

APPLICATION OF THE SCENARIO METHOD FOR THE DEVELOPMENT OF DESIGN IDEAS INTENDED FOR THE CERAMIC DISTRICT

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1. INTRODUCTION

1.1. Prospective analysis.

The process of “conceptualising innovative product design ideas”, is without doubt the major challenge that any industrial company needs to tackle at the moment in order to face up to the competition within the competitive global framework. Processes such as the technological revolution, population growth and economic globalisation have highlighted the importance of rethinking a model to comply with the new circumstances of a changing context, by adopting new decision-making methods capable of responding to these needs in an appropriate manner; new methodologies that constitute a sound structure for dealing securely with the preliminary stages of the design project, i.e. employing new analysis and monitoring tools and techniques when successfully implementing the creative ideation phase for new products.

The fundamental aim of the research proposal presented here is precisely to collate the effectiveness of a tool based on prospective reflection. The prospective analysis instrument chosen to carry out this study was Scenario Design. This tool can be defined as a systemic process aimed at identifying “futurables” or alternative scenarios, in order to guide decision-making and prevent possible consequences. In this case, these decisions are related to the conceptualisation of products for companies in the ceramics sector.

The future can only be understood in two radically different ways: a deterministic view, in which the future is unique and cannot be changed by humans; and another structuralist or systemic view, in which the future is not unalterable, but is the product of the sum of the individual actions of humans. These two ways of understanding the future clearly depend on different life attitudes: the deterministic view of the future implies resignation - one must be prepared for the future, and utopian - the future is hopeful, it can be built; in contrast, the structuralist view is sceptical - nothing is certain, and relativist - everything is possible). One of the strengths of prospective analysis is that it considers both the qualitative and quantitative variables, so that it embraces both objective and subjective values. It assumes that all variables, both qualitative and quantitative, are related to each other, and considers that the future can be shaped in the present. One of the strengths of foresight is that it considers both the qualitative and quantitative variables, so that it encompasses both objective and subjective values.

Prospective analysis has a structuralist outlook, and considers several futures (“There is no one future, but rather there are several, at least the probable, possible, preferable and plausible ones” See Masini, E., *op. cit.*, 1993, pp. 8 AND 9), whereas technical and deterministic prospective analysis takes into account one future, the predicted future, an inexorable future towards which we are heading.

Prospective analysis does not predict what will happen, nor constitute a mere

projection of the current events, but acts as a starting point for the design and development of policies and strategies aimed at achieving the objectives of any institution or organisation in contemporary societies. Prospective analysis has a purposeful aim, i.e. it is strongly linked to decision-making. Just as military strategists try to explore all possible movements of the enemy before deploying their forces, or chess players meditate on their moves conscientiously when faced with the various strategies that their opponents may adopt, establishing how a technology may evolve or what impact it will have on future sales is something inherent with any policy which is intended to be implemented.

Prospective analysis illuminates the present action and provides mechanisms that lead to an acceptable, convenient or desired future.

It's foundation: *the future is yet to be done*, because the future is the result of the thought + the action. Thus the future is open to several possible scenarios: **futurables**.

1.2. Scenario method.

The **scenario method** is a means based on prospective analysis, whose ultimate goal is to prepare strategies for the company, the city, the country, the university, the organisation, etc. to carry out, which are desired for the future.

"A scenario is a model of a possible future, provided with internal coherence" (Porter, M., (1985), *Competitive Advantage*, Simon and Schuster, New York).

"A scenario is a whole formed by the description of a future situation and the trajectory of events that allow one to pass from the situation of origin to the future situation" (J. C. Bluet and J. Zemor (1970), Cited by: Godet, Michel "DE LA ANTICIPACIÓN A LA ACCIÓN. MANUAL DE PROSPECTIVA Y ESTRATEGIA". Ed. Marcombo S.A. 1993. ISBN: 84-267-0924-9).

"Scenarios are instruments for ordering perceptions about the alternative future contexts that can affect a company" (Fernandez Güell, Jose Miguel. "El diseño de escenarios en el ámbito empresarial". Ed. Pirámide. Page 54).

The fundamental core of the methodology of scenarios is that they should allow the verifying of strategies for different futures. These different imagined futures (futurables) are predicted based on supported data and on the best specialised opinions available.

1.3. Scope of the model.

In the case that concerns us, the model we have represented pursues the search for images consistent with future possibilities for the development of design ideas for products in an SME. This is why the scenarios technique has been chosen. The scenarios presented are not predictive in nature; this is not the aim of the prospective analysis or of this study. Our goal has been to provide a model of strategic thinking that enables the systemic examination of the challenges and

opportunities of a company in the Spanish ceramics sector over the next 10 years.

As we have already noted, rapid changes are taking place in international, European and Spanish economic contexts, which are having a marked effect on the Spanish ceramics sector.

This situation highlights the need for a platform of prior reflection on the changes and mutations that global competition inexorably presents, and that obliges companies to rethink constantly their strategic guidelines.

However, for various reasons it is not easy to make strategic reflections about this sector, and less so with regard to future forecasts. Firstly, the Spanish ceramics sector has traditionally adopted strategies based on technical prediction and anticipation, i.e. on interpretations drawn up based on data from the past and from the present and taking into account certain assumptions - reactive strategies, reacting to changes in fashion ("**DE LA ANTICIPACIÓN A LA ACCIÓN. MANUAL DE PROSPECTIVA Y ESTRATEGIA**". Michel Godet. Ed. Marcombo S.A. 1993. ISBN: 84-267-0924-9). Secondly, as in most of the traditional industrial sectors in the Community of Valencia, the formulation of strategic planning is generated by the administrative heads of different sectors of the companies, who allegedly seek to coordinate activities in order to achieve common goals, but in the case of implicit plans these objectives are not developed formally and are therefore unlikely to be reasonably aligned and successful in leading the organisation toward the goals set for the medium and long-term. For all these reasons, it is essential for business people to adopt proactive regulatory stances.

