

# Phantom discipline? A preliminary study of the incorporation of industrial design in the regional manufacturing industry of Biobío, Chile.

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## Abstract

Industrial design and new product development have been proposed as key alternatives for achieving high levels of differentiation and competition among businesses and industries in the current globalized market. The Biobío region of Chile is characterized as a major manufacturing centre, historically known for its range of industries. It is unclear, however, whether regional businesses actively incorporate industrial design into the production process. The present study examines the extent to which product design is incorporated into the regional manufacturing industry of Biobío, Chile by looking at how businesses develop their product line. Thirteen manufacturing companies were interviewed, and despite appearing to actively incorporate the discipline into their work, it is not reflected in the professional staff. Industrial design appears to be a phantom discipline wherein members participate in product design without carrying the formal title of ‘designer.’

*Keywords:* Industrial design, Regional manufacturing industry, Chile

## 1 Introduction

Design has been heralded as a key strategic tool for business development, helping companies and industries achieve higher levels of differentiation and competition in the current globalized market. Indeed, such positioning strategies have received support on an academic, vocational and entrepreneurial level.

Finland, Switzerland and Denmark, among other countries, serve as key points of reference which have successfully advanced a new way of thinking about design—going beyond its technical application to underscore the natural and necessary function of design in people’s lives, just as in industrial design.

These countries are perfect examples of the theoretical application of design. Nonetheless, due to distance and unique cultural contexts, their successes are difficult to replicate. Indeed, Chilean thinking places a premium on immediate needs (reflected by the saying “bread now, hunger for tomorrow” and “today’s bread and tomorrow’s hunger”). Businesses and industries thus tend to focus on survival rather than long-term sustainability and frameworks for growth and innovation. Industrial design appears to meet this crucial need.

Chile is known for its rapid economic growth, largely a result of the production and exportation of commodities such as copper and other minerals, fish meal, cellulose, salmon and agriculture (wine, fresh fruit and meat). All of these industries use natural resources intensively [1] opposed to products with a high value-added component.

In contrast to other professions in Chile, the consolidation of industrial design has succeeded in the realm of education, but has not been successful in impacting the job market. A number of strategies have sought to position design as a professional occupation, finding support from academia, governmental organizations such as Prochile, Sercotec and Coincyt, as well as design companies and labour groups including the College of Designers. Unfortunately, none of these strategies have met expectations of integrating design into the professional world.

In 1969, the city of Valparaíso hosted the “First Conference on Teaching Design in Chile.” A survey was carried out which interviewed 24 manufacturing industries involved in the production of highly utilized consumer goods (glass, textile, tableware, furniture, and ceramics). The results showed that “(...) only three industries had a professional designer on staff, four industries employed novices (...) the 17 remaining industries imported designs from outside countries, notably Europe and the United States, through trips made by business owners, royalty payments or even pirating [2].

Nearly forty years later, the situation of industrial design is not very distinct. On a societal level, design is not a highly valued profession in Chile [3], and there are few concrete and permanent lines of communication between design and Chilean industry. As a result, the management of design is a relatively new concern [4]. Since the 1990s, Bonsiepe (2011) argues, the loss of rigor associated with the profession has meant “that public opinion tends to associate the term “design” with the formal aesthetic aspects, associated with impermanence, high cost, lack of practicality and even superfluity” [5]. This may have influenced the ways in which businesses regard design.

Hinrichsen (2006) states that internationally, when per capita income within a country is greater than US\$ 5,000, the design industry witnesses growth. When per capita income surpasses US\$ 10,000, the development of industrial design should thus accelerate [6]. Forecasts for Chile estimate that during 2014 the per capita income among Chileans will exceed US\$ 20,000 [7], paired with sustained economic growth and a higher graduation rate of design professionals. Paradoxically, these changes are not reflected in the insertion and development of design in Chilean industry.

Following this line of thought, the objective of the present study is to understand the weight of the term “industrial” in the profession of industrial design, as well as the potential integration of design in regional manufacturing. For this reason, a preliminary study was carried out in order to understand the extent to which product design is incorporated into the regional manufacturing industry of Biobío, Chile, and to be able to redefine and adjust the final instrument.

## **2 Context of the present study**

The Biobío region is characterized as a major manufacturing centre, historically known for its wide range of industries. Indeed, the Index of Regional Economic Activity (INE 2013) [8] shows that the manufacturing industry of Biobío has grown in the third quarter (July-September) of 2013. Moreover, according to the Index of Regional Competition (CEEN 2012), the Biobío region is ranked 10 out of 14 [9], keeping in mind that the principal challenge for regional economies is in expanding its potential for growth and reducing its dependence on raw materials [10].

