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Needs, values and post-occupancy evaluation of housing project customers: A pragmatic view

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Abstract

New management concepts focus their efforts on meeting the needs of those involved, especially the customer. Much research has been conducted on theoretical concepts of needs and value, and the purpose of this paper is to make a pragmatic proposal on how to apply these concepts to housing projects.

This paper presents a compilation of customer needs that housing must meet. These needs must become the customer quality standards guiding the process. At the end of said process, once the product has been delivered and in the post-occupancy stage, this same document must serve as a tool to assess customer satisfaction and corresponding perceived value.

For the development of this proposal and in order to gather the requirements that every dwelling must meet to satisfy both its residents and society, we have reviewed various rules and regulations of several Latin American countries; we have conducted extensive interviews with customers from different social backgrounds; we have reviewed the literature on this matter; and we have analysed 10 housing project claims with various construction systems and socioeconomic strata. Finally, the results of these post-occupancy evaluations will serve as a powerful feedback tool, thus promoting continuous improvement in housing projects.

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Keywords: Lean Construction; Value Generation; Customer Value; Post-Occupancy Evaluation; Architecture.

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1. Introduction

The various theoretical fundamentals of customer-focused management systems are very convincing and completely logical. This key concept is applicable to the provision or delivery of any type of service or product and to any industry or sector. In the construction sector, like in other sectors, theories and concepts also abound, but not as many as their corresponding applications. The reason for this may be that, when we refer to construction, we are also referring to a wide range of services and products. To propose a pragmatic application, this paper refers to the needs, desires, quality requirements, customer satisfaction and perceived value of a specific product: housing.

2. Customer-Focused Approach

Traditionally, success in the construction sector has been measured by cost, time and quality, or cost, time and scope. According to this, many times a project is considered successful if the work is delivered within the deadline, the budget and according to technical specifications. Thus, the work often takes the lead role and the client is a passive recipient of the building at the end of the construction value chain, Kärnä [1]. However, customer-focused management systems are changing this mind-set.

In addition to proposing this triple constraint (also called the iron triangle), Atkinson [2] presents three additional success criteria: the information system, the benefit for the organization and the benefit for the community involved. In this last criterion, customer satisfaction plays a major role.

ISO 9000 reads: "Organizations depend on their customers and therefore should understand current and future customer needs, should meet customer requirements and strive to exceed customer expectations". Figure 1 illustrates the Quality Management System described in the ISO 9000 family of standards. This illustration shows that customers play a significant role in providing input to the organization. Once the product has been manufactured, all information on customers' perception of how and to what extent their needs and expectations were met is necessary for monitoring customer satisfaction.

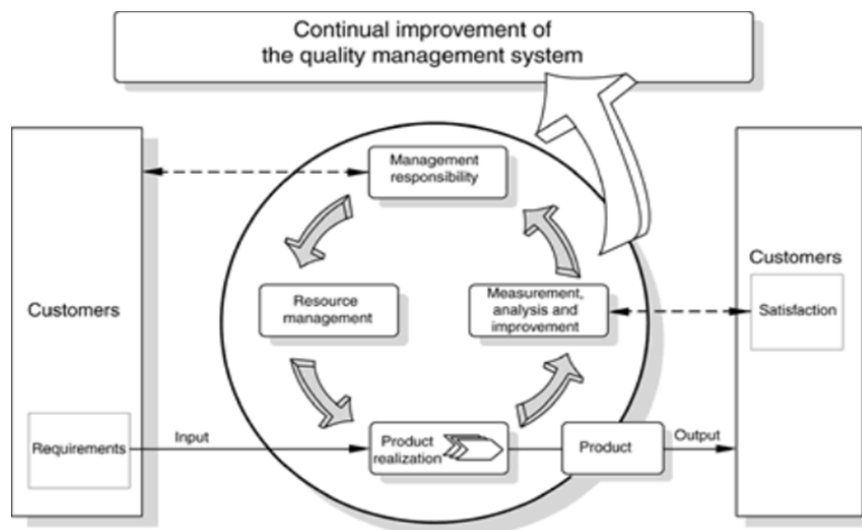


Fig. 1. Model of a Quality Management System based on processes (ISO 9000)

The Lean Construction Institute declares loss reduction and value creation for the customer as its main management philosophy. The Institute's various methods, techniques and tools are grouped into the Lean Project Delivery System™, shown schematically in Figure 2. The system proposes a sequence of processes which acknowledges the fact that a construction project should start with the identification of customer needs and values.

