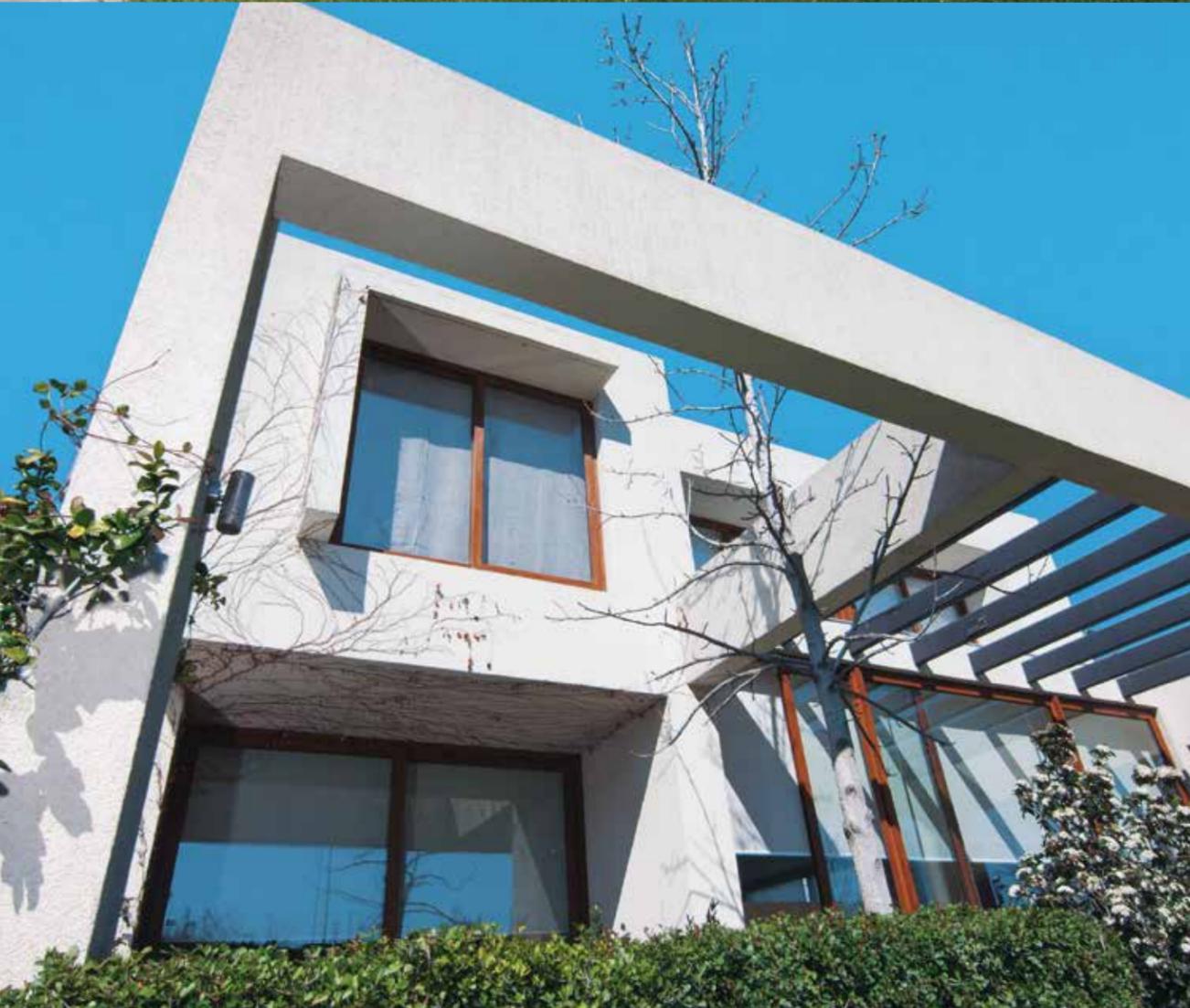
She adds that the benchmark is an initiative still under development, "which results we have not yet managed to quantify. Nevertheless I believe that the information gathered will help us - for example - to achieve greater management regarding requirements associated with specific product failures with our suppliers, review election of some specific building systems that convey higher rates

of complaints and measuring failures regarding the industry, among others".

Priscilla Villagrán, assistant service manager at Empresas Armas, also points out that one of the major failure in the real estate business concerns meeting after- sale and delivery deadlines.

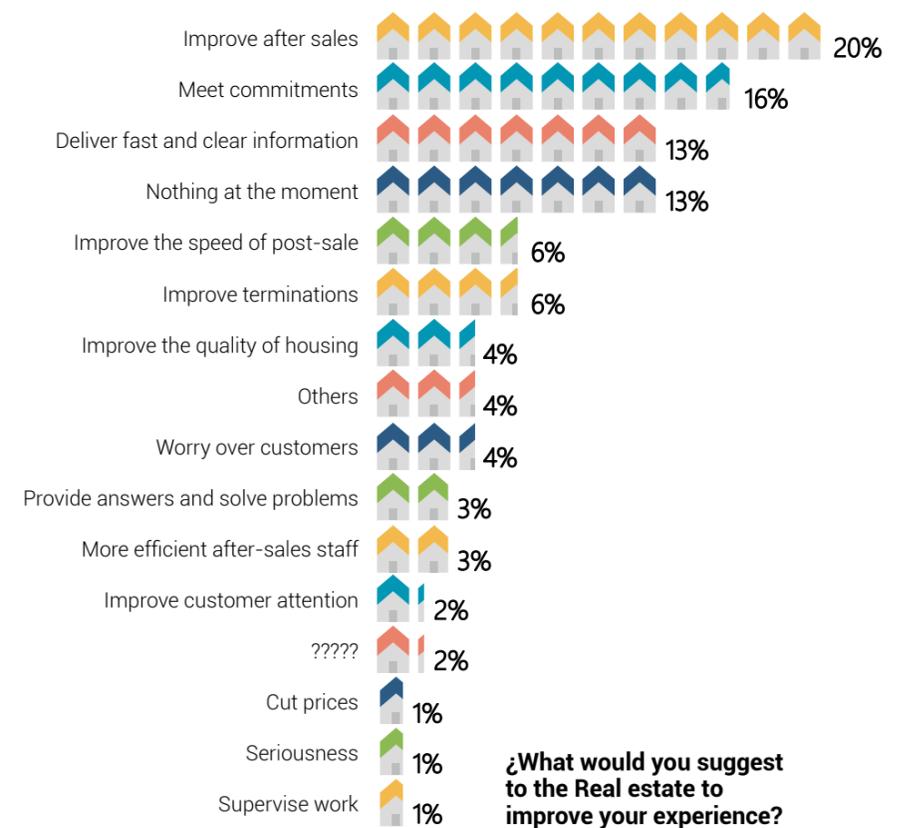
With this system, the industry has the possibility to find solutions to the various flaws in the services delivered to those who invest in new properties. The goal is that, in the near future, after-sales do not represent a problem but an agile and comfortable process for the customer.

