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Design and competitive edge: *A model for design management excellence in European SMEs¹*



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Introduction

In an environment of internationalization and quest for quality, the innovation policy in small and medium enterprises (SMEs) is a fundamental subject for their survival. Among the experts helping firms in launching new products, designers are taking on more importance. Design has proved its impact on companies and nations performance (Walsh, 1995; Hertenstein and Platt, 1997).

Design management research organized itself into:

- Organizational studies: design in an economic sector (Hetzl, P., 1993; Evans, B., 1985; Brun, M. 1994), or design in large firms, such as Philips or Olivetti (Heskett J., 1989; Kicherer, S., 1990)
- Descriptive studies of specific methods of design management (Topalian, A., 1979; Oakley, M., 1984; Vitrac, J.P., 1984; Oakley, M. 1990; Hollins, G. and Hollins, B., 1991; Bauhain, D., 1992; Blaich, R. and Blaich, J., 1993; Cooper, R. and Press, M., 1995)

Design management research results can be classified as follows:

- Design improves the performance of the innovation policy and of the communications policy of the firm (Moody, S. and Roy, R., 1982; Borja de Mozota, 1985; Landry, R., 1987; Brun, M., 1990; TRIAD Project, 1989; Hetzel, P., 1994; Hertenstein and Platt, 1997).
- Design improves the global performance of the firm; it is a profitable investment (Rothwell, Walsh, et al., 1983; Roy, et al., 1986; Hart, et al., 1989; Potter, et al., 1991).
- Design is a profession that creates value on a macroeconomic level (HEC Etudes 1987; Ministère de l'Industrie France, 1995; Design Business Association, 1990).
- Design improves the competitive edge of a country in the international competition; it develops exports (Corfield, 1979; Rothwell and Gardiner, 1983; Ughanwa, et

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al., 1988; Walsh, et al., 1992; Riedel, et al., 1996; Sentance, et al., 1997) and favors technology transfer (Ayril, S., 1990).

- Design can help the restructuring of an economic sector in regional economic policy (Piau, 1990; Lovering, 1995; Press, 1995; Mannervik, 1995; Guimaraes, et al., 1996)

Most of this research comes from the Design Innovation Group (DIG). Professor Robin Roy (GB) and his researchers made a fundamental contribution to the recognition of design as a valuable asset for company performance.

The problem of innovation for company performance justifies this perspective to design management research. Various studies tend to build a consensus on the importance of design in the innovation process, but they consequently isolate design among the other actors of innovation and separate design from management theories, when obviously design is not the only

actor that deserves to be credited with the success of an innovation (Bruce M., 1996).

The objective of this research is to create a model of how design relates to strategy and innovation policy in SMEs, issued from management research models. Recent research demonstrates the interest in the subject of design integration in the global strategic process (Brun, 1998; Hetzel, et al., 1997; Roux, 1995). In Great Britain, the results of a survey conducted by the design council show that 92 percent of SMEs believe design will provide a competitive advantage, but 50 percent still think that design is wasted money.

How do European SMEs use design today in order to innovate? The European Design Prize, created to support design as an indispensable tool for innovation and as a means to reinforce the competitiveness of the firms, was an ideal research context for both data generation and sample homogeneity (Figure 1).

Figure 1.

The research context and its methodology.

European Design Prize	This event is organized by the European Community. Each country chose local firms recognized for excellence in the design of their products.
Research objective	<ul style="list-style-type: none"> • Describe how design penetrates the global innovation process. • Select pertinent management variables specific to design management. • Verify the assumption of a typology of design management based on Michael Porter value chain concept.
Firms in competition	<ul style="list-style-type: none"> • 64 firms in the final competition, from 17 countries (Trackara, 1997). • Winners: Artemide, Authentics Artipresent GmbH, Bates emballage A/S, Bulthaup GmbH & Co., Dyson Appliances Ltd., Fiskars Consumer Oy AB., Hörnell Elektrooptik AB, Lafuma S.A., Mediamatic, Oken S.A., Oticon A/S. • Among these 11 winners, 7 firms are in the sample of the study.
Methodology	<ul style="list-style-type: none"> • Questionnaire was administered by researcher directly during the award ceremony to CEO or his "design champion." • 35 responses and 33 surveys were operational.
Description of the sample	<ul style="list-style-type: none"> • Firms with fewer than 200 people 57%; more than 200, 43%. • 57% of the firms have more than 20 years activity.
Firms by country	<ul style="list-style-type: none"> • 14 different countries. • 21 firms North Europe; 12 South Europe. • Germany 4; GB 1; Austria 3; Belgium 2; Denmark 1; Spain 2; Finland 3; France 2; Ireland 2; Iceland 1; Italy 4; Netherlands 2; Portugal 2; Sweden 4.
Expertise in design	<ul style="list-style-type: none"> • More than 10 years experience for 45% of the firms. • In the firms that have more than 20 years activity, only 10 had more than 20 years experience in design. • Design is not automatically integrated when the firm is created: 2 firms had less than 5 years activity, but 5 firms had less than 5 years experience in design.
Quality certification	<ul style="list-style-type: none"> • 60% of the firms are certified ISO 9000; 24% are in the process of certification. • Quality and design are judged as management tools that cannot be dissociated for 44% of the firms.

