



# Towards a wide definition of innovation: product, process, organisation and marketing

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XAVIER FERRÀS

Innovation is a process belonging to strategic organisation management. A new interpretation of the process from a systemic perspective and its holistic view (enlarging it to marketing and organisation) has made clear the need for new definitions of innovation and measuring patterns. This shall allow to set an end to the classic linear conception of innovation as a thoroughly technological process and to progress firmly towards the creation of a systemic model for the phenomenon and a related system of indicators.

## The concept of innovation from a strategic perspective

Almost a century has passed since the Austrian economist, Joseph Schumpeter, described in his work *Theory of Economic Development* the concept of *innovation* as a key factor in the setup of modern economics, with his famous theory on «waves of creative destruction». Just over twenty years ago, the father of modern *management* (theory and practice of business management as a social science), fellow Austrian Peter Drucker, asserted that the United States had fully entered an economy of innovation and entrepreneurship as he stated the unheard creation of 35 million net jobs within only two decades spurred by the unstoppable forces of technological change and the opening of markets. However, Europe apparently has not been able yet to successfully take on the challenge of this new economic paradigm, with the one or other notable exception.

Innovation is doubtless a part of the 21st century value portfolio. The European Commission proposed on the 2000 Lisbon summit to «turn the European area into the most competitive knowledge-based economy of the world by 2010». In Lisbon the recommendation was made to deploy public policies aimed at creating regional *systems of innovation*, a region being a unit of analysis regarding industrial and technology policy, thus becoming an ideal setting based on cultural homogeneity, common views, settled skills, networks of personal relations and trust as well as easy cross-connections between the different economic, scientific and social stakeholders based on geographical closeness. Eight years after the Lisbon declaration we can state, however, that the goal will not be met. Especially Catalonia has a big challenge ahead due to the heterogeneity of its economic structure.

Innovation is on the priority agenda of economic, technological and industrial policies of most Eu-

ropean countries and regions. It is without any doubt on the agenda of discussions on models of competitiveness all over the continent. But how comes this sudden break-in of the innovation concept to the collective mindset of decision-takers of competitiveness policies, business school teachers, entrepreneurs, social partners, academicians and scientists? What is the consensus on the meaning and importance of the term *innovation*? What is, after all, innovation and how is it measured?

**Europe has not been able yet to successfully take on the challenge of this new economic paradigm, with the one or other notable exception in Scandinavia.**

From a management perspective we can state that innovation is part of strategic leadership of organisations. Out of a position of strategic thought, innovation is a *mechanism of strategic differentiation*. To put it simple, we could say, according to Michael Porter, the leader of the powerful school of strategic positioning at Harvard Business School, that there are two basic ways of succeeding in the markets: either I do the same as my competitors while being able to sell cheaper or I do things differently and get a margin for this difference.

In Catalonia we have been competing in aggregated terms along the first proposal – cost competition – over almost the whole second half of the 20th century. We were able to produce and offer undifferentiated basic products and services, basically because the local cost structure was economical compared to our neighbouring countries.

However, with quick convergence with fellow European countries beginning in the mid-1980s and the appearance of powerful emergent economies able to manufacture at a low cost, our country suddenly lost the competitive advan-

tages that had made possible to develop most of its industrial base and attract foreign investment over decades. We must not forget that within the brief lapse of five years, *half the world population* – China and India – has become a fearful competitor of our companies as it fully entered internationalised market economy.

This leaves us with the second and only option of competitive strategy: *differentiation*. It is becoming more and more obvious that the best way to compete on sophisticated, dynamic and turbulent markets with surplus offer is precisely to *get away from competition* and create a unique, exclusive and, as far as possible, unmatched offer (in products, services or both). If I am the *only producer*, I then will have a *temporary monopoly*. And here lies precisely the very essence of innovation: to do something different from what I used to, from what my industry or any competitor does – to differentiate myself I *need to introduce new things*. So I need to innovate. Therefore, if I want to keep a competitive position based on differentiation, I need to be able to innovate. And since I may be emulated, if I want to keep a permanent position of differentiation, I need to be able to permanently innovate.

