EVALUATION OF CERAMIC TILE DESIGN

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The question of whether a product/model is "good or not"[1] is often raised in the ceramic tile sector. The answer affects the consumer when he purchases tiles for his kitchen, bathroom, apartment floor, etc., on having to choose between various rivalling products. It affects the manufacturer in view of the uncertainty of whether an old model should continue with its current characteristics, be withdrawn from production or redesigned. It affects the designer who needs to choose from a multiplicity of possible solutions at the manufacturer's demand. It affects the specifier (architect, decorator, etc.) when he needs to ensure the aesthetic and functional quality of the ceramic material in his project. It generally affects all those involved in taking decisions with regard to the product, normally professionals with different training backgrounds, whose work it is to guide the wishes and needs of buyers or users.

1.- THE DIFFICULTY OF EVALUATING CERAMIC TILE PRODUCTS/MODELS.

There is no doubt that evaluation considerably encourages divergences of opinion or contradictory opinions regarding new ceramic products or models [2]. The difficulties are almost as great for the experts as for the general public. Some may think, for example that the best ceramic wall cladding still comes from Italy, others that Spanish models are market leaders, or others again that Brazilian tiles are more priceworthy, or even that local ceramic products are better than any others.

[1] BERNARD GRENIER *Product evaluation.* Higher Industrial Education Research Institute, France.

[2] We shall use both terms to refer to products with the characterising difference that each term implies. See New Products: those that satisfy a function not met by the products produced to date by the company. New Models: those that satisfy a function already met by company products, but with different formal and constructive characteristics.

The difficulty lies in the synthetic character involved in formulating the evaluation, as it can bring to bear various heterogeneous criteria. A *product* may more or less aesthetically match the tastes of the moment. It may be easier or harder to make. It may be more or less expensive for its use. It may be sold in larger or smaller amounts. Its technical performance may be high or low, and involve more or less sophisticated technical mechanisms. It may be more or less easy to apply, handle and maintain. It may deteriorate quickly or have a long useful life. The accompanying service may be high or low quality. It may be safe or unsafe, etc. These criteria stem from different points of view: cultural, utilitarian, technical, commercial or economic. Concordant *product* evaluation largely appears to depend on the evaluator, firstly, because of the particular preferred viewpoint, and secondly because of the varying levels of objectivity that evaluators adopt in carrying out their work.

There is clearly a correlation between the foregoing points of view and evaluation objectivity. Nobody denies that an appreciation of a cultural nature is more subjective than that of a technical or commercial nature, and that appreciations of an economic or utilitarian nature largely depend on the circumstances in which the *product* is observed. Although its technical function will be identical, a snowplough is not as useful in the tropical jungle as in the Arctic. And when we turn to the issue of price increases, the costs paid by the manufacturer and those paid by the user are not the same. These are clearly extreme and even exaggerated examples. The reality of the ceramic tile sector is usually less extreme, but that does not mean it is easier to distinguish between apparently similar circumstances and ones that are radically different.

For this reason, a considerable number of companies from the ceramic tile branch turn to two easy evaluation criteria: *commercial and technical*. Some companies see the final *product* quality test as a key to knowing if it will sell well; others are less concerned about the commercial success of the product (they consider this a secondary issue) as they are focussed on the product's technical properties, which are perhaps exceptional or at least based on an extraordinary technology.

Both criteria can certainly be objective, as they are easy to apply: in the first case by fixing the number of sales, balance sheets and profit margins; in the second, by leading the technical processes to standard conditions, using standard methods and measurement units.

However, using these evaluation criteria in the same *product* can lead to different conclusions. *Product*s that are objectively technically advanced can change, yielding poor commercial results. Some will say that technically mediocre *product*s can be distributed by efficient marketing methods (advertising, distribution, dominant market position). Thus, while *product* technical qualities can be assessed almost immediately, most commercial qualities do not demonstrate their definitive value until the product is on the market, and its evaluation is of purely academic interest.

Considering the many reasons for evaluating a *product*, we can see that the (easy) solution, taking into account only commercial and technical criteria, is not very satisfactory. Certainly, because many aspects relating to cultural, utilitarian and economic factors are ignored, but mainly because it looks backwards rather than forwards, focusing more on the past than on the future.