2. VERTICAL DEVELOPMENT OF THE DESIGN SCENARIOS METHOD

2.1. Identifying the variables of the context.

The core of the model presented in this paper involves generating **competitive advantages** from a design-based strategy which is likely to give the company a higher position in the market, from which it will, as a result, be able to obtain higher than average economic returns. It is led by a **focus based** on consideration of the **context-system** in which the companies compete. Companies are open systems that compete in the world market, and they no longer do so in a decentralised and isolated way, but in continuous interaction with their context, as business groups organised into collaborative networks.

The context is defined by a wide range of variables. This is why the context should be analysed using a method that will help us to identify the variables, by carrying out a more or less extensive inventory (depending on the problem to be analysed) and choosing those that will be most important ones for the evolution of

the system. These variables define different levels of analysis that act on different levels or limits of the context.

In this study we have chosen 5 levels of analysis or categories of variables:

- Political-legal.
- Economic.
- Socio-cultural.
- Technological.
- Environmental.

We can speak of three scales or limits of contexts: **the global context, the national context and the sector context**. This study methodology can be configured by combining the analysis levels of the medium with its scales as follows:

Levels Scale	Socio-cultural	Economic	Technological	Political-legal	Environmental
Global					
National European					
Sector					

Table 1.

We can consider the context as being the set of external factors outside of the organisation that influence to a greater or lesser degree the reference framework within which the company carries out its activities.

Design should be situated at the core of the organisation as a main work activity. The main factors that have a determining influence on the design project itself can be found in the context made up of all the external systems, and thus the project becomes gradually enveloped, with varying degrees of influence, by its different context analysis levels.

It should be remembered that the model now being developed is aimed at conceptualising strategic products. Therefore an exhaustive study of the trends emerging from the different levels of analysis, both from a global, national and sector perspective, must be aimed at those relevant aspects that provide clues about users' new needs and motivations, as well as their impact on the design offered by the company; about their position in the organisation, the surrounding context and their expectations of development.

This task is beyond the logistical possibilities of an SME; therefore it employs a system of intelligence based on operational information feedback provided by associations, research centres (technological institutes, design idea laboratories,

specialised training centres and universities, etc.) and business organisations. Such a system of intelligence has a morphology managed by a coordinator and provides the basic information about the context which can be used to analyse the crossed impacts from the different levels of the context. Among the tasks that it can perform is the preparation of balances of mega-trends and global trends, and exploratory, correlational, descriptive and explanatory studies designed to provide a snapshot of the industry that enables an ongoing analysis of its evolutionary development. Prospective studies on these issues that might be of strategic value for the sector are also carried out, for example, on design, technology, sustainability, distribution, etc.

The information infrastructure creates a series of outputs which constitute the support for the proposed model and from which it generates a diagnosis which serves to identify the key factors of local competitiveness, as a participatory tool which provides an understanding of the system, the alignment of the local players, and the fact that changes are often induced in a level by acting on another level, and lastly, it is a searching and learning process.

2.1.1. Study of the mega-trends of the global context.

The analysis of the global context takes as its starting point articles and publications of a recognised standing and prospective studies, where new questions, challenges and requirements for renewal are suggested and analysed; generic approaches and prospective analysis studies into specific areas, which attempt to describe plausible future scenario(s) of other types of attempts to describe, explain or predict future events in detail.

After analysing a range of general studies on the global mega-trends detected by the **different prospective analysis authors and studies**, the descriptors of those that are the most effective and with greater impact on the objectives of the model to be represented are extracted. From a particular level of analysis, each table will establish those mega-trends that anticipate probable future traits. The five levels of analysis are those mentioned above: **Socio-cultural, economic, technological, political-legal factors and those related to the environment and safety.**

It can be seen that many of these mega-trends have overlapping themes, and the different proposals will therefore be rearranged into argumentative threads, in order to simplify the large amount of information being dealt with. In each thematic thread there is some matching content, whereas others are different or contradict each other, based on the non-deterministic view of the future characterised by the prospective analysis.

2.1.2. Study of the trends in the national and European context.

Using the same criteria of representation applied to the matrix of trends on a global level, the descriptors of trends in the national and European context from the various studies analysed are associated. The aim is to designate the main trends

that are most effective and have the greatest impact on the goals of the model to be represented, by describing them in tables. Based on a particular level of analysis, each table will establish those trends that anticipate probable future traits in these contexts. The five levels of analysis are the same ones: Socio-cultural, economic, technological, political-legal and those related to the environment and safety. Once the final descriptors of the different trends have been determined, they are grouped into definitive variables, whose evolution will describe a series of partial scenarios or future hypotheses for the national and European context.

2.2. Conclusions regarding the analysis of the micro-scenarios of the global and national/european context.

For the development of trends in the global and national contexts we have indiscriminately taken variables of the partial scenarios resulting from analysis of the global, and the national and European context. It can be seen that most of the partial scenarios of the national and European context are determined by the influence of, or relationship with (with different intensity), certain global micro-scenarios; in fact, the latter are converted into variables with an effective action on those that typify the national context. It can also be seen that some of the trends identified have already recently appeared, or are about to occur.

First to be developed are the graphs that bring together in a single descriptor the different interpretations that the various studies carry out on each micro-scenario detected, in order to achieve greater operational capacity for their subsequent tabulation and structuring. Then both the global and national trends will be validated together in a single graph. The trends identified will be arranged using the same methodological criteria as that applied to the matrix of global and national trends.