In fact, if I want to avoid that my products get lost in an undifferentiated mass of equal products, I need to be able to create and communicate these differentiated elements. And I only will be able to build up systematically and scientifically a business if I am able to define my differentiation strategy. For instance, if I am a manufacturer of dairy products and wish to launch a new product, I will not develop, produce and sell, for instance, a natural yoghurt as the market is crowded with such products and the potential consumer will therefore have no decisive elements to choose my offer unless it is cheaper. With equal products in a situation of exceeding offer, my market share will tend to zero.

However, I will be able to differentiate myself if I decide to specialise and develop, let us say, a yoghurt with specific nutrients for pregnant

women. This is the only way to bring together the needs of the market (a new market niche not covered by the yoghurt segment) and R&D efforts (which will of course require a reliable explanation of the benefits for the sound development of the foetus during pregnancy).

Only if the differentiation strategy is clear will I be able to do a cost-benefit analysis of the project to develop this new product since I will be able to assess the potential market (on the Spanish market we can estimate that there are, for instance, one million pregnant women), my target market (e.g. Catalonia, 150,000 pregnant women), my sales target (e.g. two yoghurts per week per pregnant woman, 16 million units in the first year) – in short, to assess the operative, communicative and financial needs of the proposal. I will be able to plan the whole innovation project. I therefore will be further able to set up the *business plan* as all its structure will depend on the differentiation strategy I choose.

**The best way to compete is differentiation: getting away from competition, creating a unique, exclusive and, as far as possible, unmatched offer.**

The innovation project (introducing a new product) thus acts upon a need for strategic differentiation. Differentiation is the final proposal while innovation is the process that leads to this proposal.

If the project is successful and sales rocket, new competitors will unavoidably come up attracted by the source of value we have unveiled. This is the dramatic cycle of innovation: first comes *invention* (in our example, the development of a yoghurt with beneficial properties for pregnant women), then *innovation* as such (successful exploitation of this invention on the market) and finally *imitation* by some competitors or new play-

ers in the business. Once another competitor enters the market, it usually will not be attractive anymore due to starting price erosion. We therefore need to either quickly restart the innovation cycle or set up immediately barriers to accession mainly by:

- ▶ Creating a strong brand that conveys emotional values (and thus induces to buy not only the product as such but also these associated values).
- ▶ Generating experience curves (massive investment in new R&D waves and process improvement that gives us explicit and tacit knowledge of the product and the process so as to render unfeasible the access of a new competitor).
- ▶ Protecting intellectual and industrial property. In this context, *patents* are temporary legislative concessions of a monopoly. The fact of having a unique, exclusive and legally protected knowledge of an industrial process or product gives us de facto a monopoly on it. Nobody else is able to manufacture it, so the law guarantees the return on investment for the innovation, protecting it from potential imitators.

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If the creation of a solid legal framework to protect industrial property around 1600 paved the way for the first industrial revolution in England in the 17th century, the fact that knowledge-based innovation – that is, *technological innovation* – creates most barriers to access – which, by the way, could be legally protected by means of patents – is the key element that made this innovation type clearly predominant in economic studies on innovation during the 20th century.

## From technological innovation to building innovation systems

Technological innovation has definitely been the focal point of trends to foster innovation in the last years. This is partly due to the fact that it is the kind of innovation that may provide most clearly barriers to access – owning pragmatic knowledge, i.e. technology, a set of unique skills to serve the needs of a market – while creating an excellent competitive position, especially if the technology is legally protected.

The quest for technological innovation is partly due to the progressive – and by now urgent – need for approaching universities and business. If knowledge and technology are able to create competitive advantages with strong barriers to access, then the great sources of knowledge of the Western world, i.e. universities, also need to be great sources of competitive business advantages. The possibility of converting into market value – and thus social welfare – the immense fields of knowledge opening up permanently at universities, thus taking advantage of the vast expenditure on university research by public administration, has been in recent times the cornerstone of the planners of competitiveness policies.