The economic output of industries in the Biobío region comes from the largest producers of raw materials, as well as manufacturing industries which produce footwear, glass, textiles and metal work, among others. Many of these industries, however, are not known to utilize design in a conscious, systematic or even strategic matter [11]. Prior studies show that similar situations result in *silent design* [12], wherein members participate in product design without the formal title of ‘designer’ or without knowledge of industrial design.

### **2.1 The manufacturing industry**

According to the United Nations (UN), manufacturing industries are defined by “the physical or chemical transformation of materials, substances or components into new products,” although this is by no means the “only or universal” definition. It refers to the transformation of raw materials from agriculture, livestock, forestry, fishery and harvesting of mines and quarries into products for other manufacturing activities such as alteration, renovation or reconstruction [13].

### **2.2 Industrial design**

The profession of industrial design has been consistently revised in response to distinct applications and emphases. For the present study we will use the definition provided by the IDSA [14]: Industrial design optimizes the function, value and appearance of products and systems for the mutual benefit of users and manufacturers. A study on the economic impact of design states that “when we speak of design we refer to design strategies, development and style, considering all of the steps prior to the production or application of products (printing, sales, markets, web site)” [15]. Indeed, industrial design allows a company to distinguish its goods and services from the competition in an interconnected global market where many different products constantly compete for the consumers’ attention [16].

## **3 Integration of industrial design in product development**

The integration of industrial design in product development has the potential to increase the competitive position of businesses. Nonetheless, this is by no means an isolated or unconditional fact; it depends on an industry’s evolution and design strategy [17], which supports and allows for a new configuration of materials, elements and components by transforming previous product requirements, thus impacting product appearance, user-

friendliness, ease of manufacture, efficient use of materials, functional performance, and so on.

Design integrates value on three levels, depending on its function within a given business: in the field of marketing, notably through product differentiation; in the field of innovation, by way of coordination; and finally in the strategic realm, by providing a transformative role [18]. This is shown by examples of *business-to-business* (manufacturer-distributor, distributor-retailer). Nonetheless, recent literature has neglected the multifaceted role of industrial design in business. One notable case study measured the variety and depth to which industrial design functions within a single company [19].

A study on the value of industrial design in relation to employability per sector carried out in the United States demonstrates that industrial manufacturing has a larger number of contracted industrial designers: **11,730** [20]. In a study on the integration of industrial design in Latin America, however, Betancourt Velasco (2010) shows that the regional manufacturing industry tends to emphasize low-cost innovation with little investment in technology. Moreover, designers with a strong background in business are largely interested in designing ‘beautiful’ products, and in addition, designers are seen as non-essential to the business. This reflects the region’s culture: “...During the last 40 years it has not been possible to effectively insert design professionals in the industry, and it is even more difficult to talk about the number of developments produced by them and actually put on the market...” [21].

In addition, findings show that silent design is mainly present in businesses that utilize the internet for marketing purposes. On the contrary, businesses that use overt design, or explicit design, have had improved results with attracting new clients [22].

The challenge of strategically incorporating industrial design into a business in a holistic and integrated manner should consider the aspects of integration. That is, a series of descriptive characteristics on design incorporation [23]: *Partial design*: design is only used to a limited degree, such as in superficial cosmetic styling of a product, or in marketing communications. *Disparate design*: design activity may be widespread throughout all operations, but is not coordinated holistically to realise its synergistic potential. *Silent design*, as defined by Gorb and Dumas: design by people who are not designers and are not aware that they are participating in design activity.

### **3.1 National context**

Chile experienced a short-lived manufacturing boom during the period of import-substitution. It collapsed with the opening of the economy to international markets and the subsequent reduction of import taxes. Despite this change, one of the major exceptions was CTI, a business whose brand of kitchen stoves and refrigerators maintained a stable product demand over time [24].

The number of research studies on the incorporation of design in national businesses has recently increased, albeit slightly. Two particular studies on the development and incorporation of design are particularly relevant. The first is a study on small and medium enterprises (SMEs) in the city of Valparaíso [25]. Of the 76 businesses interviewed, 32% had sub-contracted designers, while 28% counted on an internal designer while also sub-contracting external designers. Sixteen percent of businesses stated that they actively contemplate design during the production process, while 25% had not hired a designer.