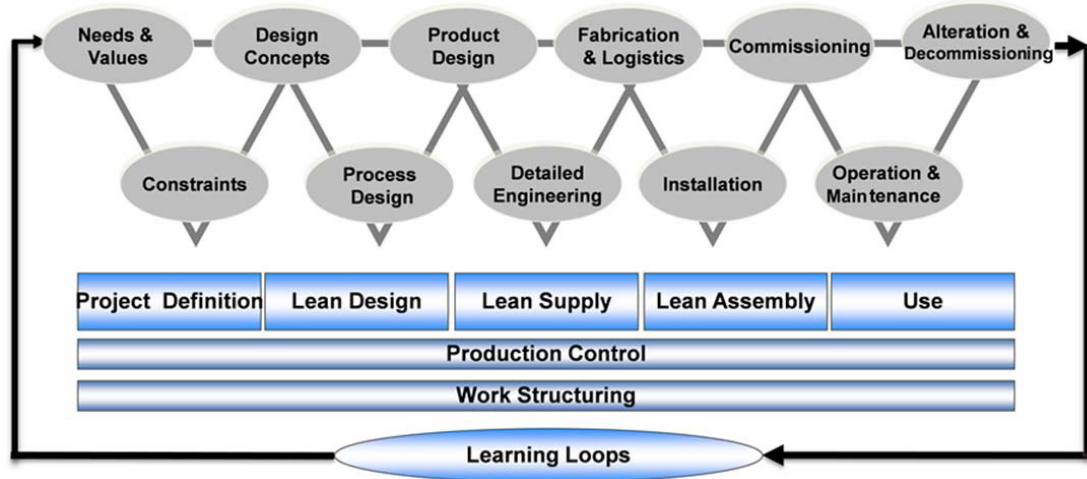


Fig. 2. Lean Project Delivery System, Ballard [3], Ballard [4]

One can also see that the project does not end with delivery and use, but requires a post-occupancy evaluation which—after obtaining information about meeting the needs and desires of the customers and their perception of value—is used as feedback for new projects. Thus, it creates a cycle of continuous improvement aimed at eliminating loss and creating value. Losses and rework are very common because the needs and values of either investors or customers are not completely clear, Orihuela, et al. [5]

3. Customer Needs

Kotler, et al. [6], define Human Needs as a state of deprivation felt by a person. They state that human needs are plentiful and complicated, and are not created by external agents but are an essential part of human nature.

Similarly, human desires are defined as a manifestation of those needs, according to culture and individual personality. As a society evolves, the desires of its members expand, so producers undertake specific actions for the public to feel the desire to acquire their products. They try to establish a connection between what they produce and what people need, and promote their product as a satisfier of one or more needs.

ISO 9000, states “Customers require products with characteristics that satisfy their needs and expectations. These needs and expectations are expressed in product specifications and collectively referred to as customer requirements. Customer requirements may be specified contractually by the customer or may be determined by the organization itself. In either case, the customer ultimately determines the acceptability of the product.”

During interviews conducted to understand the customer need for housing, we took into account that there are several types. Kotler [7], presents the following classification: the needs which are expressed directly by the

customer, those which are not specified but are expected, those which are unexpected, and those which are undisclosed.

On the other hand, Atkinson [2], shows us that during the process initiated by the company to meet customer needs, gaps that undermine this objective are generated. Gaps are created in: 1) the real customer needs; 2) the needs described by the customer; 3) the needs as perceived by the project team; 4) the plan developed by the team to meet these needs; 5) the final product delivered to the customer; and 6) customer perception of whether the product meets his/her needs or not. Figure 3 shows the performance gaps and the kinds of needs during the process of search for customer satisfaction. Therefore, we can say that there are eight gaps:

A multidisciplinary group of professionals with different systems, methodologies, techniques, and tools is involved in this chain of processes; however, at the end of such a chain, the customer is the one who rates the product. Dr. Edwards Deming mentioned in one of his lectures: "... the customer is the judge of quality; he is the only judge who should matter when providing a service or product, the customer will decide on quality."

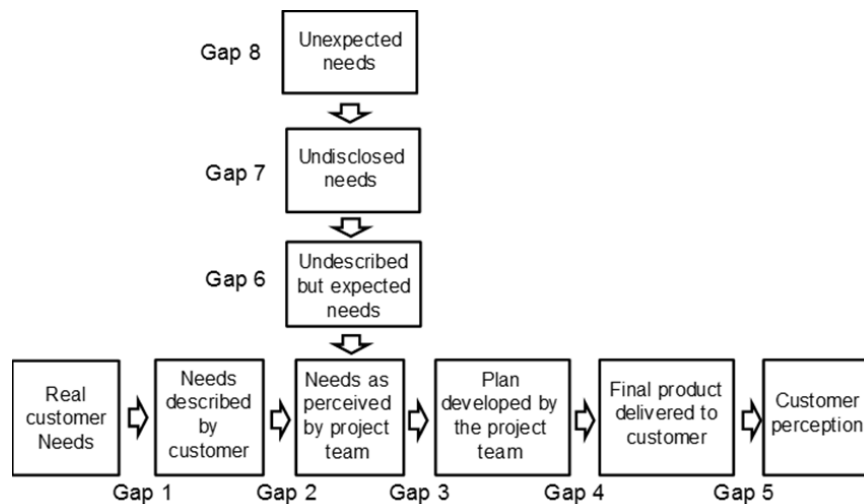


Fig. 3. Performance gaps and kinds of customer needs, Atkinson [2], Kotler [7]

4. Housing Quality Requirements

Many housing rules and regulations specify some quality requirements every home should have. However, not all of these requirements are noticed by customers. On the other hand, there are other customer requirements and expectations that are not specified in these documents.