This proposal has been applied with considerable success in the United States, where universities and companies are part of a systemic whole, especially in some hi-tech settings or clusters, such as Silicon Valley in California and Route 128 in Massachusetts, where the interactions and the rotation of staff between companies and university has been constant and generated a very strong economic growth based on technological innovation.

This phenomenon builds on a business culture, the creation of social role models based on young PhD graduates becoming successful entrepreneurs and funding new generations of technolog-

ical companies, a flexible labour setting, a tax system that encourages innovation and externalities based on hi-tech projects funded by the US Department of Defense.

## The great sources of knowledge of the Western world, i.e. universities, also need to be great sources of competitive business advantages.

Generally speaking, proposals to create systems of *science-technology-business* (in fact, systems of technological innovation) in Europe have gone through different steps:<sup>1</sup> the building of national science schemes in a first stage (1980s), the awareness of the *European gap* or the European paradox of having achieved internationally relevant scientific production but inefficient when converting the newly acquired knowledge into business competitiveness (the United Kingdom used to be the paradigm of a country producing Nobel Prize laureates but suffering deep industrial crises), the later proliferation of intermediary bodies between universities and companies (technology centres in the 1990s), only to end up (2000s) in a *systemic* view on innovation as opposed to the classic – and oversimplified – linear view on generating technology (invention) and later business.

This view on innovation as a process that needs an ecosystem to develop merges with Michael Porter's proposals of competitive dynamics and his famous theory of clusters (geographical concentrations of companies, specialised suppliers and related players operating on a same economic field). An environment with plenty of knowledge sources (universities, technology centres) is not enough anymore. Conditions based on factors (skilled labour supply, specialised suppliers, managerial experience) and demand (demanding markets nearby, generating leading users who anticipate the future), rivalry (creating competition and labour rotation, generating an imitation effect with competitors

and dragging suppliers), related players (collateral financial and legal markets), supporting infrastructure (approval and testing centres) and appropriate industrial structure (neither intervened nor monopolistic markets) become necessary, and so does a reliable legislative and legal setting. Innovation-based economic growth according to Porter is not generated only by activating some of these levers but also through achieving an optimal balance in the cluster – a fertile ecosystem – and creating a relational network based on trust, which allows the evolution of the cluster as a true system where the action of one player affects all. Innovation then becomes almost a social process in which multidisciplinary, contact networks and the association of ideas are the true drivers for economic development.

## This view on innovation as a process that needs an ecosystem to develop merges with Michael Porter's proposals of competitive dynamics and his famous theory of clusters.

Consequently, phenomena like Silicon Valley are not only due to the decisive presence of the University of Stanford with all its unquestionable scientific production, but there are other facts that have contributed altogether to create an incredibly fertile ecosystem for developing semiconductor technology: the university's mixed focus on *business* and engineering, the business footprint set by one of its first deans, Frederick Terman, the progressive forging of success stories (Hewlett Packard, AMD, Apple and Intel) and the cosmopolitanism and good weather of San Francisco Bay (attracting international talent).

The exchange of information and best practices in the pubs of Mountain View and Palo Alto, the demand for transforming projects by leading users such as the US Department of Defense (with the possibilities of creating managerial and technological skills that become dissemi-

nated and are used for new projects) and the creation of parallel venture capital and intellectual property defence markets have all been decisive as well.

Conversely, taking the example of Catalonia, the existence of first-class knowledge centres such as the National Microelectronics Centre of the CSIC in Bellaterra (one of the most important white rooms in Southern Europe) or the international corporate development centre for large plotters at Hewlett Packard in Sant Cugat (a big generator of patents) has not brought about the development of substantial auxiliary technological infrastructure. The main reason is that they did not *cluster*, they did not create a local innovation system. This is probably a big challenge for setting out future public policies: creating systems around the big knowledge centres.

### Competitive success of a company depends on the strategy chosen – which will need to focus on achieving and maintaining differentiating elements – and the setting in which the company competes.

The systemic view on innovation and its merger with Porter's studies extends the innovation concept far beyond technology and places it amidst strategic business thought (as has already been said, Michael Porter is the father of the school of strategic positioning at Harvard), which makes Michael Porter the economist whose works have been used in a most prolific and pragmatic way as to both individual business strategy and setting out public competitiveness policies all over the world.