**1. Design as a competitive edge:
The integration process**

Presenting the 33 European SMEs of the study

Research was conducted on 33 European SMEs selected in their respective countries for their excellence in the design of their products. Research, methodology, and data generation are explained (Figure 1). The firms nominated show a large range of design expertise but also a determination toward excellence in management that goes beyond design excellence: 76 percent of the firms believe their brands are superior to competition, and the rate of total quality certification is high among the firms.

For what reasons do managers turn to design?

Product design (62 percent) is the design expertise that is most widely needed for a first design project. But other design expertise, such as packaging and graphic design (25 percent) and environmental design (13 percent), are also sometimes required.

Firms turn to design for marketing reasons by priority (Figure 2). Either they use design as a differentiator for their products or they plan to launch a brand. But firms can also have a proactive design strategy in order to gain design leadership in their market. Interestingly, design can also enter a firm for technology reasons in case of technology change in the market.

Firms tend to demonstrate a proactive method for managing design. Managers in this study did not use design to respond to competitors that would have used the asset of design before them.

Figure 2.
Type of problem that initiated design entry

	mean
Search for product differentiation	4.71
Launching of a brand	4.13
Design leadership	4.13
Arrival of new technology	3.87
Deterioration of company image	3.07
Drop in sales or margin	2.25
Change in top management	2.03
Design used by competitor	1.89

5=fundamental, 4=very important, 3=important, 2=not very important, 1=not of concern

In order to select their designer for the first time, managers tend to take advice from peers, friends, and suppliers, or to use a designer they have known previously. Rather than apply to a promotion design service, they would rather trust an innovation service agency. Some firms had been prospected directly by the designer.

What are the management decisions that help the design integration process?

Previous studies identified the decisions that help the integration of design in the organization. This study ranks these reasons by order of importance. The development of a brand strategy and the continuous support of the company hierarchy are the most important decisions for good design integration. A continuous flow of varied design projects help also (Figure 3).

Figure 3.
Integrating design within the organization.

	Brand policy	Hierarchy support	Succession of design projects	Budget allocated to design
mean	5.4	5.2	4.9	4.5

Organization of design management

If the majority of firms prefer to externalize design, 35 percent have chosen to internalize it. Also, 32 percent of the firms adopt a mixed solution: internal/external design and if so, the range of projects done outside the company is wide, from 10 percent to 80 percent. When firms externalize design, they tend to prefer a freelance designer or a small design agency rather than a multidisciplinary design consulting firm.

Even if most of these firms are dedicated to design excellence, there still exist “silent design” decisions.

Only 47 percent of the firms consider that all design decisions are taken with the advice of a professional designer.

Design reports, in priority, to CEO or top management (44 percent), then to marketing or to a multidisciplinary innovation team (21 percent). Only in 14 percent of the firms does design report to production and engineering. These results confirm the emergence of an independent design function or a co-responsible position of design as partner within a multidisciplinary innovation team.

Thirty-nine percent of the firms consider it important to have a person competent in design represented at the top management level; for 17 percent of the firms, it is the designer himself.

For 48 percent of the firms, design is considered at the same hierarchical level as the other functions in the organization chart.

Managers consider they have a responsibility

for building a strategic position for design.

To do so

- 44 percent tend to build a long-term relationship with designers.
- 24 percent tend to increase their investment in design every year.

The impact of design on the product

Design is seen first as a differentiating tool. But how does the design process create value that is perceived by the market? Previous research identified variables that were pertinent. How are they ranked in our sample of SMEs ranked “excellent” in design?