This list presents the shaded variables in accordance with a system of "colours" (see Table). Each colour symbolises a series of trends whose evolution would generate different scenarios. The colour green would represent the group of variables whose progress would develop the desirable scenario, the factors with a yellow background, the transitory scenario between both extremes, and the red colour the group of variables likely to give rise to a pessimistic scenario trend. This system of differentiation will subsequently assist us in configuring the two main scenario axes. The list of definitive variables is described below.

Socio-cultural variables
Ageing population as a consequence of the increase in life expectancy. (A1)
Need for additional research into prospective analysis and evaluation systems. (A2)
Increase in inequality, exclusion and poverty on a global scale. The major problems of world instability are concentrated in Africa and Asia. (A3)
Greater investment in environmental training. (A4)

Concentration of populations in metropolises. Uncontrolled demographic movements. (A5)
Downward trend of university graduates in absolute terms. The feminisation of university enrolment is produced. Doctors from abroad are needed. (A6)
Trivialisation of cultural values as a result of globalisation of Western culture and its dissemination by the mass media. (A7)
Importance of research into families, in order to understand and plan for health care. (A8)
Imbalances in supply/demand for education and asymmetries between the educational systems and the requirements of production systems. Costs/efficiency. (A9)
The geographical expansion of Islamic fundamentalism in power generates conflicts of all kinds: religious, identity, ethnic, socio-economic, etc. (A11)
The development of digital technologies in the home will be associated with the needs of connectivity of the user and the provision of service, without representing a significant reduction in the number of hours of unpaid work at home.(A12)
Gradual return to spiritual and religious values, with the possibility of an increase in perverse anti-secular readings such as fundamentalism. (A13)
Greater consumer sophistication. (A14)
Movements reacting against globalisation. (A15)
Increase in and duality of migratory flows and the social integration of immigrants, in spite of increasingly restrictive policies. (A16)
Trend towards complexity and expansion in the consumer society. (A17)
Variation in the family structure. Trend towards single-person families. (A18)
Growth in the mistrust shown by members of the public in developed countries towards the sphere of political and economic power. (A19)
USA: World leader in forming values and aspirations. (A20)
Incorporation of components related to artificial intelligence into the architecture, as a key element planned since the design phase. (A10)
New social and employment models, caused mainly by the rising numbers of women in employment as a whole. Expansion of the role of women in society. Practical disappearance of patriarchal societies. (A21)
Outsourcing of services for domestic work, and the recruitment of immigrants. (A22)
Rethinking the role and conduct in companies. Changing from the pyramidal (hierarchies) to the horizontal or rhomboid (networks) in the modus operandi of social organisations. (A23)
The Spanish family will continue to play a leading role in the Spanish model of social protection policies, being able to count, from home, on access to preventive security services and social and health care. (A24)
Consumers moved by values. (A25)
Increase in individualism. (A26)
A globalisation process that is irreversible both from the economic, technological and cultural point of view. Connectivity of the major cities of the five great powers: USA, Europe, Japan, Russia and China. (A27)
Spirituality in business is appearing everywhere. The wave of awareness solutions. These are coming to companies near you: Vision Quest, meditation, forgiveness entertainment, Heart-Math. (A28)
Growing demand for a more participatory democracy in government. The NGOs exercise their influence via "collective actions". (A29)

Table 2.

Economic variables
Asia takes the lead in the global economy. Growth in Asia and arrival of possible new important economic means, if the rise of China and India occurs without problems. (B2)
Incorporation of ICTs in production processes. (B3)
Flourishing of non-traditional business models, often coexisting in the same market and in the same niche. (B4)
Accentuation of the gap between those who have joined the globalising processes and those who promote doctrines of trade protection, restricted to their regional sphere. This situation reduces growth possibilities. (B6)
Reduction of the life cycle of products. (B7)
Mass unemployment and the institutionalisation of under-employment as an alternative for survival. (B9)
There are large global oligopolies according to activity sectors. (B11)
The introducing of products into other markets. (B12)
Reorientation of the focus onto the "individual's" quality of life. (B10)
Need for qualified personnel from abroad. (B1)
Integration of countries/ splitting up of states, globalisation of markets/ revaluation of all things local, global deregulation/protectionism; lack of a regulated economic power. (B13)
More expensive hydrocarbons. (B14)
Discarding emphasis on the present and on short-term solutions in the management of increasingly complex companies. Use of new tools for strategic planning and long-term thinking. (B15)
Strategic priority for eco-design and eco-innovation. (B15)
Minimal global governance, with defensive and protectionist criteria that lead to profound differences between the U.S. and Europe, and between them and the major emerging countries. (B16)
Recessionary trend in non-residential construction, although much less than in the case of residential construction. (B17)
Change in the dynamics of economic development from North to South. (B18)
Severe decline in production and a readjustment of prices in house building that will lead to an increase in the renovation of buildings and the promotion of rental housing. (B19)
An even more accentuated international division of work. Increasing competition, leading to contradictory effects. Industrial delocation. (B20)
Recessive scenario for civil engineering in Spain, although to a lesser extent than for building. (B21)
Flexibility, speed of production and reduction of time-to-market. (B5)
Aware capitalism is the dominant economic model. (B22)

Relatively moderate increase in health spending as a consequence of the ageing population. (B23)
Strengthened emergence of the market economy as the sole predominant reference, deploying, with the help of Information and Communication Technologies (ICTs), a hitherto unknown degree of penetration of capital on a world level. (B24)
Creation of pilot groups of companies in matters of innovation. (B25)
Europe forms an alliance for the development of Africa, ranging from the connectivity of rural economies to international budgets. (B26)
Increasing growth in the number of global companies disseminating new technologies in a context of coordinating the economic policies of the major powers. (B27)

Table 3.