To select the most important housing quality requirements, four sources of information were used: 1) Collection and review of habitable conditions specified in the housing policies, rules, and regulations of various Latin American countries (Peru, Chile, Brazil, Colombia, Ecuador and Mexico), 2) Research papers published in various journals on attributes that generate satisfaction among residents; 3) Analysis of 4000 claims generated in 10 housing projects with different construction systems and different socioeconomic levels, Vidal [8], and 4) Residents' interviews on their housing needs, desires and perceptions of value.

Table 1 presents these quality requirements grouped into three criteria - Perez and Gonz ales [9]: 1) Criteria regarding the city, 2) Criteria regarding the neighbourhood and 3) Criteria regarding the building itself. Each one is

broken down into a second and third level, the latter being questions about the level of compliance with the expected requirements, which the customer and/or organization itself must rate. We have selected a total of 80 questions, 50 to be answered by the customer and 30 to be answered by the organization due to their technical nature. The organization could also rate the customer-directed questions so as to identify and quantify compliance gaps.

To measure a customer’s satisfaction using Table 1, it is necessary to determine the importance placed on quality standards at the second level. This weighted calculation is independent for each of the three sets of criteria and can be done by the method of scoring and using the Likert psychometric scale (1 to 5). For better validation methods, matrix pairs or hierarchical analysis could also be used. Then the 50 questions of the third level must be answered, asking customers to express their perception of satisfaction or dissatisfaction through a rating scale. In practice, we have found that a good alternative is to use the school grading system, as this is very familiar to our customers; therefore, scores will be clearly expressed.

The average of the third level gives the rating of the second level and the weighted average of these gives the rating for each of the three first-level groups. The rating of the first two groups evaluates the attributes of building location and the third group evaluates design and construction.

According to the Guide to Post-Occupancy Evaluation of the HEFCE [10], these assessments should be made in the post-occupancy stage, which occurs after a period of approximately one year following handover. It is deemed that the customer may not have sufficient experience to make a proper judgment at any time before this.

Table 1. Housing quality requirements and perception for customer satisfaction

HOUSING QUALITY REQUIREMENTS			CUSTOMER SATISFACTION			
1st Level	2nd Level	3rd Level	Rate	Avg.	Importance	W. Avg
Regarding the building itself		Wind, snow, and seismic bearing capacity				
		Capacity to bear the maximum allowable differential settlement				
		Pipes resistance to hydraulic overload				
		Wall resistance for hanging devices or furniture				
		Impact and shock resistance				
HOUSING QUALITY REQUIREMENTS			CUSTOMER SATISFACTION			
1st Level	2nd Level	3rd Level	Rate	Avg.	Importance	W. Avg
Regarding the city	In relation to workplace	Distance to workplace				
	In relation to other activities	Access to transportation				
Regarding the surroundings or the neighbourhood	Safety from natural events	Distance to other frequently visited places				
		Access to transportation				
		No landslides, flooding, erosion or others				
		Little or no seismic site amplification				
		Little or no soil and air aggressiveness.				
		Proximity to health care, education, and recreation centers				
		Access to public services (water, electricity, internet, etc.)				
	Urban conditions	Availability of public spaces for social interaction				
		Street signs, easy location and access				
		Public safety				
	Urban green space					
	Urban aesthetics					
	Land value increase in the area					
		Ability to avoid cracks on partition walls				
	Fire safety	Fire extinguishing devices and emergency lighting				
		Ease of escape and fire safety				