Design creates product value (Figure 4) because it improves

- Product image, its external appearance, and the perceived quality of the product: design viewed as “a plus”
- The conception process and the level of user satisfaction: design viewed as a system or as a process
- The quality of the product: its performance, efficiency, functionality, originality: design viewed as a tool to create performance differentiation

Consistent with previous research (Design Innovation Group), the highest scores are for the impact of design on brand, product appearance, and perceived quality. Even in these firms

Figure 4.
Impact of design on product.

	mean
Impact of design on brand image	5.64
Impact of design on product appearance	5.45
Impact of design on perceived quality	5.11
Impact of design on user satisfaction	5.06
Impact of design on product functionality	5.03
Impact of design on product originality	5.00
Impact of design on product ergonomics	4.87
Impact of design as a global process	4.77
Impact of design on product performance	4.69
Impact of design on quality measured	4.32
Impact of design on production process	3.90
Impact of design on production costs	3.60

6=fundamental, 5=very important, 4=important

dedicated to design excellence, lower scores are given to variables linking design with improvement of production process or cut in product costs. There still exists a difference between the perception of the knowledge of design and the reality of its expertise, especially in terms of quality measured ranking less than quality perceived (Figure 4).

Design and new product development

These firms give priority to marketing reasons for the launch of new products: the need for market differentiation and the necessity to balance the range of products with products in different phases of their life cycle (Figure 5).

But innovation driven by R&D policy comes in third position: 52 percent of the firms invest more than 5 percent of their turnover in research.

And, finally, innovation driven by design comes in fourth position. This result validates the proactive position of designers in generating new concepts. Concept products are launched to test various new market trends.

Innovation management is helped by a very organized scan of the competition and also by a willingness to introduce the user early in the innovation process and to observe consumer behavior when using the product.

Design and the culture of the firm: Design as tacit knowledge

These firms tend to control the coherence between the design of their documents, of their products, and of their working spaces.

A design culture is developed within the firms. Most collaborators are trained in design

Figure 5.
Classifying the reasons for launching new products.

	mean	50/50
To differentiate your product range by segments or under marketing suggestion	5.06	5.60
To balance the product range by phases of product lifecycles	4.54	5.25
Because you have a continuous research policy	4.06	4.80
Because design suggests new product concepts	4.00	5.00
To make your equipment profitable with products using similar technologies	3.58	4.30
Because you are involved in a total quality process	3.24	3.80
To value a patent or under suggestion of R&D	3.10	3.60

and 51 percent of the firms communicate systematically with design schools.

On their design background, respondents answered that for 38 percent of them, they do not have any training in design, but 30 percent had been trained by their education or by another person.

Design involves tacit knowledge that is transferred when managers make career changes, and 47 percent of the respondents admit they were raised in an artistic family environment. This information can prove to be useful for recruiting and as a variable to test when given the responsibility of design in a company.

How would the tacit knowledge of design be characterized by managers? Interestingly, while the literature on design tends to give priority to imagination and creative talents, this research also gives new ways to see the knowledge of design as craftsmanship and interpersonal qualities (Figure 6).

Design skills coming from crafts are the roots

of the “genealogical tree of design,” the branches of which are the professional disciplines of the design profession (David Walker, 1989, in Cooper, R. and Press, M., 1995).

Managers rank first variables issued from this artistic and “basic design” education and from the skills by which the perfection of a form can be evaluated: sense of colour, sense of harmony or geometry, sense of touch (tactile), imagination, sense of detail, sense of material, quality of visualization.

But they also value the interpersonal qualities of designers: designers’ communication skills. These personality variables should be debated in design education. Variables like designers’ “capacity to listen” and “capacity to dialogue” are well-ranked in the study. Finally, skills one would rather link with management science issues are also valued: designers’ “capacity to make a synthesis” or “to generate a vision.”

These last designers’ skills bring a new light to design management research, showing that designers can create managerial value as verified in the second part of this research (Borja de Mozota, 1997).

Figure 6.

The tacit knowledge of design.