Assessments are useful at any point in the *product* development process, both at the beginning and at the end. In fact, once a ceramic item has been qualified as "good" on a commercial or technical level, the main concern is getting this approval endorsed by the agents (human resources) that conceived/invented, made and sold it. However the purpose of an evaluation should go further and attempt to adopt a more strategic approach to induce users (target group) to purchase the ceramic solution for their home, or develop excellent ceramic tiles, this being probably the best way to emphasise the usefulness of the *product* (for domestic or public applications), or the relationship between tile technical, commercial, functional, economic and cultural characteristics. It is therefore useless to economise when seeking a complete analysis of all the dimensions of a *product*, by illustrating how these dimensions overlap.

There is obviously no ideal product in the ceramic tile sector. It is clear that a ceramic floor tile, dado, wall tile etc., will be considered good by some criteria and defective by others, and will thus appear better or worse to different evaluators, depending on how they are involved in the product and their role in the evaluation process. It would be ridiculous to invalidate the action of evaluating a *product* for this reason. Rather, the evaluation should focus on seeking objective bases that do not question this action, one that could take into acount any observation (closely related to requirement concerns). Instead of generating controversy, the method should allow the different agents to take decisions that will fully affect an understanding of the facts: it would help in making a choice in a purchase, taking decisions on launching a new *product*, selecting the technology and its effect on certain peculiar functional feature, adopting a style compatible with convenience of use, ideating more competitive *products*.

2.- BASES FOR EVALUATING CERAMIC TILE PRODUCTS/MODELS.

In view of the complexity of the problem, it is necessary to first identify the factors involved in the problem at issue. Three basic categories can be identified and highlighted:

A) THE MATERIAL COMPONENTS OF A PRODUCT.

A *product* is ideated to provide a service for man's needs according to his differing habitats. A *product* hardly ever acts autonomously, as it enters the same space together with different human activities, acting as an intermediary in the relation between both. (Table 1).

Circumstances	Product state	Environment	Functional state		
			Technical	Use	Economic
Definition	Idea, concept, specification	Development office	A	G	M
Development	Prototypes.	Development laboratory	B	H	N
Manufacture	Parts – subsystems.	Factory	C	I	O
Marketing	Complete inactive product.	Distribution channels	D	J	P
Use	Complete active product.	Many different environments	E	K	Q
Recycling	Deteriorated product.	Recycling channels	F	L	R

Table 1. *Characteristics of the contextual relation between the ceramic product/model and individual needs/attitudes.*

The environment needs to be observed via three components: the natural environment (natural elements, other living beings), *material factors from the artificial environment* (other products/models, fittings) and *methodological factors from the artificial environment* (the way in which they are used, regulations for use).

Part of the specific *product* environment is often ideated parallel to the product itself, thus converting it into its own environmental system [3]. (Table 2). If we look closer, we can observe a strong consistent technological core [4] to the *product*, and a space/flow of communication [5] between this core and the environmental system. This communication joins the *product* to its environmental system.

	Use	*Measurements*	*Economics*	*Time*
Representation of production.	Convenience of production. Safety of production. Detrimental effects of production.		Quantities sold. Price Balance sheet Direct production costs. Profit margin. Investment Socio/ecological costs incurred	Representation tied to the influence in time of the foregoing.
Representation of use	**Instrumental:** – Efficiency of use. – Convenience of use. – Safety of use. – Detrimental effects of use. **Perceptual:** – Aesthetic. – Symbolic. – Appearance of the instrumental representation of use.		**Exploitation purchase/cost price:** – Energy – Consumption – Surplus parts – Repairs – Insurance – Destruction **Any exploitation benefit.**	Realisation linked to the influence of time on the foregoing (e.g. Durability, reliability of use)[1].
Representation of Technology		All the physical measures used to calculate the relationships of the inner material factors among each other or for the outer material factors of the product, e.g. dimensions, weight, volume, hardness, viscosity, discharge, velocities, frequencies.		Representation linked to the influence in time of the foregoing (e.g. technical reliability).