[www.planok.com](http://www.planok.com)



The goal is that, in the near future, after-sales do not represent a problem but an agile and comfortable process for the customer.

## Suggestions





- Case 6 -

# INNOVATION AND SUSTAINABILITY

Concern for the environment and energy efficiency is increasing in the construction sector. How to make a project to have these characteristics? According to experts, the key lies on the common sense of who designs and constructs. For this regard, the strategy lies on understanding the spirit of the place where the construction will be set and of the different elements to be used in the work. Knowing to successfully combine these variables is, therefore, the first task to build a sustainable project.

Having solar panels does not mean a more sustainable construction. The key is to evenly combine each of the strategies that will be used in the project.



Today, the care for the environment and energy efficiency has become a relevant issue. "For architects, sustainable concept begins in the way the building is raised, how the sun shines and the wind blows at it, the choice of materials and construction system. All Ideas concerning the start of the process ", says architect Jorge Iglesias, a partner of Iglesias Prats Architectos.

The advancement of technology has also contributed to the development of these topics, particularly in relation to energy efficiency. However, according to experts, is not only about filling a project with technological elements. In other words, it seems the more solar panels the more sustainable the construction. The key is to evenly combine each of the strategies that will be used in the project.

Sustainable building construction should respond to a number of attributes that make it better than others. Speaking of attributes, innovating elements are incorporated, with quality (materiality of the building) as well as the quality of the spaces, and how they affect people and the environment.

The technology supply many things, but do not beat nature. Therefore, common sense leads to observe nature, beyond technological advances.

Experts agree that this is not a new topic. Sustainability has always been important, at least in architecture. "There is progress and technologies that allow us to make better works in that regard, but the core values of a work, including respect for the landscape, the climate and suitable materials are concepts related to sustainability that can be checked in any work in the history of architecture", says Jorge Iglesias.

#### DEFINITION

Overall, the most basic definition of sustainable is related to a process that can stand on its own, without external help, or reduction of existing resources. The focus should be - according to the Agenda 21 for Sustainable Construction in Developing Countries - on the holistic process intended to restore and maintain harmony between the natural and built environments, and create

settlements that strengthen human dignity and promote economic equity. This implies, on the one hand, that sustainable construction is a process in which all aspects are connected in such a way that one factor affects the others, which determines that complex interactions occur. Furthermore, this definition assumes that sustainable construction not only addresses environmental sustainability. Social and economic sustainability are also fundamental. In other words, now you cannot think of sustainable construction projects if the social and economic aspects of sustainability are not considered.

#### ELEMENTS

One of the myths about sustainable construction is to assume that the more technology is incorporated, the more solvent the project will be.

Factors should be analyzed like where is being built, why, and for whom. See the various factors: climate, orientation, soil quality, materials available, use in the future, etc. This logic invites to be aware of the material and financial resources available at the time

to build the construction. How to properly conjugate taking into account technical resources, work force or machined elements. It should be considered that the objective of designing a sustainable building is not to reduce the environmental impact and reduce operating costs, but the welfare of the occupants. This last aim should be attained in line with reducing environmental impact and promoting community development and economic benefit of property developers. According to American Society of Heating, Refrigerating, and Air- Conditioning Engineers (ASHRAE), a building of high performance, as also called green buildings, is one which during its life cycle:

- Minimizes the consumption of natural resources.
- Minimizes emissions that negatively affect the atmosphere (eg. Particulate matter, greenhouse gases, etc.).
- Minimizes solid and liquid waste.
- Minimizes the negative impacts on the environment.



Edificio Hotel Tierra Patagonia. Constructora Salta Corp.



Edificio Transoceánica. Constructora Sigro.

- Improves the quality of the indoor environment (livability).

There is a not a key element. Architects think, build and operate the building or project as sustainable from day one (from conceptualization stage of the project), thinking of all its life cycle. A decision that must be born out of the strong conviction of the customer. This conviction must permeate not only the different specialists involved in the design, but also to the construction company, and who will operate the building.

### CERTIFICATIONS

One of the main reasons has to do with the rapid emergence of "green certificates". Ratings granting certain score to buildings, evaluating with a series of indicators, how sustainable the buildings are. In Chile, they have come strong, especially the US LEED certification (Leadership in Energy & Environmental Design), that has already certified

nearly 30 projects in the country, and its database contains over 170 registered projects. Moreover, the interest is growing.

It is important to consider that these certifications are related to systems design and environmental assessment of buildings. The main role of these certifications is to establish methodologies based on studies and international standards, which allow ranking the sustainability of buildings and submit a certification, which is visible for users who will live, visit or work in these buildings. This makes sustainability more tangible to the community.

It is well known by international studies, which certified buildings are sold / leased faster, and the sale / rent price is higher than for non-certified buildings. This is, obviously, an incentive for real estate developers to certify their projects. In other cases, certification is taken advantage of, from the marketing point of view, mainly by real estate companies, shopping centers and financial institutions presenting their projects as

sustainable. Marketing itself is not a problem. The problem arises when you decide to apply for certification and carry out the project based on this certification for marketing purposes, and not by a real motivation to develop a sustainable project. In these cases, the project can be converted into score points for a certain category, at the expense of designing thinking of the overall sustainability.



Compañía  
Norteamericana  
LEED® (Leadership in  
Energy & Environmental  
Design).



# TECHNOLOGY AND TRADITION

## Refugia Hotel, Chiloé

Located on the Big Island of Chiloe, this work rescues some constructive traditions that blend with architectural and design innovations. Using the climatic conditions for the comfort of guests, the hotel presents itself as a rest stop at the end of the world.