<i>Key skills designers have (as viewed by managers)</i>	<i>Percentage of managers quote (multiple answers)</i>
Imagination	60%
Sense of detail	56%
Quality of dialogue	50%
Knowledge of material	47%
Quality of perception	40%
Capacity to listen	40%
Capacity to visualize	38%
Capacity to synthesise	35%
Design culture	29%
Sense of touch	24%
Sensibility	24%
Perfection of craftsmanship	21%
Sense of colour	21%
Sense of geometry	12%
Capacity to generate a vision	3%
Anticipation	3%
Lateral thinking process	3%
Knowledge of consumer	3%
Capacity to understand organizational image	3%

2. Design as a core competency in the organization strategy: The value chain model

Reviewing the literature

Recent literature on design management shows that design participates in the strategic positioning and in the process of building a competitive advantage. This competitive advantage by design is the result of differentiating store design (Bauhain-Roux and Lacoueilhe, 1999), brand packaging (Brun, 1990), or product design (Walsh, et al., 1992). Differentiation by designers creates value perceived by customers.

Different research trends tend to explain how this perceived value is created:

- Design creates sense and sensorial qualities for products (Schmidt, 1999; Floch, 1994; Lebahar, 1994).
- Design modifies consumer behavior (Bitner, 1992; Damak, 1996; Dano, 1996; Swift, 1997).
- Design creates form that meets the aesthetic preferences of consumers (Eckmann and Wagner, 1994; Bloch, 1995; Veryzer, 1997)

More innovative is this emerging trend of the

designer as a “sociologist of objects.” This trend comes from post-modernism and the aesthetics of everyday life. Sociology gives a symmetrical role to user and object in the innovation process and tends to contradict the classical model of market balance.

This trend reinforces the importance of design as a coordinating tool in the innovation process and its potential to generate a core competency (Cova and Svanfedt, 1993; Aubert-Gamet, 1996; Dubuisson and Hennion, 1996).

But a competitive advantage can come from decisions other than the differentiation of products. It can emerge by improving coordination among functions within the company (Porter, 1986). Establishing a competitive advantage on inter-functional links tends to change the structure of innovation: project management with multidisciplinary teams, networking and partnerships with external contractors.

In an often-cited article, Robert Hayes sees “design as a facilitator, differentiator, integrator and communicator” (Hayes, R., 1990).

This above quotation classifies previous research on the managerial value of design:

- Design as a facilitator and differentiator in the production process (Phatak, et al., 1989; Erloff, 1990; Cegarra and Hetzel, 1997)
- Design as a coordinator and integrator (Keeley, 1991; Endt, 1990; Logan, 1997; Fujimoto, 1991; Midler, 1993)
- Design as an integrator and communicator and as a tool for managing change (Hetzel and Wissler, 1997; Brun, 1998)

Cooper has demonstrated the importance of product superiority and of innovation management for innovation success. Managing innovation in “rugby team” spirit (Takeuchi and Nonaka, 1986; Barczak, et al., 1989; Rhodes and Carter, 1995) and implementing tools in order to decrease conflicts among company functions (Griffin, et al., 1996; Leonard-Barton, 1995) are both fundamental for explaining design management value.

The design process is seen as a mental representation of this new management model that organizes concurrent and parallel engineering of innovation (Clark, K. and Fujimoto, T., 1991) with a better circulation of information either through computer tools (Austin S., et al., 1996) or because of the communicative value of

roughs, models, drawings, or any visualization means of concept (Hise, et al., 1989; Schenk, P., 1991; Leonard-Barton, D., 1991; Droz, D., 1992).

This new innovation model gives power to the market and to the consumer in the launch of new products. It places the user in the centre of the process (Peters, T., 1989; Rutter, B., et al., 1997), and gives him an active role in innovation (Bailetti, A. and Litva, P., 1995; Firat, F. and Venkatesh, A., 1995; Coughlan, P. and Backlund, N., 1996).

Finally, design joins the new management trend in building a competitive advantage for the future. This new context utilizes a strategic thinking based on scenarios, metaphors, and discontinuities that tend to change the industry and to eradicate barriers among disciplines (Hamel, G. & Prahalad, C.K., 1994; Barabba, V., 1995; Barnett, S., 1996; Kilduff, M. & Mehra, A., 1997).

This new vision brings together design and the concepts of core-competency in management (Amit, R., et al., 1993; Boisot, M., 1996; Coates, D., 1996) and of the learning organization (Ashton, P., 1995). Design is an expertise difficult to imitate, is valued by the market, and can arouse a discontinuity in the firm vision of its environment.