According to Porter, at the end of the day, competitive success of a company depends on two variables: the strategy chosen (as has been said for developed countries, this strategy will need to focus on achieving and maintaining differentiating elements, that is, it will need to be based on

the capacity to innovate) and the setting in which the company competes (the ecosystem or cluster fertilising or hampering innovative activity).

## The need for enlarging the concept: innovation according to the Oslo Manual

The linear view on innovation and specifically technological innovation as a process in which someone does research and someone else makes business with the results as well as the immediate association of a country's development index to its aggregated R&D expenditure is lastly overcome with the new systemic view on innovation. Moreover, there is a set of considerable weak points in conventional thought on technological innovation that require new definitions of innovation, reaching far beyond research and technological development:

- ▶ Although technological innovation activities are relatively easy to measure (basic research costs, R&D subcontracting costs, investment in fixed assets, prototype costs, samples, approvals and tests, etc.), these are *input*, not *output* indicators. Just as it is unthinkable to measure the competitive capacity of an industrial company based on its raw material consumption, it is also wrong to anticipate the success of a company based on its R&D investment. In the knowledge economy, knowledge is a raw material but it has to be transformed into market value.

- ▶ Likewise, the indicators for patents, again related to the degree of a company's or country's technological innovation, are intermediate indicators. It is not relevant how many patents a company or a country has but the value it is able to gain from it in terms of turnover following patented inventions or the licenses obtained from these patents, which is much more difficult to measure.

► It is also clear that there is a strong correlation between a country's degree of development and its indicators for technological innovation, for instance, in terms of R&D investment on GDP. What is not clear is the cause-effect relation. In other words, is the country rich because its companies are R&D-intensive or is the country able to allocate public resources to funding research and are its companies R&D-intensive because they have been successful on their markets and have achieved a size that allows them to allocate considerable resources to research and technological development?

**There is a correlation between a country's degree of development and its indicators for technological innovation, although the cause-effect relation is not clear.**

► Finally, the same indicators for technological innovation, taken as indicators for economic development par excellence, are perverse in their conception and exclude growth and wealth factors based on other innovation types. Thus, a country could in theory be more innovative, for instance, by destroying GDP based on logistics or manufacturing (causing the ratio of R&D investment on GDP to raise). Paradoxically, if a successful international giant as the likes of Ikea, Dell, Starbucks, Benetton or McDonald's came up in Catalonia, we would be a *less innovating* country as these companies base their differentiation strategy on logistic, service, process or organisational and not strictly technological innovation, by which the country's R&D investment would not increase substantially but its GDP would, thus causing a decrease of those innovation indicators typically held to be meritorious.

At both microeconomic (understanding the innovation process from a business management perspective) and macroeconomic level (creating indicators for innovative activity that explain better regional and national economic growth), *innova-*

*tion needs therefore to be interpreted from a much wider angle than the strictly technological view.*

**The concept of innovation differs from that of improvement in the degree of risk the former bears.**

The Oslo Manual published by the OCDE is an international landmark in defining and interpreting the innovation process as well as probably the most relevant source of guidelines for collecting and analysing data on innovative activity in order to obtain comparable indicators offering an international perspective. In its latest update from late 2005 it provides explicitly for non-technological innovation processes and points out the imminent need for also measuring those innovation factors not directly related to R&D. According to this manual, innovation «is the implementation of a new product (good or service) or process or one with a high degree of improvement, or a new organisation or sales method applied to business practices, the working place or external relations».

The innovation types described in the Oslo Manual are the following:

## 1. Process innovation

It generally stands for the application of knowledge or technology to the production or distribution process, thus creating economies in the value chain. It is about doing the same in a more efficient way, thus becoming a clearly defensive innovation type.

