

In search of Value in a Product:

A case study in the construction industry.

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Resumo

O valor tem um significado muito amplo, podendo variar de disciplina para disciplina, resultando por vezes em definições diferentes ou quase opostas. Existe a necessidade de encontrar um entendimento comum sobre o valor e de todos os fenómenos à sua volta, especialmente ao nível dos negócios, ainda que se tenha de cruzar diferentes disciplinas da gestão. As organizações devem focar-se mais na avaliação do valor que criam, geram e acrescentam, e ainda no que destroem e consomem, como abordagem para melhorarem a sua eficiência e aumentarem o seu resultado final (do valor). Para esse propósito, devem identificar e considerar todas as partes interessadas relevantes e qualificar todas as transacções que ocorrem individual ou colectivamente entre si.

Este artigo pretende apresentar um novo processo analítico, baseado no valor que resulta das diferentes transacções entre as várias partes interessadas ligadas a um produto, que quantifica e qualifica, respectivamente, as dimensões tangível e intangível do valor. Pretende ainda apresentar visões mais específicas dos tipos particulares de valor num produto, contribuindo para o desenvolvimento de uma compreensão mais clara do conceito. Finalmente, este artigo pretende disseminar o conhecimento sobre duas ferramentas específicas de gestão e de tomada de decisão, a Análise do Valor e a Value Network Analysis, promovendo a sua utilização entre a academia e profissionais.

O artigo descreve o processo utilizado na avaliação do valor de um produto para a construção, um painel de pedra prefabricado para uso em paredes, e como usar os resultados da avaliação no processo de decisão. Dois conceitos de análise conhecidos servem de base ao processo: a Análise do Valor e a Value Network Analysis. O processo também utiliza os diferentes conceitos de valor, relacionados com as dimensões tangível e intangível e os tipos de uso, económico, cultural e de percepção. Este artigo contribui para uma melhor compreensão do valor nos produtos (bens ou serviços) e demonstra a importância de usar ferramentas de gestão relacionadas com o valor em processos de decisão. Ajuda ainda a academia e profissionais a desenvolver aplicações do valor noutros campos da gestão, tirando vantagem das visões propostas para o seu conceito.

Palavras chave: Atributos, partes interessadas, valor, valor cultural, *value network*.

Abstract:

Value has a broad meaning, and that may vary from discipline to discipline, sometimes resulting in different or almost opposite definitions. There is a need to reach a common understanding of value and of all phenomena that come along with it, mainly at the business level, even if this may cross some different managerial disciplines. Organizations should focus more on the evaluation of the value that they create, generate or add, and even destroy or consume, as an approach to improve their efficiency and increase their final (value)

outputs. For that purpose, they should identify and consider all relevant interested parties and qualify all transactions that occur between each other or among all of them.

This paper aims at introducing a new analytical process, based on the value that is delivered by the different transactions happening among the different interested parties connected to a product, which will quantify and qualify the tangible and intangible dimensions of value, respectively. It also aims at presenting more specific views of particular types of value in a product, contributing to the development of a clearer understanding of the concept. Finally, this paper has the intension of disseminating the knowledge about two particular management and decision making tools, the Value Analysis and the Value Network Analysis, promoting their use among scholars and professionals.

The paper describes the process used in evaluating the value of a construction product, a prefabricated stone panel to be used in curtain walls, and how to use the evaluation findings in the decision making process. Two known analytical concepts serve as the base for the process: Value Analysis and Value Network Analysis. The process also makes use of the different concepts of value, regarding its tangible and intangible dimensions and use, economic, cultural and perception types.

This paper contributes to a better understanding of the value in products (goods or services) and demonstrates the importance of using value related managerial tools in the decision making process. It also helps scholars and professionals to develop applications of the value in other management fields, taking advantage of the proposed views for its concept.

Keywords: Interested parties, cultural value, product attributes, value, value network.