Therefore, the designer formerly seen as an external actor for the differentiation of the firm becomes an internal actor in the building process of core-competency through the differentiation of innovation processes. Market vision through creativity is seen as a key for the future of “imagination management” in the examples of Italy and Japan (Bucci, A., 1998; Vidal, F., 1990; Vidal, F., 1995) or through the reinforcement of the notion of product concept, from the idea of the shape to the idea of the experiential consumption model of “a product designed like a story” (Clark and Fujimoto, 1990; Mitchell, 1993).

Valuing creativity and the company product portfolio as a social artifact does not imply the choice between the reign of the consumer or the producer as creator. It implies the consideration of both terms of the exchange relationship and reinforces the idea of an “ethics of aesthetics” in which the humanist tradition of design finds a natural insertion (Maffesolli, 1993; Hetzel, 1995; Gorb 1995).

From this perspective, the building of a competitive advantage can rely on a more effi-

cient coordination between both the upstream and downstream partners of the firm, which are the links of a global system of value chains. Firms think about the total architecture of their activity by developing strategies of alliances and knowledge transfers. Design's contribution to the external coordination of the firm meets up with the domain of technology management, a fundamental source for strategic positioning (Boisot, M., 1995; Walsh, V., 1996; Badawy, M.K., 1996; Holt, K., 1991; Allouche, J. & Schmidt, G., 1995; Maisseu, A., 1995) and of corporate design management as the management of organizational change (Quinton, 1997).

In summary, this literature review involves the idea of a strategic dimension of design that goes beyond its only differentiating dimension. Design is simultaneously a differentiator, coordinator, and transformational process. The classic system of management levels of decision, operational, tactical, and strategic, is found also in design management (Kyung Wong Chung, 1992; Cooper, R. and Press, M., 1995)

This preliminary analysis validates the assumption of linking design with the understanding of the competitive forces in an industry structure and with the concept of Michael Porter's value chain as the process of choosing a strategic position within an industry (Porter, M., 1985, see note at right). Michael Porter's model gathers the different contributions of design to the firm in a unique strategic tool for building a competitive advantage (Borja de Mozota, 1998). The value chain provides a tool for understanding the sources of design's competitive advantage: cost, differentiation, management.

Design can create value at different levels of

the value chain (Figure 7):

1. By optimizing the primary activities: design action on the consumer perceived value
2. By optimizing the coordination among functions and the support activities of the firm: design as a new function in the structure that transforms the management process
3. By optimizing the external coordination of the firm in its environment: design generat-

Note:

Rappel: Michael Porter value chain (1985)

- A firm is profitable if the value it creates exceeds the collective costs of performing all the required activities. Firms create competitive advantage by perceiving better ways to compete in an industry.
- Activities can be divided broadly into those involved in the ongoing production, marketing, delivery, and servicing of the product (primary activities) and those providing purchased inputs, technology, human resources, or overall infrastructure functions to support the other activities (support activities).
- Firms gain competitive advantage from conceiving of new ways to conduct activities, employing new procedures, new technologies, or different inputs.
- A firm is more than the sum of its activities. A firm's value chain is an interdependent system or network of activities connected by linkages. Linkages often create trade-offs in performing different activities that must be optimized. Linkages also require activities to be coordinated. Careful management of linkages can be a decisive source of competitive advantage.
- A company's value chain for competing in a particular industry is embedded in a larger system of activities the value system of which includes suppliers and distributors. A company can create competitive advantage by better optimizing or coordinating its links to the outside.

Figure 7.

Value chain and competitive advantage applied to design.

Design creates a competitive advantage		
Design is an economic competence that creates value by its action on the principal functions of the value chain.	Design is a managerial competence that creates value by its action on the support functions and on the coordination between functions in the value chain.	Design is a resource and a competence that creates value by its action on the understanding of the company environment, acting on the value chain of the sector by creating a new vision and reinforcing external coordination.
Marketing Production Corporate communications	Organizational structure Technology management Human resources management Innovation management	Prospective Knowledge management Generating a vision

ing a new vision of the industry

Design helps a firm in three main ways (Hetzl, 1993).

1. Design influences the products offered by the firm by giving “sense” to them.
2. Design influences human resources management by mobilizing, motivating, facilitating the circulation of information, and by bringing together the various actors working in different services around one project.
3. Design influences the firm by facilitating the formulation of a project and by encouraging the strategic nucleus in the company to generate a vision.