	<ul style="list-style-type: none"> Protection against the spread of fire and smoke Gas installation, lightning and short circuit protection devices Fire-resistant electrical and sanitary installations Smoke detectors, locking and security systems Water reserve for fire-fighting
Salubrity	<ul style="list-style-type: none"> Insect and rodent control Rainwater drainage Easy sanitation of floors and other surfaces Garbage collection system Preventing entry of toxic gases and suspended solids Sewage sealing systems and drinking water protection
Functionality	<ul style="list-style-type: none"> Independence and good distribution of rooms Parking facilities and visitor parking Proper operation of doors and windows Proper operation of sanitary installations Proper operation of electrical installations Proper operation of furniture and equipment Privacy from visual observation Easy maintenance of installations and facilities Flexibility regarding property extension for correct development Minimum room dimensions compatible with human needs
Aesthetics	<ul style="list-style-type: none"> Approval of front and main entrance Approval of colors, textures and veneers Proper architectural ornaments
Safety in use	<ul style="list-style-type: none"> Feeling of safety regarding building structure Safe use of ramps, stairs and rails Safety regarding hazardous corners or edges Safety during building maintenance Safety regarding exposure to electrical hazards
Property security	<ul style="list-style-type: none"> Design that helps prevent robbery Alarm and safety equipment
Legal security	<ul style="list-style-type: none"> Formal land registration Formal building and subdivisions registration Property appraisal
Thermal, acoustic, luminance and ergonomic comfort	<ul style="list-style-type: none"> Thermal comfort in hot or cold weathers Appropriate room ventilation Internal and external sound insulation Natural or artificial lighting Ergonomic comfort during handling or operating equipment
Durability	<ul style="list-style-type: none"> Materials and components durability Durability under humid conditions Structure durability
Impermeability	<ul style="list-style-type: none"> Impermeable surfacing of gardens Impermeability to rainwater Impermeability in bathrooms, kitchens and laundry rooms
Environmental impact	<ul style="list-style-type: none"> Green spaces inside the building Spaces available for house bio-gardens Infrastructure that promotes additional income Classification of solid waste Low or moderate road impact

	Water conservation, reuse and recycling
	Power energy conservation
	Use of renewable energy (solar energy, biomass)
	Instructions for good use of property
After-sale guidance	After-sale social support
	Provision of guarantees
	Claim attention

5. Post-occupancy customer satisfaction

Kotler [6] defines Customer Satisfaction as the feeling of pleasure or disappointment resulting from comparing the perceived performance of a product with the customers' expectations. Kano [11] proposes five types of attributes that a product or service may possess and which generate various feelings of satisfaction or dissatisfaction in customers: 1) Must-be requirements: attributes whose compliance do not generate additional satisfaction but when not provided, generate high levels of dissatisfaction. 2) One-dimensional requirements: attributes whose presence generates satisfaction directly proportional to their implementation. 3) Attractive requirements: attributes which are not expected, but when implemented generate high levels of satisfaction. 4) Indifferent requirements: attributes which if not implemented, will not generate satisfaction or dissatisfaction. 5) Reverse requirements: attributes whose presence is unwanted.

The attractive requirements (type 3) are very important because they generate added value.

6. Customer value

The Institute of Value Management defines Value using formula 1 below:

$$\text{Value} = \frac{\text{Function}}{\text{Cost}} \quad (1)$$

This formula shows that value results from comparing the achievement of purposes or delivery of the expected benefits of the product with their cost. When this comparison is purely economic, it is known as Cost-Benefit Analysis, where the numerator and denominator are expressed in monetary units resulting in a tangible indicator and numeric value.

6.1. Customer perceived value

The perceived value involves the customer assessment of the ability of the products to meet his/her needs. He/she therefore considers the value of the product and its price before making the decision to choose the product that represents the maximum value for the money, Kotler [6]. When it comes to the customer perception of value, the numerator in formula 1 represents the degree of customer satisfaction which—as stated above—is a subjective rating. The denominator, in addition to the monetary amount paid, also represents other sacrifice factors involved in buying the product or service. This is especially true when it comes to a house, which is usually one of the most important acquisitions of an individual or family. Therefore, when it comes to assessing the value that the customer places on a house, ratio 2 is more appropriate:

$$\text{Customer perceived value} = \frac{\text{Perceived satisfaction}}{\text{Perceived price paid}} \quad (2)$$

Once the customer has answered the questions in Tables 1a and 1b, the results are presented to the customer, and then he/she is asked to carry out a second rating on the perceived value, considering the price and the sacrifice made to pay for the house.

6.2. Added Value

Lean Six Sigma defines Added Value as: "activities or essential works that ensure a product or service meets customer needs." A more precise definition would be: "An additional attribute that the customer did not expect, and when perceived, it contributes to increased value." This definition is in line with what Kano [11] classified as an Attractive quality element. Posing a simple question to the customer, who has received an attribute or benefit that was not expected, and asking him/her to describe and comment on it will provide a good indicator of whether or not added value has been generated for the customer.

7. Conclusions

To generate value for customers, we need to understand and identify their needs and desires. These should be provided in a document that also indicates their level of importance. This document, supplemented with the relevant technical specifications, will help establish quality requirements that guide the customer-focused management. Once the project is finished and the product is delivered, this document will serve to evaluate customer satisfaction during the post-occupancy period. After rating overall satisfaction, customers will be able to form a second opinion on perceived value and added value. In brief, this paper proposes the model of a document with the above-mentioned characteristics which serves for housing projects, and can be improved and modified insofar as it is used.

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