I. INTRODUCTION

Generally, value is understood as expressing the worth of something. But a closer look into the existing literature can reveal different types of value, as Jensen (2005) has identified: (i) economic value – or value as exchange; (ii) use value – or value as utility; (iii) cultural value – or value as meaning and sign; and, (iv) perception value – or value as experience.

A cross-disciplinary research proves those findings. To Smith (1776) any “good” had two different meanings, one expressing the utility of the same particular object, “value in use”, and the other, the power that the possession of the object conveys to purchase other goods, “value in exchange”. [Aristotle (384-322 B.C.) was the first to differentiate between a use value and an exchange value of goods. (Politics, Book I.)].

The consumer or user is at the center of this inter-relation of different types of value in the same good, leading value to be understood as a perception function, represented by the equation “customer perceived value = perceived benefits/perceived sacrifice” (Ravald and Gronroos, 1996). Another way to view the issue, supported by Anderson, Narus and Kumar (2007), is that “customer perceived value = customer benefits – customer sacrifices”, arguing that this is easier to be understood by individuals and businesses. We should note that perceived value differs from

“desired value”, where the last represents what the customer wants to happen and the first represents what the customer has obtained or that it has happened. Desire value can take two aspects: value in use and possession value (Flint, Woodruff and Gardial, 1997).

According to Clawson and Vinson (1978), in order to investigate consumer’s product valuation, it is necessary to integrate cultural values, personal values, consumption values, and product benefits. Cultural values are related to how cultural, social and familial environments affect the formation and development of individual beliefs, also called “society core values” (Engel, Blackwell and Miniard 1990), which are implanted into individuals naturally through socialization and education. Personal values are the individuals’ beliefs about what are desirable for themselves, therefore self-centered, and deriving from, and modified through personal, social, and cultural learning (Clawson and Vinson, *op. cit.*). Rokeach (1973) divides “human values” into two types: terminal (or end-state), beliefs about goals that people strive for, like self-fulfillment and enjoyment in life, and instrumental (or means), beliefs about desirable ways to attain those terminal values, like owning a luxury car or going to an entertainment. Personal values correspond to terminal values, while instrumental values are comparable to values of desirable “activities”. According to Sheth, Newman and Gross (1991), people achieve personal values, or goals, through actions or activities, such as social interaction, economic exchange, possession, and consumption.

Consumption values refer to subjective beliefs about desirable manners to attain personal values, therefore being instrumental in nature. Product benefits refer to what customers benefit from buying, using or consuming a product (Hooley and Saunders 1993). In the customers’ perspective, product benefits are not the same as product attributes (Day, 1990; Peter and Olson, 1990). In a competitive market, products have many attributes, such as features, durability, quality, style, symbolism and related services, in addition to the basic provided benefits. I will return to the issue of benefits later on.

According to Boztepe (2007), value can be something assigned by the user, being independent of the product’s physical qualities, or embedded in the object and recognized by the user. This leads to the view of a philosophical branch concerned with the theory of value, known as axiology, which posits a bipolar distinction between objectivism and subjectivism (Fronzizi, 1971). Positioning value as inherent in an object, prior to any subject interaction or evaluation, is an objectivist view. On other hand, if it is the user understanding that prevails, including many factors under consideration, it can be seen as a subjectivist view. This dichotomy between objectivism and subjectivism views leads to a discussion between tangible or intangible, use or emotion, and utility or esteem, which I will address later, together with the issue of measuring value.

This continued “consumer perspective” creates a need to understand consumers in a much wider extension. One of the many ways to understand users’ needs, as consumers, is studying their specific functional and emotional needs and, consequently, transforming those into product attributes or functionalities (Fernandes, 2011). Value Analysis (VA) contributes to that understanding through a process of functional analysis (FA) and function costing (Miles, 1972), determining the relation between the satisfaction of needs and wants and the resources utilized, being this relationship called “value”. According to the European Norm EN 1325:2014 value is the “measure which expresses how well an organization, project, or product satisfies stakeholders’ needs in relation to the resources consumed”. On the other hand, according to the SAVE International Value Standard (2007) value is “defined as a fair return or equivalent in goods, services or money for something exchanged. Value is commonly represented by the relationship: $Value \approx Function/Resources$ ”. Both version of the same concept of value were initially mostly based on the satisfaction of the user’s needs, but it has been developing into the concept that value also counts to all other stakeholders in the same manner (Value Management Handbook 1995; European Norm EN 12973:2000).