Technological variables
The unregulated use of some advances in genetic engineering could lead to ecological problems. (C1)
The automation of manufacturing processes may lead to an imbalance between the production structure (jobs) and the formative structure of the active population. A greater transfer of knowledge must therefore take place from the academic world to industry. (C2)
The consolidation of renewable energy sources as a viable alternative to other conventional sources will not slow down advances in nuclear technology. (C3)
Technologies for processing all products throughout their life cycle, for recycling and for the full use of resources. (C4)
The advent of a society based on information and knowledge. (C5)
Implementation of a new generation of means of transport. (C6)
Flexibility, increased production speed and reduction of time-to-market (C7)
Reorientation from an approach focusing on the "product" toward another focusing on the "person", in terms of comfort, personalisation, sustainability, etc. (C8)
Human-machine interaction (HMI) will have a common software platform in the medium term (2015). (C9)
Localised and distributed production systems. (C10)
Radical transformation of the basic manufacturing processes, resulting in them becoming processes that are: Adaptable (replying automatically to market changes), Digital (Virtual Reality for planning, incorporating software in the areas of the design and ICT in manufacturing) and organised into networks (without borders between companies and countries). (C11)
New ways of promoting the spreading of knowledge via the industrial fabric. Functional integration of ICTs into existing products; fuel cells in vehicles; recycling; components on a micro and nanometric scale. (C12)
Genetics, biotechnology, nanotechnology and computer technology will have increasing and greater variety of impacts. (C13)
Improvement in the efficiency of energy generating and distributing. (C14)
Extensive application of biotechnology and genome technology in a sustainable way. (C15)
Development of new sources of energy. Sustainable industrial technologies with an export potential in the future. (C16)

Materials for the whole life cycle of the product (disassembly, recycling). (C17)
Smart materials that will be able to act as design sensors. New materials for linking technologies together. (C18)
New medical devices and materials aimed at the disabled and chronically ill. (C19)
Lightweight materials (metals, polymers, carbon and glass fibres, composites) in design, production, recyclability and disassembly. (C20)
Standardisation, self-configuration and interoperability between the different technological devices, with user-friendly and accessible interfaces. (C21)
Tools for self-programming and monitoring processes, advanced sensors, artificial vision and self-diagnosis and tele-assistance elements. (C22)
Design for closed loop supply chain. (C23)
Applying fieldbuses for interconnecting equipment to control continuous processes on a plant level. (C24)
Design of low capital cost production processes for new products. (C25)
Communication by strengthening information networks, both internally and externally. (C26)
Architecture of new products (platforms, modules, services). (C27)
New viewing processes via distributed networks. (C28)
Training of qualified personnel in SMEs to implement new technologies and organisational practices in the network. (C29)
Methane from urban waste; biomass, wind energy; fuel cells for power and heat; clean energy production methods from fossil fuels; biological methods in water purification; robots in mines and oilfields. (C30)

Table 4.

Political-legislative variables
The U.S., although it is reluctant to assume the role of global "sheriff", continues to exercise the leadership role in international politics, however it loses the scientific and technological leadership in favour of new ICT-promoting powers. (D1)
An increasingly devalued UN. (D2)
Rapid expansion of the number of states in the EU, which generates more internal tensions due to a lack of common policies, with an increasing instability between neighbours and in its relationship with other powers outside the Community. (D3)
The decentralisation of political structures and the nation-state, via regionalisation, may lead to an increase in local conflicts for economic and cultural reasons. (D4)
Devaluation of power and legitimacy of the states in favour of supranational bodies –the EU– or necessary decentralisation of the responsibilities of auxiliary daily management, which will lead to a loss of real (qualitative) participation due to a lack of a clear legislative reference point. (D5)
Emergence of the Civil Society. (D6)
Devaluation of formal politics. (D7)

Timid reform of the UN Security Council that enables it to be opened up to more members, both permanent and non-permanent. The right of veto is maintained for those who held it at the beginning of the century. (D8)
A context where the diversity of economic and cultural models and value patterns prevail, and where Spain plays the leading role as a catalyst in the Mediterranean and in Latin America. (D9)
Promotion of rental housing. (D10)
Acceptance by Public Administrations of the need to develop sustainability. (D11)
Growing importance of the Third Sector. (D13)
New model of territorial distribution. (D14)
Policy drives for refurbishing housing and public areas. (D15)
Involvement of the public promoter. (D16)
Involvement of international agencies in Sustainable Development, which will be reflected in the national environment with the approval of a regulatory framework aimed at protecting the environment and the internalisation of environmental costs. (D17)
Cooperation and standardisation between innovation systems. (D18)
Regulations established that encourage eco-technology and ecologically-friendly economics. (D19)
Strengthening the process of convergence with the EU, albeit at a slower pace than desirable in terms of the expenditure on R&D+i. (D20)
Regulatory mechanisms in social and employment matters to mitigate the lack of supply in the employment market. (D21)
Social welfare policies that anticipate the demand from various age groups with specific needs. (D22)
Policies that encourage internationalisation. (D23)
Tariff policies that put limits on unfair competition. (D24)
Energy liberalisation policies to obtain cheaper energy and raw materials. (D25)
The EU is made up of 29 states: A strong European administration and good economic cohesion. (D26)
Spain is an influential country in the EU, particularly in terms of policies involving the Mediterranean and Latin America. (D27)

Table 5.