Productive process innovation is a way of innovating that is deeply rooted in our managerial mindset. This is basically due to the fact of being intricately related to management methodologies that were predominant in the Catalan manufacturing industry, expanded vertically across the whole value chain (often because the customer required it) and spread horizontally to other value

chains starting basically with the car industry. Such management methodologies come from Japanese *kaizen* («improvement for change»), are based on incremental improvement, continuous improvement as a method of personal progress and business management tool, leading to the set of instruments known as Total Quality Management (TQM), which is after all a sort of incremental innovation.

**Total quality, fully turned towards incremental innovation, is nothing else than a subset of a basically defensive mentality within innovation management that tends towards avoiding risk.**

TQM thus generates innovation through evolution (never revolution) tending towards process standardisation, zero fault, absolute perfection of existing technologies and processes as well as the implementation of control systems that anticipate and avoid production faults. Total quality, fully turned towards incremental innovation, is nothing else than a subset of a basically defensive mentality within innovation management that tends towards avoiding risk.

However, the classic way of applying technological innovation to the production process is *process automation*. Robotising a production line and incorporating electronic measuring and control systems is the usual kind of innovation initiative our industry demands. But here we are again in a clearly defensive innovation type that shuns risk. Acquiring several industrial robots and placing them in a production chain is, albeit a certainly considerable financial effort for a company, a low-grade innovation process due to the following reasons:

- It means acquiring technology that is freely available on the market, state of the art, yet *vulgarised* technology. It does not provide for any

true competitive advantage since any competitor can also acquire it.

- It is a project in which the technology is proven. It may represent an engineering effort but success is guaranteed, and so is the return on investment. Since there is no uncertainty (should the investment be a failure, then it is due to a managerial error, not the technological risk of the project) and since no real competitive advantage is generated, the project should not be given priority when allocating public funds for innovation.

In traditionally manufacturing industries as the textile branch, there has been recently occurring a concentration of margins on distribution channels. This sectorial trend, typical of segments characterised by big consumption, has led to a new successful strategy: the control over the distribution channel and, in a wider perspective, innovation in distribution processes. Many companies in these industries have started focusing their differentiation efforts on this part of the value chain. Those staying in direct contact with the customer win.

As a consequence, there are in Catalonia over a hundred fast growing (often double-digit or more) textile companies that achieved this target by specialising in certain market segments, fast logistics, the creation of own brands and the control over the distribution channel. Mango (with over two hundred engineers at the Palau de Plegamans site improving the company's logistic algorithms), Desigual and Sita Murt are some examples.

At international level, the classic success story in a mature industry based on innovation in distribution is Zara, a company that presents its value proposal (differentiation strategy) in its capacity of pushing new clothing collections every two weeks so its logistic apparatus reacts immediately to the market trends. It is said that Zara flooded the market with black two weeks after 9/11 while the fashion colours of the season were then much livelier.



- ▲ ZARA (Inditex) is a classic success story in a mature industry based on innovation. The walkman by Sony was a legendary innovation in history.

Companies such as Dell (online PC distribution), Ikea (coproduction of furniture with the customer) and Amazon (the world's largest virtual bookshop that transformed the typically medieval business of selling books and propelled it into the 21st century through online and interactive marketing) are further success stories that are already part of innovation history.

## 2. Product innovation

It stands for the generation and introduction into the market of a new or significantly improved product. The introduction of a new product is an aggressive type of innovation. Having own products means not to be part of the value chain (subcontractor, manufacturer, distributor) but to really dominate the business and deciding the fate of one's own business. Many Catalan subcontractors of car manufacturers – that came up as small garages or electrical and electronic engi-

neering companies to support foreign manufacturing plants or as specialised suppliers of metal and plastic pieces – have developed outstanding managerial and technological capacities. These companies have first-class technical departments that unfortunately have seldom thought of searching an exclusive market niche independent from the orders of their traditional customers and becoming true international manufacturers and exporters of their own products.

The local managers of Tecniacero, a plastic injection factory within the Raymond group, or the owners and managers of Vilardell Purti, a Catalan precision machining company, are typical examples of innovative nonconformism and obsession for creating own production lines – as is the case of RayGreen (biodegradable plastics for the agrofood industry) and Avinent (tooth implants for the health industry) – that have allowed them to escape the decadent evolution of their source industries.