The construction work of Mobil Architects is a reinforced concrete structure and metallic carpentry, with timber cladding coatings. It is located in an area of 6 hectares and was built in 2011; it was inaugurated on September 2013.

### BIOCLIMATIC PARAMETRIC STUDY AND DESIGN

The issue of parametric technology should cover not only energy efficiency but also comfort of users and the integration of the same requirements of a hotel. This work was conducted by Mobil Architects with a team including Lyon Bosch and passive

design consultant and managing partner at MINUS SA, Esteban Undurraga. The latter explains that "the parametric design criteria managed to sort the morphology of the project, the envelope and its geometry based on other objectives that actually had to do with what was the design itself, what was reported to architects so that they could design and build".

Parametric design technology was used to control the geometry of the envelope and its components, to protect the interior and take advantage of the resources offered by the climate: downspout and gutter for conducting rain water; building facades and outgoings to protect the interior and keep ventilated enclosures. Moreover, the orientation and configuration of openings and windows to take advantage of natural light and control heat gains, all under strict criteria of morphology and constructability. An example to understand the level of detail obtained with this methodology is the work





The logic of design builds guarded interiors, but at the same time takes part in extreme weather conditions, allowing you to enjoy the sights and scenery.

done in the larch tiles of the roof where, due to rainy weather, they should not lose the 30 ° inclination, because if they do, that could provoke water leakage into the building envelope. Then through parametric study, it was possible to consolidate criteria in areas such as angles and depths. Another example highlighted from Mobil Architects is the design series of skylights of 1.5 m high and 1.5 m long, in the overhanging second floor that brings light and warmth to the rooms from the North into the hallway, the bathroom and the same room. It has a particular position to allow the sunlight in, only during the hours and months where it is necessary to obtain heat energy.

Due to the place and its conditions, the most important technical requirement of the hotel was regarding the thermal side. That is why in order to reduce energy consumption in these areas; it was thought to capture the maximum amount of sunlight. For this regard, some softwares were used (such as EcoTech) that helped performing

preliminary calculations on bioclimatic behavior, which consisted on building three-dimensional models to assess certain construction parameters, materials and shapes, placing them in a physical point in the real geographical space. Then, a climate database is added verifying solar angles, radiation angles and position at certain times of day.

#### **WINDOWS AND BUILDING ENVELOPE**

With the studies, the team faced a problem: the light came from the North, while the best views were to the South. To find a balance, architects decided to perch the building on the hilltop where the wind also became another factor to be considered. Therefore, it was proposed a building envelope system that reduced heat loss and thus optimizes the use of heating energy resources.

This was achieved by adding texture and depth to the building envelope, reducing the wind speed. "The

envelope is made of wood, and when working with this material, the main isolation occurs inside the structure and is accompanied by a lower isolation outside the structure. Literally cutting thermal bridges, after a couple of layers for the protection from the rain, water, moisture and stamped (stuck) in the case of larch shingles that are against the wall", explains Undurraga.

For the exterior of the hotel a ventilated façade was used, forming a cavity between the wall and the ring larch that reduced pressure allowing, in conjunction with the isolation system, that water condensation occurs outside the structure and within this ventilated space. Therefore the drops drain off the structure, down and not inward. Thus, in addition, the thermal energy is contained by reducing temperature oscillations and the structure

is protected from moisture, ensuring better durability of the building and improving its indoor air quality.

Regarding the issue of sunlight, the first thing we did was to "capture it" through windows located on the north side, letting the sun come in deep and warm the hotel passively, while we tried to slow down the speed of the loss through the windows, for which crystals Low E were used. As for the rooms, the architects divided the skylights into three parts, forming "tunnels" leading light to different areas.

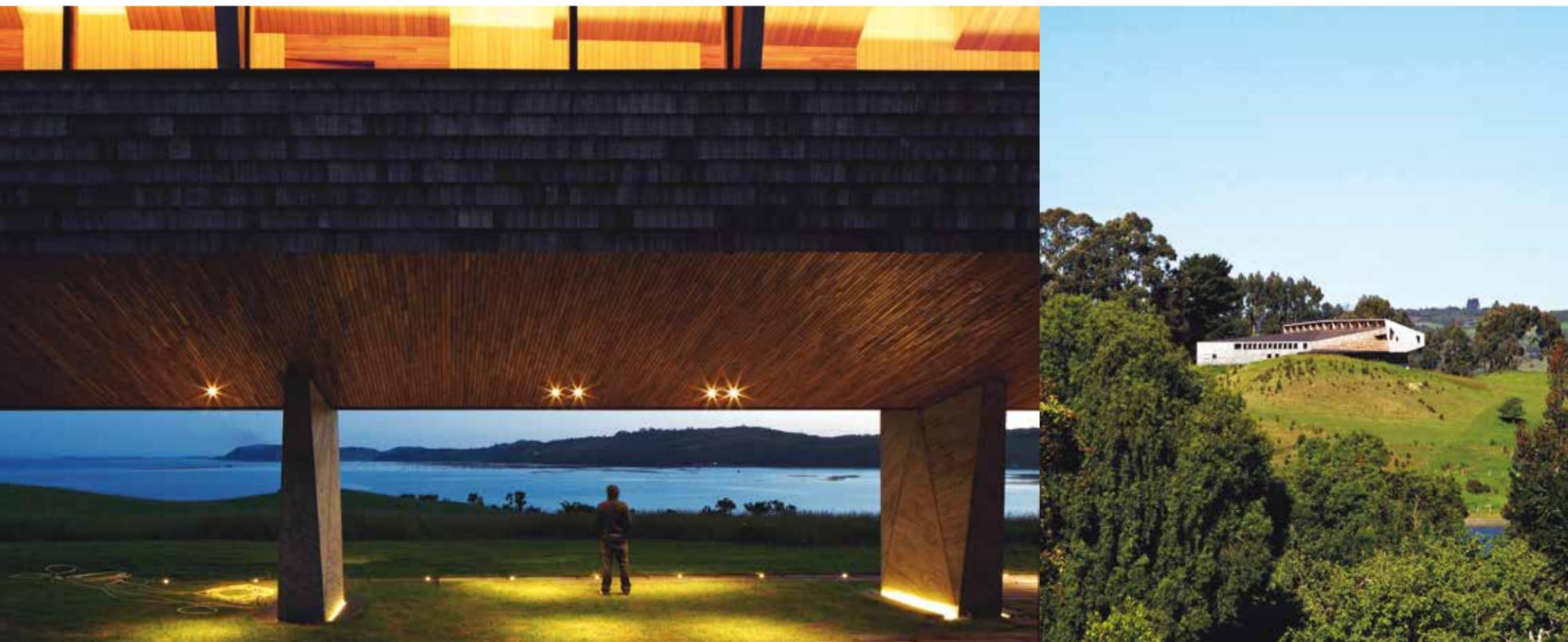
#### INTERIOR DESIGN

Among the materials used in the interior of the hotel, there were woods selected like ulmo and mañío,

which were taken to a furniture factory in Puerto Montt for the drying process. "We use the ulmo because of its red color and hardness, and mañío because being a white wood allowed a better job with the overhead light and skylights," said Browne. The architect added that in the interior design there is a high level of completions considering the complex geometry of the work.