Variables related to the environment and safety
Worsening climate change. Global emissions of greenhouse gases. Growing evidence that climate change already exists. (E1)
Increasing amount of waste being generated. (E2)
Frequency of energy crisis. (E3)
Loss of biodiversity. (E4)
Environmental crisis and the collapse of ecological systems. (E5)
Critical shortage of water. (E6)
Limited availability of non-renewables, and growing risk of new price rises. (E7)
Pollution and over-exploitation of the seas. (E8)
Instability in Russia poses an increased threat to security, in a context where the EU's foreign policy actions remain limited. (E9)
Massive land occupation. (E10)
Growing demand for natural resources, combined with growing damage to the environment. (E11)
Alteration of tourism patterns. (E12)
Advanced systems for separating, re-using and cleaning industrial waste. Creation of centres in the sector for collection and treatment. (E13)
Reduction of the danger of a nuclear war on a global scale. (E14)
A redefining of environmental objectives over a longer term and criteria according to GDP/capita by macro-regions, without causing a loss of momentum in this type of issue. (E15)
Politically orientated alliance for cooperation with Russia in counter-terrorism operations, in the face of an uncontrolled increase in the capacity of weapons of mass destruction of some problem states. (E16)
Smart and ecologically friendly buildings fitted with supply and consumption control systems. (E17)
Construction of infrastructures and macro-equipment. (E18)
"Sustainable" lifestyle in the developed countries. (E19)
Very significant increases in productivity, based on socially responsible investment under new environmental parameters. (E20)
Distribution among the major powers of the functions for maintaining peace and promoting democracy by large areas. Progress towards a global ethics. (E21)
Europe has made a great effort to build up its military capability and has come to achieve the status of a coercive power. (E22)
Within the framework of the UN, the capable and responsible states relate the collective security and the various threats: terrorism, weapons of mass destruction, poverty, civil wars, extreme poverty, infectious diseases, etc. (E23)

Table 6.

3. EVALUATING THE VARIABLES THAT DRIVE CHANGE

Once the major trends in changes on a national/European level which could affect demand for ceramic tiles over the next 10 years have been identified and merged, the next step is to evaluate them on the basis of two criteria - Level of Impact and Degree of Uncertainty- which were measured according to three values - High, Medium and Low. This evaluation enabled the trends of change to be positioned in the so-called "Impact-Uncertainty matrix". In the top right-hand quadrants of this array are located the trends of change that are of greatest interest in the design of scenarios; i.e. those which display a strong impact on the evolution of the demand for ceramic products and reveal a high degree of uncertainty. The logic behind this choice lies in the fact that the important and uncertain trends are those which determine future scenarios because they represent the true sources of uncertainty.

		Degree of uncertainty about their occurrence		
Levels of impact		LOW	MEDIUM	HIGH
	HIGH	(A1) (A3) (B3) (B6) (B11) (B12) (B13) (B14) (B18) (B24)(D10) (D13) (E1) (E2) (E10) (E11) (E18) (E19)	(A12) (A23) (A25) (B2)(B5) (B7) (B17) (B19) (B21) (C6) (C7) (C8) (C10) (C18) (C20) (C25) (C27) (D15) (D16) (D25) (E3)(E5) (E7) (E9) (E13) (E17) (E20)	(A14) (A17) (B15) (B15) (C4) (C11) (C13) (C14) (C15) (C16) (D4) (D18) (D24)
	MEDIUM	(A2) (A11) (A20) (A24) (B4) (B16) (B20) (B27) (C19) (C28) (D1) (D3) (D8) (D11) (D14) (D20) (D21) (D26) (E6) (E21) (E23)	(A5)(A21) (A28) (B9) (B10) (B26) (C3) (C12) (C26) (D5) (D9) (D19) (D22) (D27) (E4) (E15)	(A4) (A10)(A27) (B1) (B25) (C2) (C17) (C30) (D17)
	LOW	(A7) (A8) (A29) (B22) (B23) (C1) (D2) (D6) (D7) (D23) (E8) (E14)	(A13) (A15) (A16) (A19) (E12) (E16)	(A19) (A26) (E22)

A: Socio-cultural variables. **B.** Economic variables. **C.** Technological variables. **D.** Political-legislative variables. **E.** Variables related to the environment and safety.

Table 7.

4. ANALYSIS OF THE SECTOR CONTEXT

In this section we focus on the ceramics industry in the Castellón region, based on different studies that explore, describe, correlate and explain the area that is the subject of our research.

The analysis of the variables that characterise the Spanish ceramics industry are therefore the result of an exhaustive in-depth review of the literature, which first

logically and consistently links the concepts and proposals from previous studies, providing an overview of the state of knowledge of the subject under investigation. Secondly, it helps us to establish and quantify the degree of association between variables.

The main objective of this section is to set out the main elements that characterise the company's regional/sector context as well as the different components of its industrial area, that form the basis of the study (basic infrastructure, the employment market, support institutions, local business culture, etc.). As a method, we have basically implemented **exploratory prospective analysis**; i.e. analysis of current events and trends and of where they are leading us. Yet elements of **regulatory prospective analysis** have also appeared; i.e. what events and trends should occur in order to achieve a desirable scenario. The points analysed in order to construct the basis were the following:

- Econometric data related to production, exports, consumption and type of product.
- Analysis of the sector's innovation system.
- Identification of the types of innovation in a ceramics industry area.
- Assessment of the design management in the ceramics company.
- The ceramics sector's environmental policies.
- Strategic directions in the ceramics company.

It is considered that drawing up a basis that describes a series of events and variables of the environment closest to the company and its projections in the future provides important criteria for constructing scenarios on which the strategies involving the positioning of the company can be formulated, in the national and international sphere.

5. CONCLUSIONS FROM EXPLICIT INFORMATION: IDENTIFICATION OF VARIABLES FROM THE CROSSING (INTERRELATIONSHIP) OF THE VARIABLES EVALUATED CONCERNING THE GLOBAL/NATIONAL CONTEXT AND THE CHARACTERISATION OF THE CONTEXT OF THE SECTOR

Once a detailed and in-depth quantitative and qualitative "image" has been built up of the situation in the sector that is the object of the study, where the variables to be taken into account have been identified, quantifiable or otherwise, they should be situated in the transitory scenarios identified in the analysis of the global and national/European contexts, after evaluating the main variables driving change. The trend for the sector variables in the global-national/European scenarios allows us to draw up a list that is as complete as possible of the different

hypotheses that constitute the definitive scenarios. To do so, the trends obtained in the validation of the global - national/ European context will be re-sampled and will be contrasted with the variables that characterise the sector context **in terms of prospective analysis**, i.e. thinking about the possible future developments of the trends, in order to facilitate the design of scenarios.