Identification of the 21 variables characteristic of design management

Twenty-one different variables characterizing design management were analyzed in order to isolate the variables with the highest scores in the data matrix.

“Design creates a competitive advantage” ranks first. Firms think unanimously that design provides them a sustainable advantage in their innovation policy. For the managers, 14 variables out of 21 were considered as highly characteristic of design’s contribution to strategy positioning.

Visualization of linkages among the variables

A factorial analysis was conducted in order to group the 21 variables into significant clusters.

Variables that describe the economic value of design (nos. 6, 7) are independent from variables that describe the managerial value developed by design (nos. 10, 8). This will be confirmed as a discriminating factor in the typology of design management styles.

Variables that explain the role design plays in modifying innovation processes: design improves circulation of information (no. 17), design changes relationship with suppliers (no. 20), and design accelerates new product development

(no. 13) are highly correlated. This verifies the contribution of design to modifying the innovation processes.

Most of the variables (except nos. 21, 19) can be grouped into three clusters that correspond to the three levels of optimizing the companies’ activities and value differentiation through design:

- Cluster 1 is constituted by the variables describing the impact of design on the market, therefore on the company’s primary activities revolving around the value chain. Variables that describe design as a factor for increasing market share, higher price, better product margin, and technology transfer are correlated.
- Cluster 2 is constituted by the variables that describe the impact of design on the support activities of the firm’s value chain. Variables that describe design as a factor for accelerating innovation, improving cooperation

Figure 8.

Classification of 21 characteristic variables of design management.

characteristic	Mean	Dispersion
1. Design creates a competitive advantage.	5.39	0.55
2. Design is a core competency.	5.12	1.04
3. Design contributes significantly to benefits perceived by consumers.	5.00	0.97
4. Design changes the spirit of the firm, which becomes more innovative.	4.94	0.86
5. Design develops exports.	4.88	1.15
6. Design increases market share.	4.75	0.94
7. Design allows a company to sell at a higher price.	4.69	1.16
8. Design improves coordination between marketing and R&D functions.	4.68	1.07
9. Design is a know-how that transforms the activity processes.	4.64	1.12
10. Design develops care for customer in the innovation policy.	4.60	1.25
11. Design generates technology transfers.	4.22	1.47
12. Design gives access to a wide variety of markets.	4.19	1.55
13. Design accelerates the launch of new products.	4.07	1.28
14. Design improves coordination between production and marketing.	4.00	1.16
15. Design develops project management of innovation.	3.93	1.20
16. Design creates a new market.	3.90	1.72
17. Design improves the circulation of information in innovation.	3.80	1.34
18. Design means higher margin or costs reduction.	3.80	1.31
19. Design is difficult to imitate by competitors.	3.76	1.43
20. Design changes relationships with suppliers.	3.70	1.23
21. Design improves cooperation among agents.	3.64	1.18

6=fundamental, 5=very important, 4=important

between agents, and information circulation are correlated.

- Cluster 3 is constituted by the variables that describe design as a factor to change the company's vision. Variables that describe design as a core competency, a tool for creating new markets, for changing the company's culture, and developing customer care are correlated.

Impact of design experience, company size, culture

The analysis of linkages among these 21 design management variables and the variables describing the companies, interestingly, does not demonstrate any relation between design perceived as a source of competitive advantage and the years of design experience.

But the strategic value of design as core competency that goes beyond its economic value is the knowledge that is acquired through years of experience. Few years of design experience limit the strategic positioning of design to its economic level and its impact on the primary activities of the firm.

Design seen as a core competency shows a relationship (test value 1.87) with more than 20 years experience of design. This can be verified by the fact that companies that have more than 20 years experience in design give the highest score to variables describing design as a way to have access to a wide variety of markets and as a tool to create a new market.

On the contrary, companies that have less experience in design give a higher score to variables describing design as a tool to increase product margin or to reduce product cost.

The perception of the impact of design on the management of innovation is different according to the company's geographical zone. In Northern Europe, design is seen as a know-how that transforms processes. In Southern Europe, on the other hand, design is seen as a useful tool to set up project innovation with multidisciplinary teams.

Companies that have finalized their total quality certification process will see design more as a know-how that transforms the processes. Whereas if the certification process is not finished yet, companies will only see design as a

tool for developing a competitive advantage.