So Refugia Hotel is a project that reconciles design with comfort and digital technology with the craft ability, complemented with the environment, its landscapes and traditions. A resting place located in the end of the world.

A project that reconciles design with comfort and digital technology with the craft ability. It is complemented with the environment, its landscapes and traditions. A resting place located in the end of the world.



#### DATA SHEET:

**Location:**

Rilan Peninsula, Chiloé, Los Lagos

**Region Client:**

Refugia Hotel.

**Architects:**

Mobil Architects: Sebastian Morande Patrick Browne, and Antonio Liphay Cristian Palma (associate architect).

**Builder:**

Refugia Hotel.

**Structural analysis:**

VMB Structural Engineering.

**Parametric Design:**

Lyon Bosch

**Builted surface:**

1,250 m<sup>2</sup>

**Year built:**

2010-2012



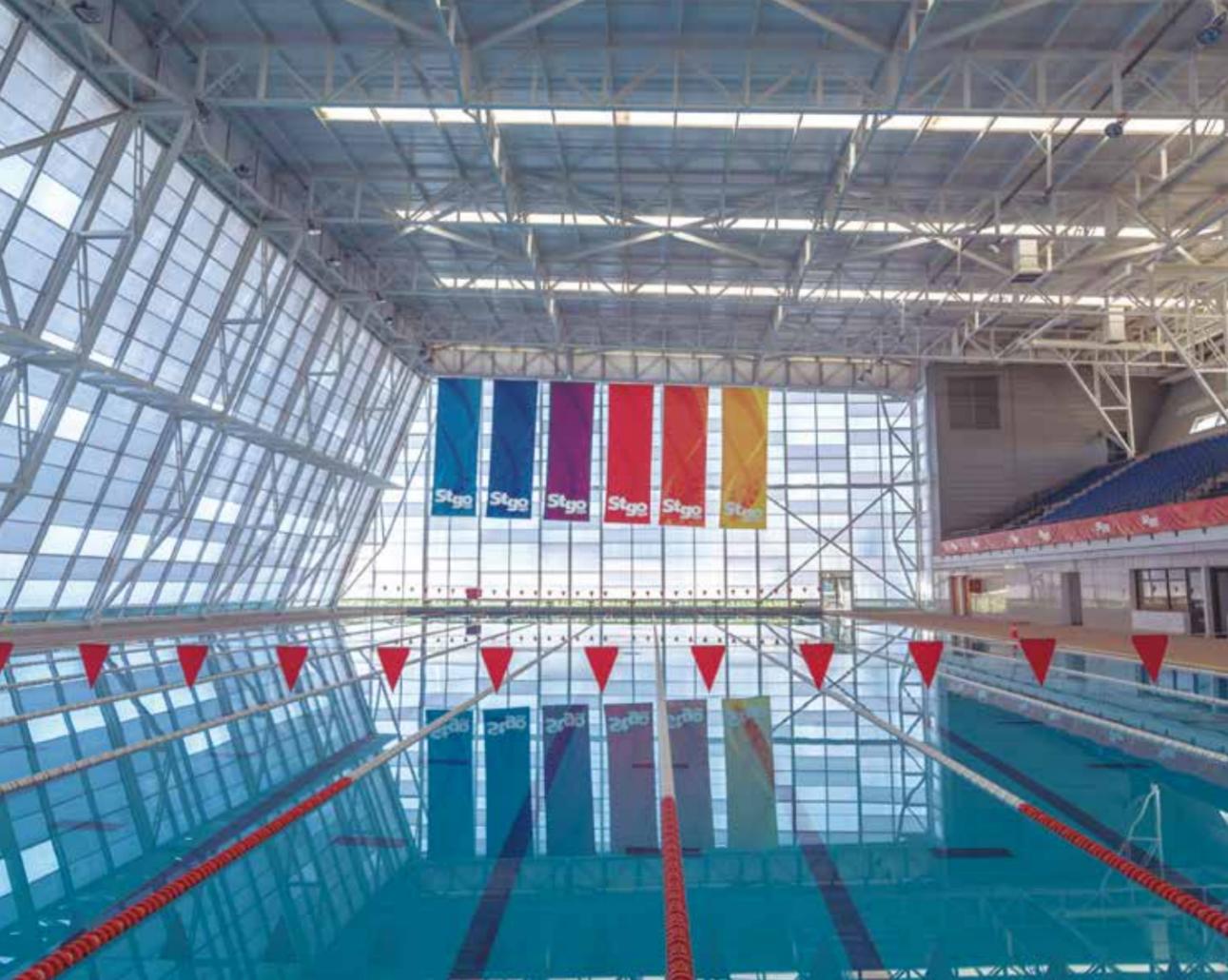
- Case 7 -

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# PLANNING WORK

A new look

The country's economic growth, which resulted in the good moment the construction industry began to experience a few years ago. The emergence of new real estate, energy and mining projects and the consequent lack of specialized human capital, forced the industry to put its attention on a range of strategies to meet deadlines, without increasing their costs. All of it added to the image of the construction sector being somewhat or very unproductive. So the obvious question is how to be more productive? The search for an answer began to be recurrent and - sometimes - distressing in the various constructions of the country.



It is widely believed that good planning reduces uncertainty on a project and facilitates the development of each of its stages. The key is to generate the commitment to meet the planning, and the skills that each of the constituents possess to lead it and carry it out.