Table 2. *Product analysis (main points to be evaluated).*

[3] *The environmental system* comprises two parts: one ideated specifically for contact with the ceramic product/model (house walls, urban pavements, other ceramic items, etc.); another completely independent of the existence of the ceramic product/model (for ceramic tile for example abrasive agents, moisture, cold, wall concavities/convexities, etc.), which however need to be kept in mind on ideating the ceramic product/model.

[4] *Core*: this is the most technical part of the ceramic product/model, a network of components/systems that only relate to each other; in purely technical and materials relations (in a ceramic tile for example, graphic decoration and colorants, the ceramic tile and firing temperature, etc.).

[5] *Communication* is the boundary of the product/model, combination of inner and outer factors, which ensure the relation between the technical core of the product/model and the individual that uses it, on the one hand, and the environment on the other. The inner part is material (packaging) and organisational (way of using it, after-sales service) and for the ceramic product/model includes dimensions/size, decorative patterns, surface characteristics, maintenance handbook, application handbook, etc.

[6] Obviously all the changes of representation with time: the characteristics of its variation also constitute a representation.

B) CIRCUMSTANCES OF *PRODUCT* LIFE

A *product* has its own life: it is ideated and developed, starts its existence, functions, deteriorates, is readapted, dies and is recycled.

Product definition (concept) is a matter for the creators (managers, board of directors, heads of sales areas, etc.) in the so-called development offices (product committees, etc.)

Project development is a matter for the designers in the design and development offices and in the control laboratories [7].

Product manufacture is a matter for the plant managers and factory workers.

Product marketing a matter for sales staff by means of distribution channels and expected buyers (target group).

Product use is a matter for different categories of users (those that use or repair it are benefited by it or adversely affected by it) in a wide number of different places.

Product recycling is a matter for recycling networks / companies working in different sectors.

All these agents and environments differ radically. However, they are not involved in the *product* in the same way. Simplifying greatly, one could say that a good *product* is:

— Well ideated by its conceiver.
— Well developed by its designer.
— Well made by its producer.
— Well sold by its salesman.
— Well used by its user.
— Well recycled by its recycler.

However *"well"* does not mean the same to these individuals. Does it mean ease of installation? Does it define a certain lifestyle? Is safety expected? Does it resist all the expected aggressions? Is it low cost? Does it exhibit an intelligent use of graphic and colour ranges, etc.? It can be mentally satisfying to hypothesise that a good concept, good development, good production, good marketing, good value in use and good potential recycling should converge, but we are aware that these facts are often quite different. It is not likely that a badly realised product will end up selling well, but nor is it certain that a well made product will be a commercial success.

The evaluation criteria of a *product* in the conception / creation stage are extremely complicated, as they should logically include all the other aspects. How can it be well

[7] Here there is a paradox in the ceramic tile sector as these levels are only characterised by technical offices, where products are only oriented in terms of their technical characteristics, while the aesthetic / formal / communicative features are stereotyped by external agents such as the trends or products of competing companies or branch leaders. For this reason, technical and commercial objectifying prevails in the scarcely implemented levels of model evaluation.

ideated for it to become well developed, well made, well sold, well used and well recycled? Success in all the other stages of *product* life depend on its original conception, and this is what product evaluation does, in the final thrust, it is almost equivalent to the evaluation of its conception. It is certainly difficult to see how a poorly conceived *product* can be good at a significant number of other levels.

C). CHARACTERISTIC TYPES OF PRODUCT REPRESENTATION

To review the radically different natures that characterise a *product*, it is useful to distinguish three main types of functions:

- *Technical function/representation:* this implies the relation amongst the different material factors. They are of a physical nature and can be carefully verified with the aid of well-defined, accepted measurement systems (for example resistance to abrasion, friction, compressive stress, etc.).
- *Use function/representation:* these involve the relations between the *product* and the user (human being) in his system of direct and indirect living experiences. They are of a sensorial, physical or mental nature and are guided by means of communication (efficiency, convenience, and safety). It is difficult to define a way of measuring these and there is no standard evaluation system.
- *Economic function/representation:* these involve the participation of the factors resulting from the foregoing relations that can be translated into financial terms and are a consequence of monetary transactions (costs, receipts, profits, invest). Their common measurement unit is money.