- ▲ Actimel, a product developed by Danone, creates a new value space halfway between nutrition and health. Dell is another success story that is already part of innovation history.

The generation of new products offers great creative opportunities. It allows to develop true *blue oceans*<sup>2</sup> in the words of the professors at the French business school INSEAD, Kim and Mauborgne – blue oceans, free of the blood of competitors, new, pristine, virgin value spaces. This is the case, for instance, of Actimel, a product developed by Danone that creates a new value space halfway between nutrition and health, a nutritional product with beneficial properties for the digestive apparatus that can be sold both as a mass consumption good in department stores and in pharmacies by medical recommendation.

Other examples of new value spaces, new and original combinations of product and market being at the same time success episodes in innovation history, are the walkman by Sony (nobody demanded it, nobody had even imagined it, but Sony identified a clear opportunity of generating a new product and a new market by combining the passion for music with the possibility of listening to it while walking), the arrival of the MPVs in Europe with the first Renault Espace and the introduction of snowboards to ride the slopes of the Alps with the same spirit as the surfers in Hawaii. Finally, if the motor car was the machine that changed the world,<sup>3</sup> then the e-mail (to speak not of a physical product but a new service) has been the tool that

sparked a revolution in our working and communication pattern.

### The introduction of a new product is an aggressive type of innovation.

The magic of innovation is that the economy is not a zero-sum game. On the contrary, infinite new value spaces can be created, as many as our imagination allows and as many as there are human needs to be satisfied. Whole new industries can be developed upon them. Technology adds a new dimension to the development of the product. If classic economics state that the production factors (basically capital and work) are finite by definition, for the first time in history now appears a new production factor that turns out to be infinite: knowledge. Pragmatic knowledge, technology, applied to solving infinite problems and needs of humans, becomes an utmost powerful driver for creating new products and markets, even more if we consider that the existing scientific knowledge in the world doubles every five years.

But again, we must not forget the great contributions of non-technological innovation. Few products have had the same impact on society as, for instance, newspapers (the appearance of commercial press) or insurances.

### 3. Marketing innovation

It is the implementation of a new business method that brings about significant change in the product design (driven by aesthetics, functionality or ergonomics) or in its promotion, distribution and pricing policies.

Design, which in the new version of the Oslo Manual is restricted to marketing innovation, is probably the most human aspect of innovation – the product ergonomics, functionality and aesthetics yield doubtless competitive advantages. When buying a new car, its design and appearance are often decisive. If I want to acquire a thermostat to regulate the temperature at home, I probably will take the nicest one, even if its sensitivity in tenths of degrees is lower.

**Any product has a structural, constituent design as well as a differentiated design as to the properties defining efficiency when interacting with the consumer.**

However, design has not only to do with aesthetics. Any product has a structural, constituent design as well as a differentiated design as to the properties defining efficiency when interacting with the consumer. For instance, the sheer inefficiency of most remote controls of consumer electronic devices is notorious. A DVD player comes with an often unintelligible one-hundred-side user guide. Brands like Samsung and Panasonic are making now great efforts to incorporate a differentiated design in its products that optimises the relationship with the consumer, starting research and innovation lines aimed at analysing the user behaviour in a real setting, a sort of 21st century consumer anthropology.

Innovation in the way of communicating a product or in the very set of values the product bears is often a vast source of wealth. To put an example, eyeglass manufacturers discovered recently

that glasses can be bought not only for the sake of optical correction but also as a *fashion item*, even without any therapeutic aim. Montblanc smartly managed to position itself as a luxury article brand in spite of manufacturing pens (nobody would buy a pen for six hundred euros for its primary use but they would as a luxury gift to a beloved person) and Benetton breaks traditional marketing rules by launching an aggressive campaign in which the product (clothes) is not advertised, as the classic business paradigm would suggest, but featuring controversial pictures of terminal AIDS patients and a newborn baby full of blood and still attached to the umbilical chord, thus looking for sheer impact and brand notoriety.

### 4. Organisational innovation

It is the implementation of a new organisational method applied to business practices at the working place or in external business relations.