What is sought is to control the uncertainty in the works; this is achieved by implementing concrete actions at different levels of planning.

Innovation management, introducing technology, industrialization, incentives to training and the labor of workers, among others. So far, many solutions have been put forward and none has been positioned over the other. Instead, each one complements the other.

Planning, early coordination of each stage of the work, emerges as agglutinative solution of all strategies named above. Because it is widely believed that good planning reduces uncertainty in a project and facilitates the development of each of its stages. The key is to generate the commitment to fulfill that planning, and capabilities that each of the constituent possesses to lead it and carry it out.

Ultimately, this is anything but establishing the way to add value to the work, reducing losses or those activities that do not add value. The goal is to optimize the various processes of the project based on the team's commitment with their ability to anticipate situations that affect the normal development of activities and, thus, give solutions. At first glance, it does not look like an easy task, but planning appears

to be another affordable way to achieve productivity projects. Of course, first, you must be willing to change. It is another look, a new philosophy.

#### PLANNING WORK: A NEW LOOK

One of the possible ways is the methodology of planning, monitoring and control of projects, called Last Planner® which incorporates the principles of Lean Construction philosophy in the usual practices of construction, by enabling compliance with deadlines and costs, as well as more commitment in the teams.

This philosophy is aimed at production management in construction, which main goal is to eliminate tasks that do not add value or generate loss. In general, Lean Construction presents a number of fundamental principles that relate to satisfying customer's requirements and reducing activities that do not aim at the same target.

The other principles are: to reduce the time cycle, reduce variability, increase the flexibility of the company (LEED® ISO standards) and the transparency of processes. Concentrate control on the whole process as well as its continuous improvement, and benchmarking (systematic and continuous process to benchmark products, services and work processes in organizations).

Proposed by Lauri Koskela in 1992, the model discusses the principles and applications of JIT (just in time) and TQM (total quality control) in the construction industry, trying to identify the foundations which he defines "the new philosophy of production". Lean Construction focuses efforts on stability of workflow and thanks to that, several tools aimed at reducing losses through the productive process have been developed. Among these appears Last Planner®, a methodology that introduces a new way of seeing how projects are planned and controlled.

#### METHODOLOGY

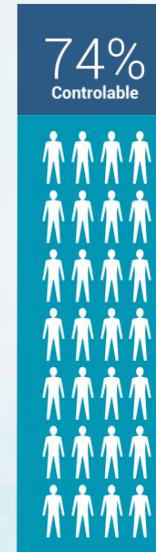
Last Planner® is a control system that improves the performance of activities and the proper use of the resources of construction projects. Originally developed by the founders of Lean Construction Institute, Gregory Howell and Glenn Ballard, its theoretical framework is based on increasing compliance with construction activities to reduce the uncertainty associated with the planning. Alarcon, Pellicer and Rodriguez suggest that this is not a tool to replace or compete with the traditional planning methods; on the contrary, it complements variability and improving workflows.

"This system is intended to increase the reliability of planning and therefore increases performance at work; in order to do this, the system provides effective tools for planning and controlling. It is specially designed to improve control of the uncertainty in the works; this is achieved by implementing concrete actions at different levels of planning", they say.



**Naturaleza de los tiempos que "no agregan valor", para edificación en altura, integrado 2003 al 2012.**

Fuente: Calibre CDT



**Origen de los "tiempos perdidos" en proyectos de minería, integrado 2003 al 2012.**

Fuente: Calibre CDT



By controlling the uncertainty, reliability on the planning increases, thus the project productivity is improved. In addition, the entire team is involved in the planning, management personnel, operative, monitoring, in work support areas and subcontracts, so greater reliability and commitment of the people is achieved.

Before setting up what "will be done" it is key to know what really "can be done", with the available resources. The aim is that in regular meetings the leaders of the processes identify their capabilities (what "can") and, based on that, they discern what "will". That way it is anticipated that the project will not be interrupted by certain situations or any not released restriction. "This situation notoriously helps productivity tasks, because it gets around the annoying lack of materials, labor, etc. The planning process should primarily focus on managing the "can"; the more we enlarge the "can", the higher the real possibility of advancement. This could be affected if the number of activities which may be executed is low. To avoid this, planners should concentrate their efforts on release the restrictions that prevent the

job to commence or continue. In this way it enlarges the whole "can", increasing the advance options. It is important that the management be done on the root problem because nothing positive will come out of requesting the executors to carry the activities faster if they are not delivered the resources on time", point out Alarcon, Pellicer and Rodríguez.

## RESULTS

This planning methodology has been applied with some success in Chile for a few years. One example is the company Sigdo Koppers, which after running two pilots in the Angamos Thermoelectric Project and Andean Project, decided to implement this methodology in its projects. "First, provided training for ground and technical office staff and then made a field coaching for the main planners." Later, we began implementing the mid-term plan meetings, compliance and weekly planning meeting, involving our workers to lift all restrictions that may appear on a six weeks' time frame," details Eric Fuentes,

manager in charge of implementing Last Planner for the engineering and construction projects at Sigdo Koppers.

The expert indicates that planning helped preventing stop activities that could delay projects, following the various stages proposed by the methodology. As a result, there was a considerable increase in goals achievement. Constructora Loga is a company that is recently applying this system oriented towards building and housing construction. The company has been developing this tool in its projects for a little more than two months. According to its experience, planning with this tool has allowed the programs reflect the reality of the work and reach the field staff, reducing restrictions or losses that do not add value to the project. "The contact with the foreman, that everyone knows what it is done, is part of all the techniques provided by Last Planner (Last Planner®), which gives greater possibilities to optimize projects. In addition, CALIBRE measurements allow us to compare the performance of various works and focus on improving what is important", illustrates Patricio Gonzalez, general manager at Constructora Loga.

# DEVELOPMENT IN BIM

## Touching the cloud

The Building Information Modeling (BIM) is gaining ground around the world. The tool, which has facilitated the execution of the works, communication between specialties and the reduction of execution errors, design and projection, today aims at a much more direct collaboration. It is possible today to have access to the documents from anywhere and change them in real time. There has been some progress in Chile, but a lot remains to be done. BIM is uploaded to the cloud.