There is a system of relations between these types of major functions, which is far from being determining for two reasons: because there are really no mutually unequivocal relations between the different types of elemental functions; as there is considerable functional variation between the different states and circumstances of a product life.

Why is there no system of relations between major functions, taken as mutually unequivocal relations?

1. Because each elemental function depends on various components and elemental functions of an earlier point in time.
2. Because each component or function at an earlier point in time influences various subsequent functions.
3. Because no component or elemental function of one type is automatically involved as an elemental function of another type.
4. Because the technical function is not an end in itself, but an intermediary in the selection of appropriate components for the economic and use function, as a conclusion of the investigation (thus the function of high technical level does not necessarily mean a function of satisfactory use, but a function of desirable use, and the economic function may need a certain degree of technical function).

The variations in function of the different steps of product life are summarised in Table 1. It is obvious that groups A, G, M and B, H, N are quite different from each other as product/model varies according to its state, environment, evaluators and evaluation criteria.

3.- CAUSES OF DIFFICULTY IN PRODUCT EVALUATION.

A) INADEQUATE DISTINCTION BETWEEN THE NATURE OF THE REPRESENTATIONS

The foregoing analysis has allowed identifying the causes of the difficulty of *product* analysis, which for the sake of simplification should be divided into three categories.

B) INADEQUATE DISTINCTION BETWEEN THE CIRCUMSTANCES OF *PRODUCT* LIFE

The use function should not be assessed *a priori* by the standards of the technical function. For example, a ceramic item for a domestic floor will not be better for resisting abrasive chemical agents, because its is designed to respond correctly to industrial environments where work is done in the most demanding conditions.

The use function for example, is not only involved in use, but also in production, though they are not the same. A *product* may be easy to make, but not necessarily easy to use (appropriate position for required performance). Similarly, the economic function does not only involve production, but also the user, though not in the same way. Costs only interest those who pay them. Manufacturing costs involve the manufacturer, use costs involve the user that exploits the *product*: a *product* that is cheap to make will not necessarily be a *product* that is cheap to use.

The use of a given *product* is not the same when used in different circumstances. We should not confuse the evaluation of a product by the appropriate criteria with the consideration of these criteria in view of the requirements and preferences of product users. The function of a product varies in different stages of its life: its function in the conceptual stage is only hypothetical, its function on leaving the factory is nominal (and will not be absolutely identical in all the models of the series), and its representation will deteriorate on ageing (and does this in different ways according to conditions of use).

C) INADEQUATE FUNCTIONAL ANALYSIS IN TERMS OF THE DEFINITION OF THE CALCULATION OF THE REPRESENTATION

Reliability, for example can be evaluated in terms of technical functions but also according to their consequences (technical, use and economic). Similarly, aesthetic convenience and use have a reality and an appearance, which are equally important though distinct, they can be measured by experts on the basis of highly accurate experimental processes or by interviews with users as to their general opinion.

Obviously, depending on what is being calculated and the way of calculating it, the rules will not be the same. Nor will they be equally useful for the evaluator: appearance for example has a considerable influence on sales when the product is launched for the first time, whereas the reality of the current representation is much more closely related to long-term sales.

3.- CONCLUSIONS.

Stricter standards are required in evaluation. *Product* evaluation, if it is to be truly useful, shall include an explanation of evaluation criteria and circumstances, and the calculation methods used. The whole evaluation should therefore be preceded by a broad functional analysis of the technology and use of the ceramic product/model.

Functional analysis of technology involves an accurate understanding of all the ways in which the material factors interrelate. Functional analysis of use involves an accurate understanding of all the ways in which the product and its environment interrelate, with particular attention to what it means for the users (target group, social circumstances, urban tribes, etc.

This functional analysis should take place early, in the *product* development process, in the general context of creativity, specifiers, market research, standardisation, regulations, tests, industrialisation, marketing, after-sales time, computer-aided planning, etc.

Development of a functional analysis technology lies beyond the scope of this paper, but Table 2 indicates the main points that might need to be evaluated, retrospectively to establish the facts or provide a verification, as well as in anticipation of a design project to verify a hypothesis or establish an objective.