The true breaking innovations in such a competitive and R&D-intensive branch as the car industry have been paradoxically of organisational nature: the linear assembly line by Henry Ford in the early 20th century that allowed car mass manufacture at a low cost for the US middle class (it is said that it came to democratise the industry) and Japanese *just in time* from the mid-20th century that allowed a country so short in competitive advantages as Japan to gain a considerable share of the world car market thanks to organisational capacity by service à la carte and extreme stock reductions through synchronising their assembly line with those of the providers.

The Oslo Manual avoids referring to the use of *technological* innovation since it feels that the word *technological* restricts considerably the scope of what is known as *innovation*. In fact, according to Drucker, *management* itself (and also innovation as part of *management*) is a social *technology*. And all organisations have by definition *technology* (pragmatic knowledge) they incorporate into

the product, the production and trade process and the organisational architecture to create value for a certain market.

Nevertheless, in spite of making a significant step towards enlarging the concept, the definition of innovation is still extremely ambiguous. What does *significant improvement* mean? And what effect may this ambiguity have on public policies? The solution is reasonably simple: the concept of innovation differs from that of improvement in the *degree of risk the former bears*. Improving is doing the same as before but with resource economy. For instance, installing *LEDs* in parking houses to tell if there is a car or not is not an innovation but an improvement since the owner acquires common technology on the market without taking any risk. It is a simple engineering, not a technological innovation project. And this is the real clue that shall define the object of public aid as far as it exists: to cover business risk in order to take on projects that could be of high social interest (due to their economic impact or their capacity to disseminate generated abilities) but difficult to tackle due to their degree of uncertainty and risk. This is covering *market failures*.

## Towards multidimensional innovation: the car industry

Let us have a look at the car branch, without any doubt the most competitive and R&D-intensive industry of the world and a great generator of management methods and best practices that have been exported to other industries. If we look at the profitability of the different car brands, especially the return on investment for their shareholders, we will see that there are two groups of car manufacturers clearly leading the race for competitiveness: <sup>4</sup>

► Those creating value for the shareholder by means of a *combination of attributes related to brand, quality, technology and design*, such as the German brands from the Bavaria and Baden-

Württemberg *cluster*: Mercedes, Porsche and BMW. They are characterised by transmitting the strong emotional values of an exclusive sports and luxury brand at a high selling cost and in general also high production costs.

► Those creating value for the shareholder by means of a *strategy with high operative efficiency*, with organisational and process innovations that allow to keep production costs low and offer cars with good value for money. A good example are the brands from the Japanese car *cluster* such as Honda and Toyota.

**Technology (understood as R&D investment) is necessary but not enough anymore. It is indispensable to compete, though not a guarantee for success.**

Other brands are by and large out of the game of perceived differentiating attributes and find themselves often in difficult financial situations, especially due to the low appeal of their shares related to other stock offering a higher profitability at the same risk. Some are even steadily losing money in their manufacturing and distribution operations, being only able to make up for it through their financial services when selling cars. These manufacturers wage a fierce price war among themselves, thus eroding margins and leading to progressive strangling of their supplier networks. They have no strategic differentiation factors.

The gap between R&D investment, the degree of innovation and market success turns apparent with all its cruelty in this industry: four of the ten most research-intensive companies of the world are car manufacturers (Ford, General Motors, Daimler-Chrysler and Toyota)<sup>5</sup> but three of them (the former) are destroying value for their shareholders and find themselves in a deep strategic crisis that threatens their very survival while only one (Toyota) ranks worldwide at the top of innovative companies<sup>6</sup> and has systematically been

making progress in its overall turnover and profitability since the 1950s. Thus, paradoxically, the most R&D-intensive companies such as Ford, General Motors and Daimler-Chrysler are in fact losing the war of profitability in the industry and need to take drastic saving measures.<sup>7</sup>

The technological flow needs to be followed at the same pace as it is generated so we are not expelled from the market. Innovation as a strategic differentiation factor has now entered other spheres.