Construction projects demand a special concern for their quality, productivity and commissioning. Meeting the deadlines is key in the development of the work. And for people in charge, profitability is paramount, especially when the sector faces several challenges arising from problems in coordination and communication among different designers involved in one project. Faced with this problem, the Building Information Modeling has become a tool that significantly reduces time and construction

costs. This has allowed, for example, maximizing the deadline terms since one of the programs identifies potential and eventual failures before they can occur in the construction site. Put in a simple way, BIM predicts all inefficiencies. This allows the project to meet the deadlines. In simple words, BIM provides all errors that could be committed and that makes the project meet the established dates. The tool, in practical terms, manages to integrate all the relevant information of a project, the various specialties through a centralized model that improves communication and coordination between all stakeholders: architects, engineers, other professionals and specialists, etc. Thereby reducing failures and meeting deadlines as well as improving the details of the work.

Today, the tendency is to optimize applications of BIM. Not only because of 3D modeling, it also saves none graphical relevant information. It is a platform that, for example, enables architects to better understand the mechanics of the equipment

and spaces that will be required for the building or construction. The interior visualization, 3D model integration with other information, facilitates communication between architecture and mechanical engineers, even with the structural engineers, improving the process and allowing better buildings or constructions designs. If we add all the advantages, the tool provides the possibility of using a new application that allows sharing and modifying files in real time from anywhere in the world through the network. Its functionalities increase. BIM is uploaded to the cloud. But that is not all about it, in Chile, there is also progress, some new developments.

### ONLINE

The cloud or "cloud computing", corresponds to the processing and mass storage of data in servers hosting the information on the Internet. It is a delivery model that allows users to access a range



BIM predicts all inefficiencies. This allows the project to meet the deadlines.

It is a delivery model that allows users to access a range of services faster and more efficiently through the web.



of services faster and more efficiently through the web. Overall, it is a center of online storage that can be accessed from anywhere with an Internet connection device by which instant collaborations between different users can be generated. Given this possibility, Autodesk Inc., one of the leading developers of software design, created its Autodesk 360 services, a cloud-based platform that provides a workspace, tools and services to cooperate in the significant improvement in the way of design, visualize, simulate and share the progress of the project with other users anytime, anywhere.

#### NATIONAL REALITY

In Chile, BIM arrived in early 2000, and henceforth it has gained ground in the way of designing the various works. It has been a long road that has come hand in hand with the technological development, with access to knowledge and foreign experiences.

More and more companies learn about its benefits. Information work and training are key to setting up this platform, now projected as a tool to cross each stage of the works. A service that aims at a total communication of the professionals involved in the project.

Experience has so far been positive and together with the integral management of projects, it has been "observed a greater mouth to mouth among our customers, in terms of its recommendation. Once they get to know it more in details, and it shows with pictures and numbers that it represents considerable advantages and practices, customers got convinced to use it.

It is satisfying to see today more people finding solutions in BIM that were impossible to have access to before," says Macarena Soto, technical coordinator of the company BIM DRS.

In terms of concrete progress regarding BIM beyond the usual 3D analysis, it is innovating in

the application of the 4D technology, which has to do with the programming of works, incorporating time (equivalent to the Gantt chart) brought into a three-dimensional model. Moreover, DRS joined the 5D few months ago, which corresponds to a three-dimensional model associated with the estimation of construction costs based on the amount of materials generated from the data supplied by the model. This estimate improves budgeting and calculates, in real time, the impact on costs when the design is changed.

BIM allows evaluation of interference or inconsistencies and represents significant savings in investment. We may have potential savings of around 2.5% and 3% of the total contract, which are often of millions of dollars in regards to free plants projects.

As shown, the BIM trend, with the help of project management, continue to grow and settling in the market. Along with technological development,

this tool starts to deliver more improved benefits. Profitable solutions. Working online, in real time, it will be a breakthrough. Innovation is there. It is a fact: BIM is here to stay.

5

Testimonies



“Hands on”

George Garcelon

He was an outstanding entrepreneur with vast experience in companies both in Chile and abroad.

**N**o need to be a specialist.

In order to undertake you need to know you have a good idea, that there is a market and prospective customers and that you can jump-start a business. You do not usually master the specific technical part. However, you can find people that do master the technical part. The world today is diverse. With enough time, you can surf the Internet and find out what you want about any subject. Therefore, I think today specialization is less worthy. If I had to hire someone who has spent 20 years in one industry versus another that has been in seven industries and has the same level, age and rank, I would prefer the latter because people grow in the face of diversity. After 2 or 3 years you know where the industry is going, you know the driving factors, and after the fifth year, you can "surf" at ease. Therefore, if you have been 20 years in one area, it can be assumed that you learned during the first 5 years, but simply vegetated in the remaining 15 years.

Today the world of work is changing in the sense that it is no longer looking for someone who has 10 years of experience in one specific activity, but people with expertise in various areas in different industries: in short, learning ability is wanted. There are those who like a field of work, fall in love with it and always remain. As far as I am concerned, I prefer to change category permanently. If tomorrow I dabbled in biochemistry and I have never had a project in this area, I will get involved in the project if I think it has a future, market, customers and can provide me good benefits.

Nor do I mean that you have to be in various industries without any continuity, but I can assure you that one is not limited to one type of business in life. Steve Jobs, for example, left the technological area, moved to the film industry and then returned to its original business.

Supermarkets are another example. Today, they have become banks that grant money, and sell appliances, clothing, liquor, diverse goods that do not belong to the classic category of a supermarket.

When I lived in Honduras I had a very successful consulting company, I earned a lot. However, I wanted to return to Chile with my business. What was my field? I was a chemical engineer with an MBA in Finance and International Business. I was counseling the US Government in the development of a country ... And in what business I embarked to return to Chile? Making pizzas! And what experience did I have with restaurants? What knowledge did I have in the business of making pizzas? None. However, I glimpsed it was a good deal, that you could earn some money in Spain. I went there; I studied and got convinced that it could work in Chile.

I have learned that what is important is to identify the business is likely to succeed. The ideal is to have worked elsewhere, because few geniuses manage to create something so unique that has no precedent in the world. I always transplanted businesses that have been successful with in other countries. After the pizza chain, I went to manage shopping centers. After that, a customer asked us to assess the market for movie theaters. We presented the project to the Board of the customer and it approved the idea of entering Chile. Then we collaborate with them to build and operate the cinema chain. What did we previously know about cinema? Nothing! The important thing is to have entrepreneurship to form teams. You have it or you do not. If you do, you do not need to be an expert in different fields, you can learn. My own life is a good example that you do not have to be a specialist.