If we consider that all stakeholders have some kind of interest in a product and its life cycle, that opens an opportunity to determine who out of the same stakeholders will be affected positively (positive value) and who may be impacted negatively (negative value) by the value subject. In the same fashion, different stakeholders may take advantages and benefits, from some attributes or functions of the product and its life cycle, in utility (tangible/use value) or emotional terms (intangible/esteem value).

Lay (op. cit.) proposes a typology of benefits, related to products, that consumers may derive from possession or consumption, including eight generic product benefits: functional, social, affective, epistemic, aesthetic, hedonistic, situational, and holistic. Benefits are what consumers and users take out of product attributes. Fernandes (2015) proposes, “attribute is a permanent or timely condition of a solution (product) to some consumer need” (p.785). Attributes are properties, predicates, features, dimensions, characteristics or even independent variables, depending of the context that defines the product. Assuming that “value=benefits/sacrifice”, we may accept that attributes can be related to benefits and to sacrifices. Attributes that are benefits may be “resistance”, “duration”, “design”, “accessibility”, “taste”, “sound” or “pleasure”. Attributes that are sacrifices may be “cost”, “assemblage”, “transportation”, “storage” or “displeasure”.

Still according to Fernandes (op. cit.), attributes can be of utility, related to use value, or emotional, related to cultural value. The former are tangible in its form and the last are intangible. Attributes are representations of service functions, which are what provides answers to consumer needs. These must follow also the tangible and intangible form, like it happens within attributes.

Therefore, functions can be: (i) of use, providing answers mostly to utility attributes, but also may provide answers to emotional attributes in particular circumstances; and, (ii) of esteem, providing answers only to emotional attributes (op. cit.).

At a further level, service functions are served by product functions, meaning what the product does in order to deliver the service function. The product functions can be: (i) technical, mostly related to use service functions, but in some special circumstances also related to esteem service functions; and, (ii) cultural, only related to esteem service functions (op. cit.)

All these concepts were accepted and applied by the participants in the project under analysis in this case study.

1. Methodology

2.1 Methodology applied in the development of a new product.

The methodology applied in a normal exercise of new product development is based on the following activity flow:

- a) First, the project team performs a Value Network analysis to identify all interested parties and all possible tangible and intangible transactions between them (Allee, 2000).
- b) Second, the project team identifies all “interactions” that may exist within the value subjects (solution under development) at three different levels: (i) human utilization; (ii) connections with other systems and sub-systems; and, (iii) connections with other elements of the surrounding environment (EN12973:2000).
- c) Third, the project team identifies all potential “attributes”, of utility or emotional nature, that consumers or users will may find in the future solution.
- d) Fourth, all attributes are transformed into “service function”, of use or esteem nature.
- e) Fifth, all service functions are derived into “product functions”, of technological or cultural nature, needed to deliver the former.

2.2 Methodology applied in reverse order in the case study.

A some how reversed process was applied in de development of the solution under study in this paper, based on the following activity flow:

- a) First the project team developed a set of activities in experimental assemblage and testing (applied R&D) on the potential solution. When the solution was basically defined, the possibility of a value study aroused, with the objective of improving the final product, and the project team was involved in a value analysis study. At this stage, most of the “product functions” were defined and accepted by the project team. However, there was no clear

understanding of their connection to related users functions, which led to the identification of service functions, as next.