The shares of Ford, the most R&D-intensive company in the world, are now less worth than twenty years ago and the company is thinking of selling its premium subsidiaries (Jaguar and Land Rover) to act on its severe financial crisis. General Motors suffered a 6% sales reduction in 2007 and Daimler, the company doing most R&D in Europe, recently sold Chrysler to a venture capital fund. By contrast, Toyota recently replaced General Motors, the traditional giant in the industry, as the manufacturer with the highest turnover, basically thanks to its continuous improvement capacity.

Opportunities lie therefore often in other, not strictly technological but organisational (logistic integration, cooperative development with suppliers, concurrent engineering) or marketing factors (creation of new market segments, sports design, creating emotions associated to the brand). The buying decision is becoming more and more emotional instead of rational.

However, there is more to it: if R&D investment (i.e. technological innovation) is not a key to competitive success without a differentiated strategic positioning, then *technology itself becomes a hygienic, not a strategic factor*. Who takes the decision of buying a car looking specifically at the engine technology or GPS? On the contrary, without the latest combustion technology, state of the art ABS brakes or electronic traction control,



▲ The German brands, Mercedes, Porsche and BMW, are creating value for the shareholder by means of a combination of attributes related to brand, quality, technology and design

the car would probably not sell. If it does, it is generally not thanks to the latest technological features but the factor determining the buying decision (*strategic factors for the manufacturer*) is usually the combination of brand and design or value for money, two competitive factors related to the two aforementioned groups of manufacturers. Technology (understood as R&D investment) is necessary but not enough anymore. It is indis-

pensable to compete, though not a guarantee for success. The technological flow needs to be followed at the same pace as it is generated so we are not expelled from the market. It is just good for having the cards to play the game but not good enough for winning it. Innovation as a strategic differentiation factor has now entered other spheres.

## Conclusions

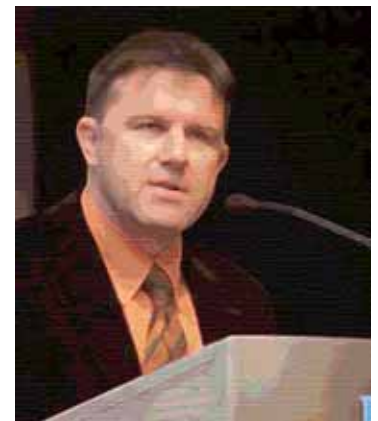
Innovation is a process the goal of which is to have strategic differentiation elements for the company. It is therefore about strategic organisation management. Whenever these differentiating elements are based on technology we speak of *technological innovation*, which is especially important as it creates strong barriers for the com-

petition to enter. However, the linear view of technological innovation (generation of knowledge, its wrapping into a product or process and later sale) does not explain cases of competitive success based on other innovations types, restricts the key to development of countries and regions to their R&D potential and comes up with one-sided and controversial indicators.

A new interpretation of the process from a systemic perspective and its holistic view (enlarging it to marketing and organisation) has made clear the need for new definitions of innovation and measuring patterns as those featured in the new edition of the Oslo Manual that sets an end to the classic linear conception of innovation as a thoroughly technological process and progresses firmly towards the creation of a systemic model for the phenomenon and a related system of indicators.

### XAVIER FERRÀS

Telecommunications engineer, MBA (ESADE) and DEA (UdG). Director of the Business Innovation Centre, ACCIÓ CIDEM-COPCA, having been director of business development and coordinator of the 2001-2004 innovation plan. Professor of Innovation at ESADE. Coauthor of the book *Pasión por innovar*.



## Notes

1. Eugeni Terré, *Evolución reciente de la política científica y de innovación en Cataluña*, Universidad Internacional Menéndez Pelayo, 2001.
2. Cf. «The Blue Ocean Strategy», Kim & Mauborgne, Harvard Business School Press, 2005.
3. Cf. «The Machine that Changed the World», Womack, Jones & Roos, Mc Graw Hill, 1990.
4. Goldman Sachs, «Time for a Model Change», Maxton and Wormald.
5. *Industrial R+D Scoreboard*, European Community, 2007.
6. Businessweek, 2006.
7. It also has to be said that these companies carry the burden of historical welfare schemes with a devastating effect on their profitability.