## BEYOND GOOD INTENTIONS

Business plans provide a minimum of standardization in order to compare different businesses. Entrepreneurs that I know usually do not have made a business plan thoroughly.

As for me, in all my projects I designed the business plan in the long term, with much analysis. It took me from four to five months. Carefully, questioning: "Why we will succeed instead of someone else? What is so special?"

If you have solid equity or a good first customer to finance the business, you may feel you do not need a good business plan. Nevertheless, if you need an investor, you have to present a coherent and comprehensive plan, which answers all questions. However, no one jump – starts a business just because, you should have thought of the whole picture.

You have to sell your first customer or investor your idea or project. If you do not have something concrete to sell, you will not get anywhere. Enthusiasm and passion are legitimate, but still, it is necessary to have a coherent presentation in order to convey properly your energy to a customer or an investor, even to your spouse.

Most of those who wish to undertake make their business plans superficially. I know another entrepreneur who had invested and made very significant costs. He established agreements with suppliers, and paid several thousand per month in forms. He had never thought about who was going to buy! Nobody asked the question "how and to whom you sell?".

I remember that in a pharmaceutical venture I checked product by product, spent several months analyzing how the market worked, how we were going to sell, how we would import products.

We went beyond the details: the drugs, painkillers, antibiotics and analyze each segment, how much they had grown. As you can imagine, before the Internet a market analysis was a Herculean task.

When we analyze the pizza business, I tried to determine what percentage of the purchasing power of ordinary people was spent in eating out or ordering pizza. We reviewed where the per capita income was spent and what the trends were. There was no readily available market data, so I had to study at IRS, seeking VAT data and ended up finding a US \$ 6 million market. That is how you create the market potential.

The big issue is to specify whether a venture will work or not. In the film industry, for example, we determined that in all countries with multiplex cinemas the number of tickets sold in a year doubled the population of the country. With the opening of the multiplex, the market had grown twice, 10 times in US, 20 times in Los Angeles. In Chile, it was only 0.3 times and went up to 1. Nevertheless, with this analysis the bank gave me US \$ 30 million for the results obtained from studies conducted in different countries and business plan. Although we had initial capital contributed by the partners, we needed an additional granted by banks. However, beyond calculations, the most important is the deep conviction that the business will generate profit and know why it happens. Then, it is less complex to earn the trust of everyone involved.

Budgets and plans are actually your cover letter. They show how confident you are and how much you dominate the business. They have to have that

fluency. I need to determine the figures I will use, under what circumstances, how big the market is and how many customers make it up and how much will I sell. How much I will miss at the start and how long it will take to get to the balance point.

Before starting a new business, you have to analyze all the variables from start to finish. The project must analyze the comparative advantage over the competition. That is essential.

#### FIRST CUSTOMER WANTED

If you get to the meeting with a new client and are able to tell, for example: "I am working with CineHoyts" (or Entel or another renowned company), then it greatly facilitates the beginning because it means you already have references that believe in your product or service. The key then, the most difficult, is to attract that first major customer.

Then play your networking, your network of contacts. I opened the first Telepizza place in La Florida. I knew "so-and-so" (who knew me for a long time), who were building a shopping center. I presented them the idea and they liked it.

Once I had that first local a real estate company bought the idea of opening a second unit immediately, financing the purchase and remodeling of the premises for lease. That company did not know me, but believed in a business that was working. They bought the place and invested \$ 150,000 for remodeling. It is important to highlight, it was also a good property business. The local would gain ground and served as collateral, which partly reduced business risks. The key is how to manage to get the first customer. The first step is to ask: "Who has to be my strategic partner for the start?"

That is why, getting the first customer will make your hair turn gray. Again, for any developing company its first customer is key. I am a member of a technology company. Its first client was the CineHoyts. I was out of the movie business, but they knew me. So the fact that I was a partner gave them confidence to buy even though it was a new company. It was easier to get the second customer because we could say: "We are taking care of CineHoyts!"; that sounds good. The next customers think, "Oh, these guys have already achieved something". The first one is the great challenge. I stand in the shoes of a business manager who is frequently presented projects. I am presented an interesting project and ask, "Who are you working with?", And if I get the answer: "With no one yet"; then I will think, "Oh, I will be the first!". Is it worth the risk? The most likely answer: not.

Then the key issues that have to solve in your company are: Who will be my first client? How can I get it the easiest way? That is when your network works. The network of people who trust you.

## George Garcelon



“We always dare  
to innovate”

José Molina Armas

GERENTE  
GENERAL

Molina Morel  
Constructora e  
Inmobiliaria.

**M**olina Morel S.A is a company that has been in the market for 65 years. It is a family business which projects I visit since my childhood days.

I used to accompany my father, always with the idea of becoming a builder in the future. I graduated and right after I began working here. I have been climbing positions. In the beginning, I was project manager, and then worked at the central office. I am General Manager now. Nevertheless I go to the construction site every day. I arrive at 8 in the morning and stay until 12, every day. I am a civil engineer and what I like the most is the construction site, for this is the heart of every real estate business, and for me is the way, I can improve, see problems, and opportunities. After all, that is what I like: the construction itself.

Even though you do the same thing at the working site, it is not always the same thing. There are many innovations being incorporated or processes being improved. We are a real estate and construction company at the same time. I am in charge of managing the after-sales service. This way I can see what we lack in the buildings after-sales services, to improve it in the next and subsequent work.

Although we do almost the same work every day we innovate a lot, there are always changes and new problems to solve.

I walk and work alongside the professionals from the company. We have ideas sometimes quite bad, some regular and sometimes quite good, but we always try. Always dare to innovate. One comes up with ideas and we say, "Well, no harm in trying" and if it works we implement it and keep it for the following projects.

That is why after sales is the key, not only for the real estate company, but also for the entire design cycle and creation of a project.

We have managed to stand thanks to the innovations that we have implemented. For example, our buildings were always accessible for disabled people. Thinking that only 10 years ago in the public buildings, the ramp became mandatory. There were always ramps in our buildings because we were aware of disabled persons. This idea began to be implemented because the first owners of the company traveled a lot around the world and saw things that were not implemented in Chile: ramps to get to the first floor; wide doors in the departments and bathroom doors, which even fit a wheelchair through them. We do not fear making mistakes. We do trial and error, trial and error, and if the test works, great. This is how we have been innovating in the work.