The smallest companies are those that are less convinced of the potential of design on costs reduction. The largest companies give a higher score to design as a know-how difficult to imitate. The bigger the company, the more design is perceived as an intangible management asset the impact of which is to be measured internally.

Winners of the competition give a higher score to the variables that describe design as a way to generate innovation concepts and to improve product maintenance and product cost.

Typology of design management

A perceptual map represents the matrix of data under five significant axes (Figure 9)

Axis 1 separates firms that have a "market vision of design" from all the others. This is evidence that the basic factor of differentiation in design management leadership is the vision of design as a resource and core competency.

Axis 2 divides firms that have an "economic vision" of design from those that have an "innovation vision" of design. The second factor of differentiation is obviously whether companies see design as an economic or a managerial tool.

Axis 3 divides firms between those that have "a downstream vision" of design and those that have an "upstream vision" of design in the value chain.

Axis 4 divides firms between those that see design as "an external transaction cost" valuing design for its impact on technology transfers, from other firms that consider design as "an internal transaction cost" valuing design by its action on the behavior of agents.

Axis 5 divides firms that have a "competitive culture" in which design is a competitive advantage because it changes the spirit within the firm, which becomes more innovative, from the firms that see design as a competitive resource and design is appreciated as a know-how that transforms the processes within the activity.

The typology allows the classification of the sampled 33 SMEs, all excellent in product design, into four classes described by the way they characterize and differentiate their design leadership .

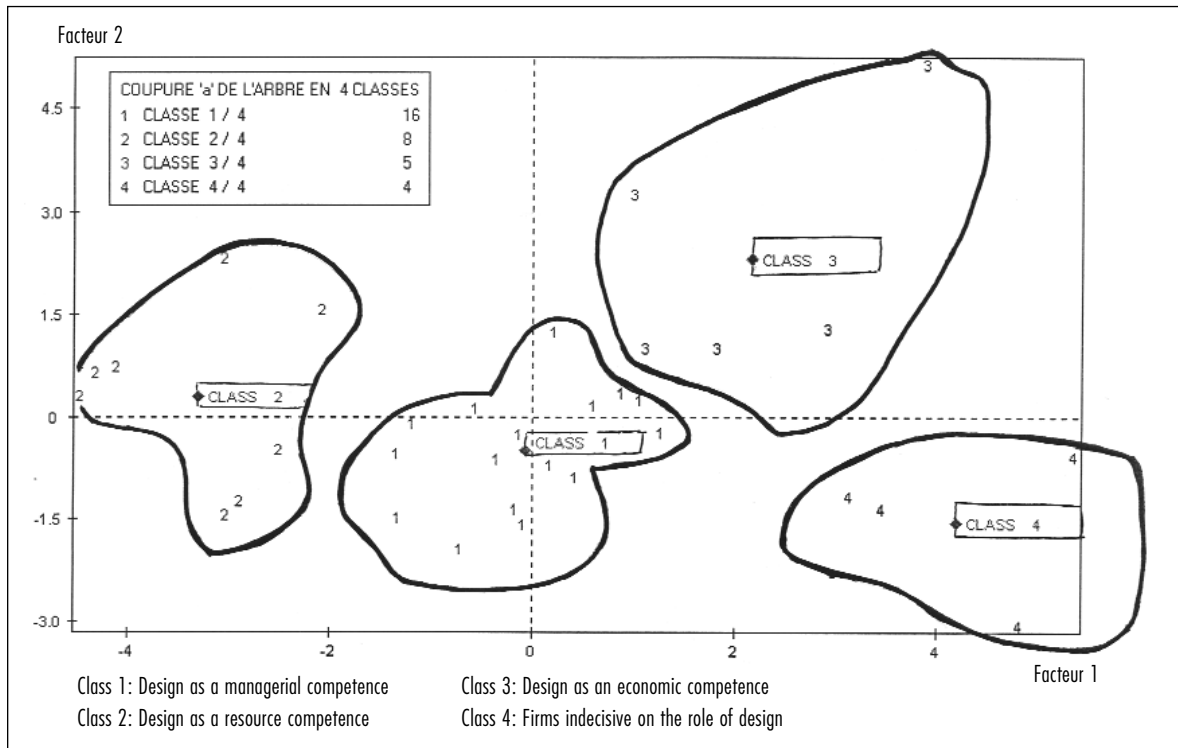
This typology validates the research assumption of using the concept of the value chain to explain different design management styles (classes) by differences in value chain design sys-

Note:

Competition juries will be pleased to learn that, globally, the winners have a more favorable opinion of design than the firms nominated!