6. CREATING AND DEVELOPMENT OF SCENARIOS

After evaluating the trends of change, those which demonstrate a medium-high level of impact on the demand for ceramic products and a medium-high degree of uncertainty about the possibility of their occurrence and their subsequent interaction with the main sector trends are grouped into homogeneous groupings.

In this sense, our model as a whole sets out a series of variables that affect the company and the user as the object and purpose of any design action, based on the following premise: The development of design scenarios must play a central role in any business strategy scenario, and thus its correspondence, in addition to positive, is indispensable and inseparable. It is a tool for understanding how the users and their context are evolving, but also for understanding the context in which the organisation that produces objects to satisfy the needs of consumers develops. With the design scenarios method, we translate the different scenarios into the different functions, from the point of view of the user, which the products manufactured by the company need to fulfil. Each scenario will give us different kinds of functions and purposes, with a different strategic load. **Thus the model that we are presenting here will modulate those variables that affect the two fundamental aspects in the design of products: the user and the immediate sector context.**

VERTICAL AXIS (V): **Evolution of the user and the social norms that form it.**

HORIZONTAL AXIS (H): **Evolution of the sector context.**

Considering the circumstances, the report describes the evolution of the ceramic sector in terms of three possible scenarios within a time-scale up to 2020. These scenarios are developed under the later heading with the following slogans:

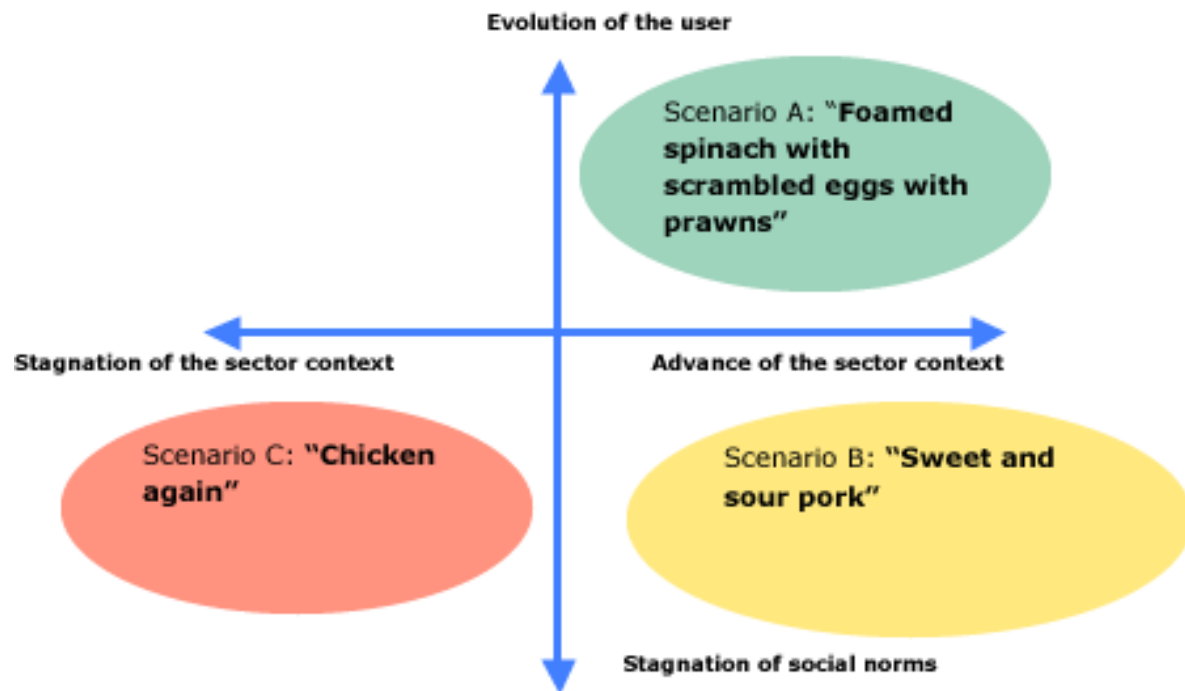


Figure 1.

Scenario C "Chicken again" is an entrenched crisis scenario which represents a possible panorama if the sector does not take it upon itself to become actively integrated into the irreversible process of globalisation, with a proactive attitude, "shedding the dead weight and the ballast which represents the proverbial traditional mentality", exemplified in the "it's always been done that way" or "we have known about this all our lives" attitude. After a number of years of deteriorating competitive position, the current production structure of the Spanish ceramics sector is in a situation where it is failing to adapt to the challenges and opportunities arising from a greater degree of international competition. The strong imbalance between the costs of labour and productivity, as well as the high job specialisation in the production of intensive goods, have brought about a complicated panorama in which the industry is the hardest hit. The relocation of production activities will generate savings in direct labour costs, and in the distribution of the product in these areas, but will however lead to a rapid transfer of knowledge (both tacit or explicit) to the competition in those receiving countries. Moreover, the additional costs that will be generated by the movement of production activities to low-cost countries will not always be easily met by many companies (indirect staffing costs [logistics, supervision, administration and management], increased general costs: [travelling, communications, auditing, etc.] and an increase in stock levels and its associated costs: [financial, obsolescence, storage, etc.]).