We are also pioneers in sustainability. We have always been very aware of this matter. Two years ago, an architect told us: "Why do not we try to get this building that we are going to build certified under LEED certification?" After that, we established contact with the Green Building Council, which is the American institution that administers this certificate. We noticed that most of what they demanded to certificate us, we already had it implemented because it was part of our culture building that way. Therefore, it was simple. I mean, a lot of paper work, a lot of information, a lot of everything, but the basics, regarding the concept of energy saving and many other things, we had always done that. This way of doing things, allow us to receive this international recognition. The fact that one of our projects became the **first residential building in Latin America to achieve the LEED Gold certification.**

We have made the after-sales management an essential competence. I have seen in other companies, another kind of organizational structure very different from ours. People who are leading the post sales are second in command. We have an advantage. It is

true, after-sales is a constant headache, but it is I who know exactly what is missing in all our buildings. I am personally involved in solving the problems that some of our apartments may present. I know which one lack satisfactory receipt firm. I keep a very fine and direct contact with the clients. I know exactly what happens, so after-sales help a lot for the next building, because I see where the problems were concentrated in the previous project, to substantially innovate and improve ahead of new projects.

Another area where we have frequently innovated is in our relations with the subcontractors. We have always been concerned with training people. I remember that before, as any other construction company 20 years ago, we had our people, with the exception of the traditional contractors: elevators, electricity, sanitary and heating; but everything else was born inside the house, with our own workers. We started to train all specialists, who were not contractors: carpenters took training courses; potters, too. We bought machinery for the plasterers, even cutting machines. For the carpenters, we bought electric saws. After a while, many of our workers created their own companies in different specialties. They became contractors. We seek them advisors to help them form their societies. We brought the forms for the first 6 months and then they hired an accountant, which made them more independent. They became entrepreneurs. Today, all the structural work and carpentry terminations, is carried out by contractors who used to be our workers. Today they are our contractors.

Two years ago, we bought plastering machines for the plaster specialists. They did not know how to use them. We trained them in site and they asked us for the machines. They paid for the machines during the time that the construction works lasted. Nowadays, all the plasterers are contractors, and they used to be our workers. The same happened with the potters and masons, among others.

We have helped contractors and subcontractors. The advantage for the contractor is that when we finish our work they leave with their tools, with their team of workers and can work for another company as a subcontractor. Carpenters leave with their teams and come back to us when there is another work, elsewhere. Finally, in our company, willingness to innovate is permanent. It is part of our culture. Many things that today seem to be just arriving we had them implemented for years. We have been pioneers, and our customers recognize us for that. We had ecological closets before it became fashionable.

Before residential garbage began to be separated, we used to put shelves to bring papers out. We take advantages of our trips to evaluate new trends and technologies in the real estate sector. I had the chance to see several times in USA, in closets or junk niches that the lights worked when opening the doors.

The lights switch on alone, without pressing any button. We began to implement that idea. Normally, people enters in garbage closets, turns on the light, go away and the light stays on. Now, when you close the door, the light turns off automatically. We set the halls with light motion sensors. Not long ago, the corridors light remained on for 24 hours. Now, by incorporating motion sensors, if someone passes by the lights go on for two or three minutes. Time is regulated and then the lights turns off. Concerning stairwells, we privilege to build them open on the outside to benefit from daylight.

My father brought to the company the first tower cranes that arrived in the country. The first four that arrived in Chile. My father went to a fair in France and brought one of the first tower cranes to Chile. It was 1979, much before the other arrived and were assembled here, in Chile. There are many chambers for collecting rainwater in the undergrounds. For example, there

can be 20 or 30 chambers in one underground. Two years ago, we built the chambers with the traditional system of bricks. Then, we came up with an idea that had a direct impact on our productivity: Why not buying a 300 mm precast concrete pipes and use them as cameras? It turn out very simple. Innovation does not need to be complex to get a positive impact. Some are technological innovations, others are "small things," but all these innovations are what make the difference, the ones that had better positioned us in the market where we compete.

This spirit, we try to transmit to the new generations. Unfortunately, we have realized that in many colleges, future professionals are asking for office internship rather than field internships. Work in site is the heart of all real estate business.

Therefore, the interns we receive every year, besides fulfilling their duties at college, we urged them to make a report every week. We ask them to explain what they did, why, what they saw, what they think they can improve. It is not a report meant just for us. It is essentially for them, to take the work seriously. Because that is where innovations make sense, where creativity and ingenuity value their performances and make companies grow where they work.

José Molina Armas

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**General Issue**

Carmen Paz Cruz Lozano, CChC  
Santiago Barcaza Soto, CDT

**Technical and Drafting Committee**

Carlos Bascou, CChC / Tadashi Asahi, CChC /  
Carmen Paz Cruz, CChC / Santiago Barcaza Soto, CDT /  
Aldo Aspilcueta, CDT / Maria Carolina Grez, CChC /  
Paola Devoto, CChC / Juan Carlos Leon, CDT

**Journalists**

BIT Magazine news team / Alejandro Pavez V., CDT /  
Patricia Avaria R., CDT / Daniela Maldonado P., CDT/  
Alfredo Saavedra L., CDT / Camila Alcaíno M., CDT /  
Elena Pantoja, CDT

**Photography**

Andres Figueroa

**Photographic Contributions**

Constructora DLP AS / Plan Ok S.A. / Constructora S.A  
/ Stitchkin Real Estate Consultants AS /  
Ingevec S.A. / Constructora Basco S.A. / Constructora  
Armas Ltda. / Rene Lagos & Associates Civil  
Engineering Ltda. / Ralei Capital S.A. / Sika S.A. Chile  
/ Tecno Fast S.A / Boetsch S.A. / Guillermo Hevia /  
Paz Corp S.A / Ruben Boroschek and Associates /  
DIS System / SIRVE S.A / TECHO / Carlos Coronado -  
Architect / ANRU / Tensocret / Daniel Corvillón Photo  
/ IDIEM / Nicholas Saieh, Architectural Photography  
/ Andres Bravari / Augusto Dominguez / Cristian  
Barahona / Cazu Zegers

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