- b) Second, the project team identified some of the main “interested parties” in the solution. Once those were stated, the team identified the potential future “transactions” and “interactions” between the interested parties and the solution under development.
- c) Third, the “service functions” were identified and connected to the previously stated product functions, validating that the last were providing answers to the former. No product functions were found without any connection with the new stated service functions.
- d) Fourth, the project team identified all “attributes”, of “utility” and “emotional” nature, that were answered by the service functions. They were classified of utility (tangible) or of “emotion” nature (intangible).
- e) Once arrived at this stage, the project team went back to the product functions and discussed, one by one, either how to improve their performance or reduce their cost, or both, in such a way that no service function would be affected.
- f) The last activity was connecting all attributes to marketing activities, such as the creation of pamphlets and catalogs, or the communicational procedures. For that purpose, the team used the AIDDA methodology, as developed by Lewis (1903), to determine the contents of the marketing outputs. The selling argument triad (attributes + advantages + benefits) was defined and applied to pamphlets and catalogs in order to develop a strong interest in the mind of the targeted audiences.

3. Case Study

The case study in hand is an Value Analysis exercise done of a new prefabricated stone panel, developed by a research laboratory in the ornamental stone industry. The panels are composed of two sides stone cladding panels, supported by metallic connectors and tyrants that give them the needed strength. The panels have internal insulation to reduce thermal and acoustic passage from one side to the other. The panels serve as curtain-walls, internal or external, and are flexible to integrate other construction elements, such as doors, windows or balconies. Panels can reach seven square meters each, and by connecting to each other and to structural elements of the construction, such as pillars and beams, they can cover large vertical surfaces.

3.1 Technical testing.

The technical tests performed were as following:

- a) Resistance – a set of tests was performed to evaluate all required resistance parameters, according to existing construction regulations, regarding weight and pressure. All final

results presented were well inside the accepted figures and were accepted by the R&D team as good to proceed further within the development of the product.

- b) Insulation – tests on acoustic and thermal resistance were made to verify if the product was inside the legal accepted figures. Several potential solutions to solve acoustic and thermal needed resistance were considered. The chosen solution was the one with the highest resistance at the lowest possible cost.
- c) Other tests were performed to verify the adequatibility of the product in different use, application, assembly and transportation situations. All tests were validated and results accepted by the R&D team.

3.2 Value Analysis exercise.

The value analysis exercise was performed as following:

- a) All “product functions” identified during the R&D phase were stated and characterized. This included technical compliances with existing regulations and with needs identified as important to users and other interested parties.
- b) An exercise of Value Network Analysis was performed to identify all “interested parties” that might have some individual or collective interest in the product. In the exercise the team only considered those interested parties that could have some direct interest in the product.
- c) The most important “transactions” among interested parties and consequent “interactions” with the product, or other interactions between the product and other systems and the environment and context were identified and classified, according to the criteria previously mentioned.
- d) Based on the product functions previously identified, the team identified the “service functions” and developed an evaluation exercise of their relative importance. This consists in determining the relative importance of each function in percentage terms, by classifying the importance of each function against all other functions according to an accepted criterion (note: the scale adopted varied from “zero” - equally important, to 3 – much more important).
- e) A “function cost” exercise was performed. For that purpose, all components were identified, the cost of each one was determined, and the participation of those components in each function was determined. That led to the quantification of the cost of each function.
- f) A comparison of “relative importance vs relative cost” of all identified service functions was done, determining situation of equilibrium and of disequilibrium between the relative importance and the relative cost of each function.

g) At this stage, the team needed to connect service functions to transactions and/or interactions previously identified. Those connections were made by determining the “attributes”, related to service functions of the product that were used or applied during the transactions or interactions. The team reached the end of the exercise when each line was completed, as shown in a shortened example of the original document, in figure 1.