The second study looks at the incorporation of design and its development in the wood-manufacturing sector in Chile [26]. Alarcón (2012) notes that 46% of businesses surveyed integrate design into their businesses strategy. Nonetheless, the results are incongruent; when considering businesses objectives, only 15% positively responded to the idea of integrating design. Moreover, out of a total 100 businesses interviewed, only 17% of those declared having some type of official plan for incorporating design. As a result, it is possible to infer that design integration is mostly intentional, but not made a reality.

With regards to the field of design and its particularities in Chile, Consulting Design (2013) draws a distinction between four areas: graphic (web, logos, etc.), products, interiors, and with a special mention to garment and fashion [27]. Demand for design services is linked to consumer demand, and it is SMEs that tend to value graphic design and branding. As a result, design responsibilities appear to be insignificant and largely aimed at improving sales competition vis-à-vis product identity and differentiation. Solely looking at a product's value and utility through its aesthetic qualities and differentiating elements does not encourage the SMEs analyzed here to invest in design.

When reviewing the incorporation of these areas within businesses, Bastías (2009) states that graphic design has the highest incorporation rate (91%), followed by textiles (4%), product design (4%) and interior design (2%). The hiring of independent or external design services is also favoured within graphic design, specifically web design (89%), followed by branding and logos (87%), corporate identity (69%), brand implementation (64%), publicity (51%) and packaging (31%) [28].

Considering this context, it is important to understand business' reasoning behind incorporating design. Specifically, what are their motivations?

Investment costs: Use of poor technologies. Local businesses cannot finance the research and development of new products since the return investment is drawn out or simply not profitable. Low-cost alternatives include copying design or buying Chinese products [29].

Lack of confidence: Many people do not value their own ideas for fear of plagiarism—a very common practice. The fear of failure is another obstacle, although this often comes from the fear of punishment resulting from failure. Innovation implies taking a risk, for example, if “I were to take a risk and end up losing my position, I would set a terrible example for the rest of the organization” [30]. According to statistics published by the Organization for Economic Co-operation and Development (OECD) [31], Chile has one of the lowest indicators of trust in the world: “87% of people mistrust their partners” and “only 13% of Chileans express having confidence in their fellow citizens, a much lower percentage than the OECD average of 59%.”

One indicator for measuring the incorporation of design is defined by the Swedish Industrial Design Foundation (2014) [32], which outlines four sequential phases: Phase 1: No design; Phase 2: Design as a style; Phase 3: Design as a process; and Phase 4: Strategic design. This indicator may be useful when studying and comparing the level of incorporation in generic terms, as well as design trends and developments in Chile compared to the European Union. For example, it could be used for understanding the disparity between the two countries, and particularly within the Biobío Region, where design plays a very minor role in product development (most businesses operate in the *Phase 2: Design as a style*), where the majority of businesses use design in order to increase product sales, and where design work is carried

out by other professionals. The low hiring of design professionals, who may consider the ways in which comprehensive improvements (function, usability) impact product competition, substantiates this point. Many businesses advertise the level of design incorporation in *Phase 3: Design as a process*, regarding it as a commercial resource that communicates originality and innovation in design without implementing design in the development process. Actually, there are few exceptional businesses that succeed in integrating design into product development. In contrast, countries within the European Union tend to integrate design in a transversal manner, as reflected by *Phase 4: Strategic design*, defined by Design for Growth & Prosperity (2012) [33].

#### **4 Integrating Design**

International studies reveal a gap in the preparation for design careers and professional practice [34]. In Chile, the rate of employment for industrial designers who have graduated within 2 years is 69.1%, with a monthly wage of SU\$ 968. This contrasts with the rate of employment and wage of Civil Engineers (95.2% US\$ 2,525 per month respectively), due to their high demand [35]. Industrial designers appear to have the lowest demand among professions in the industry. Indeed, design is often regarded as dispensable, and it is assumed that other professionals can carry out design tasks. Nonetheless, the centralization of people and work in the capital region can affect employability; in the Biobío Region 45.6% of industrial designers are employed within the first year following graduation, while the Metropolitan Region boasts a 75.5% employment rate [36].

Strengthening collaboration between academia and industry is another key strategy for incorporating design. Finland is exemplar, marked by ongoing education in the field of engineering. The industry expects and requires professional formation grounded in theory, despite a larger emphasis on concrete case examples [37]. In many cases, these projects lead to employment in participating businesses, and in some cases, allow for new research collaborations between the university and the private sector. Nonetheless, regional experiences of design education in Chile have not been sustained or systematic. One project worth noting is the The Innova Project –UBB 2012, *Interdisciplinary Proposal for a Development Model for Innovation Directed at SME in the Biobío Region*. With government support, it brought together 15 regional SMEs, 15 industrial design students, 15 commercial engineers students, and 15 civil industrial engineers students [38] in order to develop products in a collaborative and interdisciplinary manner to meet the needs of the regional manufacturing industry.