Figure 9.

Design management typology in four classes.



tems. There are three classes and a central class (class 1) that gathers the majority of the firms (16 out of 33).

Class 1: Design as a managerial competence

The modality that characterizes this central class with 16 firms (variables with test value higher than 2) are

- Design accelerates time to market.
- Design improves cooperation among agents.
- Design changes relationships with suppliers.

All these variables share an “innovation” vision of design management and a strategic orientation based on internal transactions costs. These 16 firms justify the competitive advantage of design by the value it creates on the management of the support activities and, in particular, on the role given to design as a source of ideas and innovation concepts. The variable “design changes the spirit of the personnel, which becomes more innovative” is the one that has the highest score.

Class 2: Design as a resource competence

This class of eight firms is characterized by the following variables:

- Design improves coordination between marketing and production.
- Design creates a new market.
- Design develops care for the customer in innovation.
- Design is a core competency.
- Design generates technology transfers.

These variables show a “market and client-driven” orientation of the strategy and an “external transaction cost” vision of design. Design management gives priority to the impact of design in terms of perspective and imagination and on continuous quality improvement. High scores are given to innovation driven by design and design seen as a know-how that transforms the processes.

Class 3: Design as an economic competence

Five firms do not see the importance of design in innovation management. They attribute a lower score to each modality that tends to give a managerial value to design. But they do give a higher score to the following variables:

- Design allows the company to sell at a higher price.

- Design contributes to benefits perceived by consumers.

These variables show that these companies have an economic vision of design, with a profit orientation. The value created is judged by its impact on marketing-mix policies.

Design management is operational and limited to product policy internally and to product performance externally.

Class 4: Firms indecisive on the role of design

Four firms are uncertain about the value design can create and give a low score to the variable “design is a core competency.” Here design integration seems conjectural. Design management shows no objective of creating a competitive advantage, only the willingness to innovate in the product portfolio.

We can show a final chart (Figure 10) that isolates the 7 more discriminating variables (in bold) among the 21 variables studied. These 7 variables can influence managers’ opinions about design management.

This research

- Validates the three levels of design management: operational, functional, strategic
- Classifies the variables that are pertinent to discriminate design management strategy

The most interesting result, apart from the typology, is that managers can be divided into two categories whether or not they agree that design is a useful process in the management of innovation.

This study demonstrates that even if the sample were homogeneous in terms of product design excellence, the managers of these SMEs were widely different in the way they perceived design in their strategy and selected its position within the industry.

Conclusion

This research tends to develop a single model that brings together every aspect of the importance of design in the company value chain system. The objective is to explain how design participates in the selection process and continuous improvement process of defining a competitive advantage.

This research can be useful for professional design managers because it isolates variables that are pertinent to explain how design transforms management processes and which process it changes. Design managers will then more easily be able to decide the place of design in the company value system and to select the pertinent variables in order to accelerate the integration of design. (See also Gorb, 1990; Dumas and Mintzberg, 1991.)

Managers will find in this research a model to explain design as a managerial asset. Design is not only a competence that can be used for differentiating products and generating a prospective vision of the company sector. Design is also a function within the company structure that modifies processes and innovation management.

Linking design with competitive advantage, this research provides an exploratory model that can be used in a prescriptive way. Every manager

Figure 10.
Research results and typology of design management.

Design creates a competitive advantage		
Design is an economic competence that creates value by its action on the primary activities of the value chain.	Design is a managerial competence that creates value by its action on the support activities of the value chain.	Design is a resource competence that creates value by its action on understanding the system value chain and on external coordination .
Design allows a firm to sell at a higher price.	Design changes the relationships with suppliers. Design accelerates the launch of new product.	Design improves coordination between marketing & production. Design creates a new market. Design is a core competency. Design develops customer orientation in the company.
Design economic competence 5 firms (Class 3)	Design managerial competence 16 firms (Class 1)	Design resource competence 6 firms (Class 2)

will be able to locate his or her design strategy under one class of design management strategy:

- Design strategy as a differentiating positioning
- Design strategy as a coordinating positioning
- Design strategy as a transforming positioning

And every firm can therefore choose to give design a strategic value and use the variables identified in the study to make this process effective in its evaluation and performance system.

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