EMITTER	RECEPTOR	TRANSACTION	TYPE	REQUIREMENTS	TRANSACTION	INTERACTION	ATTRIBUTE		SERVICE FUNCTION		PRODUCT FUNCTION		
Subcontractor	Constructor	Assemblage of elements	C	CEN/ISO norms	Assemblage of elements	C	Fixing to structure	Compatibility of fixing system	Util	Allow fixing of standard systems	Use	Use "din" screwing system	H/T
Manufacturer	Constructor	Apply regulations	C	Legislation	Apply regulations	C		Comply with regulations	Util	Retain road noise outside	Use	Provide internal air chamber	H/T
Architect	Constructor	Provide referance	NC	Quality norms	Provide referance	NC	Feedback and dissemination	Quality standard	Emo	Comply with ISO X Standard	Est	Provide heat retention below X%	H/T
	Subcontractor						Assembling operation	Ease to assembly	Util	Comply with ISO Y Standard	Use	Use ISO Y Standard screwing system	H/T
Subcontractor	Constructor	Certification of Operators	C	ISQ qualifications	Certification of Operators	C		Quality assurance	Emo	Comply with ISO Z Standard	Use	Use ISO Z standard certification	H/T
Manufacturer	Project owner	Supporting services	C	Warranty legislation	Supporting services	C	Repair malfunction	Warranty	Util	Provide help service on site	Use	Create urgency response team	H/T
Constructor	User	Pass credibility	NC		Pass credibility	CN		Reliability	Emo	Provide warranty (50years)	Est	Obtain LNEC certification	S/C

Figure 1. Value Network Analysis and Value Analysis Matrix. (Note: content has been altered for information protection purposes)

h) The evaluation and the analysis of all information gathered during the previous steps provided enough inputs to generate new ideas on some of the solutions previously tested and applied during the initial R&D phase. Performance improvement and cost reduction were achieved by modifying some product specifications and production processes. A quick evaluation exercise determined that those solutions were reducing production costs and increasing perceived value in some very reasonable figures (kept hidden for the purpose of this text).

3.3 Marketing development

As part of this project, the team needed to produce marketing material to present the product in two international fairs, where potential clients would be present. For that purpose, the team developed the full content for the communication media – pamphlets and catalogs, based on the description of the attributes and on the respective related service functions (use and esteem). The attributes related to the service functions with the highest scores in the relative importance exercise were given primordial visibility in the communication. Those were of emotional sphere, supported by esteem use functions, and well understood by potential clients. The technical details, related to the technical product functions, were mostly left for the catalog, to provide information to those interested parties with specific need for them.

The design and construction of the pamphlet and catalog were based on the principles and process of the AIDDA methodology (Lewis, 1903). The content followed the selling argument triad (attributes + advantages + benefits) in order to present a logical, but also emotional sequence, to facilitate the presentation of the product to potential clients.

4. Conclusions

Despite the project has started at an advanced stage of the technical development phase, with many resistance and other technical tests already done and with a clear vision of what the final product would become, the Value Analysis exercise has helped the R&D team in being more efficient with the project conclusion. The validation of the value to users and other interested parties, also covering different technical options related to assembly and insulation, and yet the well cost reduction of some technical product functions were evident results of the VA exercise.

The most appreciated project outcome was the content developed from the description of the attributes and used in the communication media, clearly expressing the most important emotional attributes to each of the interested parties, based on the individual value that those would benefit from the product.

It was difficult to quantify the cost reduction obtained with the project, due to the fact that all economies were related to solutions that were not worked out prior to the VA exercise. In the same way it was difficult to quantify the economical benefit of the content of the marketing material, as there was no possible comparison with what would be the output of any other solution. However, it was clear that the VA exercise brought clear savings and selling benefits to the product, as well as it reduced the experimental time length initially targeted.

Like most other project teams, this one enjoyed the “value Network Analysis exercise”, indentifying all interested parties and all transactions among them, and connecting those to the attributes of the product through the identified interactions. But what they enjoyed the most was the discovery of the relation between emotional attributes and esteem use functions, and between the last and cultural product functions. This new perspective about the intangible side of a product was very important to the R&D team, especially when the team had its main focus on the technical dimension of product.

This case illustrates how the process used in the Value Analysis exercise can be easily used in any other situation, independently of the stage of the product development. Scholars and Value Management (VA) professionals can use such process to increase the efficiency of Value Analysis exercises and their resulting outputs.

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