#### **5 Research Methods**

The study population is comprised of 250 manufacturing businesses from the Biobío region of Chile, located in the cities of Concepción, Talcahuano, Chiguayante, Hualpen, Coronel, San Pedro, Penco, Arauco, Bulnes, Cañete, Chillan, Huépil, Los Ángeles, Negrete, San Carlos and Tomé. Information was obtained from the board of directors of various businesses in the larger Bío-Bío region, including the web site [www.amarillas.cl](http://www.amarillas.cl) and the director of Sofofa. This information was then compared to a registry taken by the Internal Revenue Service (SII). Participating businesses were associated with metalwork, wood and plastic, among others, and each business acted as a single sample. The sample group reflected those in charge of the area of product development: owners, general managers and those in charge of production during 2013. An exploratory study [39] was carried out using a pilot survey [40] among 13 manufacturing businesses in the Biobío region. The sampling technique was non-probabilistic, wherein the subjects were selected by convenience, accessibility and proximity to the object of study.

This exploratory research was undertaken initially as a way to obtain a preliminary analysis about the research question, and it will serve as a basis for generating a hypothesis for future studies. The collection of data was carried out using a survey marked by open-ended and close-ended questions, and was developed with attention to the following topics: information about the business, production, performance, production system, incorporation of collaborative design work within the business, information technology and communication between the client and user.

## **6 Results and Discussion**

The survey was given to 13 businesses in the manufacturing industry in the Biobío region, including those involved in the fabrication of farming and fishery machinery, furniture, wood products, metal products and general machinery.

In Chile, 90% of the Gross Domestic Product (GDP) is provided by commodities while 10% results from products that are designed and manufactured in Chile. Although the rate of regional productivity in the last trimester of 2013 has been steadily high, this is not reflected in the Biobío region, which is ranked 10 out of 14 in terms of competition. In light of this context, the following results are notable:

With respect to future business prospects, 69.2% of businesses foresee new product development; 53.8% of businesses are looking to provide clients with new products; 53.8% of businesses are searching for a new client base; and 30.8% are looking to adjust their products in order to offer them to new clients.

When paying attention to the planning and production system, it was seen that 66.7% of businesses undertake project planning, compared to 33% of those who do not. In regards to production, 61.5% of the work is based on individual projects, with 61% of businesses having worked with third parties. The percentage of mixed work totals 15.4% (7.7% for online work and 7.7 per set). Moreover, businesses carried out 1 to 30 projects per year, with 30% of businesses having developed 5 projects and 20% having developed 4 projects.

In regards to the product development team, 24% of businesses are made up of management and 22% are comprised of an in-house design team. The opinion of both clients and users is a factor for 25% of those surveyed, demonstrating that development is often channelled through management, the design team and the client/consumer. Nonetheless, this is not reflected in the number of designers hired within a business. In addition, while more than 40% of businesses value having a high number of professionals on their team--to improve the quality of the businesses or to improve client satisfaction--fewer than 40% of businesses have formally hired industrial designers.

The “*necessity*” to launch new products on the markets is a concern for 84.6% of businesses surveyed. Sixty percent declared that clients drive this process, while 40% declared the importance of utilizing client and user needs. This is consistent with the focus on individual projects, which are generally motivated by clients who provide instructions on how to design a new product. Businesses show their interest in the creation and development of new products by highlighting the relevance of industrial design. However, the number of hired design professionals is not proportional to interest.

The study sample is representative of the industry, since out of the 7 industrial areas surveyed, all 7 responded. As a result, the instrument is valid, and will be applied to the final study. In the future, additional businesses will be incorporated in order to cover all industrial areas present in the region.

## 7 Conclusions

When considering the limitations posed by low representation in the preliminary study, we can affirm that businesses search for longevity, taking steps to guarantee steady sales. As a result, industrial design appears to be a phantom discipline used for projecting a better image of the business in terms of advertising and sales. It is not, however, seen as an indispensable part of product design, and is often carried out by other professionals within the business.

Chile enjoys a robust economy and is considered to be an emerging country within South America. Low rates of public debt, paired with the ease of starting businesses, good growth indicators and low rates of unemployment confirm this statement. In the area of industrial design it is still unclear why the field has not found its grounding; the information presented here is thus beneficial for future studies.

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