The production activity in this scenario is characterised by an industrial fabric consisting of a quantity of non-specialist SMEs with a relatively vertical integration of companies. Companies of a family origin. Little business collaboration in joint projects. A great deal of subcontracting. Poor positioning in the top market sector. Highly fragmented distribution and marketing, and without a clear image of the

end user. Re-encounter with the national and European market after failed efforts to penetrate “outside” markets.

Technological innovation continues to be driven by ceramic colours and glazes and supported by ICT. These innovations will continue to have a fundamental impact on the process in the manufacturing phase, in the form of incorporation of new elements in the production operations or functions. These are incremental in nature, giving rise to new products which often result in specialised versions on existing products for increasingly small market niches, as a result of the hyper-fragmenting of the markets. Innovations in design are aimed at the growing development of the product in functional and aesthetic terms. Innovations aimed at considering the product’s emotional and symbolic dimension are relegated to second place. Design quality, understood as being the quality that in essence sets out the relationship between the product and the consumers, and their subjective needs and motivations, is hardly examined in any depth. Therefore, aspects such as the quality of market research, quality of concept and quality of specification are looked upon as being of little importance as targets of innovation.

The porcelain laminate is strengthened for both vertical and horizontal rendering. Developing the design of the back of the piece, of techniques of decoration and positioning, and innovative gripping systems. Ceramics pressed with a mechanical locking surface configuration, similar to the configurations found in some extruded pieces. The inconvenience caused by the effect of low absorption on adhesion is overcome once and for all. Enormous formats. Consolidation of new shaping systems and printing systems by ink injection (Ceramic plotter) and laser technology.

Most of the strategies related to ecodesign and eco-efficiency introduced by companies will continue to be related to operations having to do with the production process: Preparation of raw materials (milling and fragmenting), pressing, drying, preparation and implementation of enamels, cooking, sorting and packing, and with environmental practices in the storage and handling of raw materials.

Scenario B (“Sweet and sour pork”) is a transitory futable that contains many contradictions. An industrial sector bemired in distribution conflicts (political and economic) in a global framework that will see the consolidation of China as the world’s number one producer and exporter. Brazil and India will overtake Spain in terms of production. The relationships of the national and European regulatory framework with the production system are characterised by being less interventionist, and there have even been major reforms promoted in the employment market and in the Social Security system.

A trend towards formal mergers, in the face of the unstoppable process of corporate concentration as a result of economic globalisation; based on the principle that the best way to create value is interdependence, continuing cooperation, close interaction and mutual dependence, i.e. symbiosis. Many of these initiatives will

fail. Joint investment firms, related to flexibility mechanisms for acquiring emission reduction credits from third-party countries.

Disappearance in particular of smaller-sized companies offering low price products, which have focused their customer-base on property developers rather than those who have opted for production specialisation, and those businesses run according to continuist policies that are family rather than professional-orientated. The largest companies will reinforce their position.

There is a slight increase in innovation related to the introduction of a new organisational method in practices, the organisation of the workplace of work or relations outside the company, but in a very toned down way and lacking in conviction. All the company's personnel will be trained and made aware of branding. *The presentation of the product will be improved, supported by innovative solutions capable of stimulating the wishes of the customer in the real use scenario* (places and situations where the product is used). Use of advanced computerised tools for immediate viewing of the installed product. In terms of participation in trade exhibitions, the Sector Trade Fairs and other institutional events will still be attended as much as possible, but without devoting all or almost all of the budget to "being there".

A certain awakening of technology and innovation is detected. Technological innovations continue to focus on functional factors or those of use and in the aesthetic functions of the ceramic object. New pastes will appear based on indigenous clays. Tiles that are less rigid, while maintaining their hard-wearing characteristics and mechanical toughness; in other words, having a greater resistance to bending. Perhaps a new technology of hybrid organic and inorganic materials could make this property a reality. Light ceramics for hitherto unimagined applications. Nanotechnology will be applied to provide new functions for ceramics: anti-slip, anti-scratch, new design and texture effects, thermal effects, etc.

From an aesthetical point of view, new expressive approaches will be consolidated based on the restoration and reinvention of ceramic material as such, although finishes that imitate materials will arrive at their maximum improvement without losing any of the ceramic's inherent new technical achievements.

A certain interest in other strategic actions to address the eco-design of the product is also therefore perceived, such as designing with the aim of allowing the subsequent reuse or recycling of the product, a reduction of its volume and weight, or encouraging the use of ceramic products in more ecologically-friendly ways, which would reduce the chronic risks arising from their use.

With regard to education and training, it is the private sector which has begun to invade and participate in the restructuring of the system, driven by the need to solve urgent shortcomings.

Scenario A (“Foamed spinach with scrambled eggs with prawns”) is a very ambitious scenario that requires first and foremost a proactive **understanding** of the macro-process of globalisation which is operating in the world, and a desire to **do away** once and for all with the self-limiting structure characteristic of the Spanish ceramics industry that makes it difficult to find clearly successful alternative strategies. Addressing this scenario requires a change of mentality, as well as the enthusiasm to undertake hard, coordinated and sustained work and at a good pace.

The Spanish ceramics sector operates in a European environment composed of 29 states, with a strong European administration and good economic cohesion, where marketing is done via intermediaries, as in most developed countries. Ceramics distribution is becoming concentrated, and is doing so in various ways, depending on the area and the type of end consumer, but the trend is unstoppable.

A trend towards relational marketing is appearing among suppliers of raw materials and machinery. Each customer is recognised as being an individual, with their specific individual requirements. An increasingly exclusive and differentiated design. This is the basis for personalising every interaction with a customer based on their interests and preferences that are derived from the knowledge that we have about them.

Systematic use by companies of methodologies for detecting subjective requirements in the design of the product. In this regard, organisations need to have the ability to create and maintain an attractive value proposal addressed to their public, encouraging emotional and sociological aspects, which has so far been avoided in devising ceramic products. Growing needs for organisations to hold on to their best customers. In this way, their main aim will be focused on encouraging customer loyalty.

This new mentality is the result of the generational leap that will lead to the adoption of a more managed model in which decisions are taken by shareholders via the board of directors. This translates into an increase in the workforce of designers in organisations specialising in habitat (sociologists, designers, industrial designers, architects, experts in domotics, sustainability, etc.) as a result of the diversification of the activity in the ceramics sector (a new life for this material). “Are we creators of a lifestyle or experts in ceramics?” The incorporation of engineers from other countries into the workplace will also take place.

In terms of training, a systemised analysis of the company’s training needs is undertaken, in order to be able to identify the objectives clearly. Standardisation of training that is managed and connected to the H.R. area, and periodic evaluation of the impact of the educational activity in the company.

In terms of trends related to the product as such, ceramic objects are conceived as independent structural units, for use in new applications. Establishment of new

methodologies for the quantitative assessment of ceramic rendering systems with engineering principles, where the design is based on the characteristics and the envisaged movements of the building in question. Consolidation of nanotechnology for the creation of conductive ceramics for machining by electro-erosion, electromagnetic shielding, etc. Introduction of electronic elements in tiles, to promote the connectivity of the product with the user or the community as an extra value. Incorporating smart technology in buildings (in ceramics). Generating smart spaces based on computer systems (invasive intelligence). Insertion of chips in ceramics “self-sufficient homes”.

Ceramics increasingly loses its purely epidermal nature and takes on more structural and technological roles.

In terms of the production process: Promotion of personalised production using numerical control machines, etc, forming part of the same genealogy at all times. Incorporation of information and telecommunications technology, and smart technology into the ceramics process line. Flexible and versatile productions that generate products that stand out, and which include an integrated set of values based on the interests and preferences deriving from what we know about our regular customers (*Paradors*, hotels, franchises, public works, etc.). The results are proposals that are more relevant to the customer, which add more value to the relationship, reinforce the link with the brand and improve the effectiveness of communication.

This scenario requires a large number of people with great individual autonomy, involved in the fight against social opposition to change, and able to learn and to undertake projects. This scenario requires design to be integrated as the basis of the company strategy and used as a way of thinking that is fundamental in order to innovate; a kind of enabler of structures and values.

5. DESCRIPTION OF THE STRATEGIC POSITIONING OF EACH SCENARIO

Projects will be developed based on the areas described by the change-driving variables structured in previous phases. The identification of different scenarios or design contexts channels the development of new design concepts for products based on a theoretical view of the future. The intermediate steps outlined by each scenario are drawn up, together with the strategies for tackling the various design concepts. Transitory strategies are called for in this phase, i.e. the various possible actions based on various lines of product development (scenarios). These strategies will be “carved out” based on the assessment of the implications that each of them would have on the different functional areas of the company, both in terms of innovations in processes, products and organisation and in marketing. **To measure the level of impact of each scenario on the organisation, a comprehensive functional analysis of the organisation was first carried out.** The analysis of

the functional system of the company was limited to characterising the elements that make up those actions and skills that the company performs and possesses in order to carry out its activity, and to the means at its disposal. By verifying the requirements allocated to each scenario for characterising the ideas presented, the gaps in the company's functional system caused by the impact of these design ideas are can be identified. In the words of Fernandez Güell *"It is a case of detecting the company's shortcomings in order to face the challenges of the future successfully for each scenario"*. (Fernández Güell, José Miguel. "El diseño de escenarios en el ámbito empresarial". Pub. Pirámide. Page 119).

6. ESTIMATING INTERNAL STRENGTHS AND WEAKNESSES: THE SWOT MATRIX

The characterisation of the provisional strategies described in each scenario are compared with the reality of the company situation, forming an initial task that is primary and essential for the linear development of the model. One of the best-known tools for comparing the transitional strategies for each scenario with the internal characteristics of the organisation is SWOT analysis, by means of which all the STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS which are identified by the variables defined from the diagnosis of situation are arranged into a matrix. The SWOT matrix allows us to show, on the one hand, the internal aspects that make up STRENGTHS (i.e. positive internal aspects of the company or territory) or WEAKNESSES (i.e. negative internal aspects) in order to meet long-term strategic challenges.

7. CONSIDERATION OF REMEDIAL ACTIONS

This may well be the most delicate point for business people. Accustomed to thinking in terms of market areas on a short-term basis, to responding to econometric goals, they now have to start considering initiatives to correct the deficiencies identified, in order to deal successfully with a scenario over the long-term that involves the "heart of the consumer". It is time to "decide" to invest in tangible resources in order to make the chosen ideas feasible, and therefore it is an opportunity to discover how willing the business person is to change the present situation, or on the contrary, to maintain it. The initiatives must involve a planning process: setting out the scope of the action, its timing, the identification of the teams responsible, the estimate of budgets for implementing the strategic positioning involved in each chosen idea, and the establishment of the sources of financing.

8. FORMULATING THE STRATEGY

Most of the methodological approaches relating to building scenarios culminate with the formulation of corporate strategies. Prospective analysis is based on the need to report on future alternatives with knowledge and opinion provided by experts in decisions and strategies. Whatever the activity it may be engaged in, in order to maintain an adequate level of competitiveness in the long term, an organisation must use procedures for analysis and formal decisions, in the framework of the “strategic planning” process.

9. OTHER ASPECTS

The theoretical development tool presented here has been awarded a prize in the first edition of the Valencia Region Prospective Analysis Awards of the Evaluation and Prospective Analysis Agency of Valencia - Agència Valenciana d’Evaluation i Prospective (AVAP).