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Effect of Subjective Evaluation Factors on the Buying Decision of Residential Furniture

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Abstract

There are different elements involved in the product purchase; among them, there are the subjective ones, such as satisfaction (usability) and other ergonomic factors (shape, color, maintenance, security, interaction, materials, function and durability), which are involved in the first evaluation, even if the user is not in contact with the product. In this process of perception and evaluation, some products of the furniture industry are rejected by the customers in this first visual interaction, causing large economic losses. Knowing which factors have a bigger influence on the customer, supports a designer, in the initial design process, and reduces the possibility to manufacturing a product that will not be acquired. The present study presents the case of purchase of residential living rooms furniture by women in Mexico. The attributes of pleasure and satisfaction are determinants for having a positive buying decision; these attributes were translated into design elements, which can change the buyer perception, and generate a purchase intention.

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1. Introduction

There are several problems in the furniture industry, mostly related to the purchase decision prior to use and having real contact with the products. The emphasis is in regard to the fact that hundreds of furniture items are

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rejected by buyers, just through subjective evaluation of factors such as usability, maintenance, efficiency, safety and resistance.

In the design process, needs and aspirations of current and potential users are identified to provide a product that satisfies not only in the physical contact interaction, but even from the perceptual and mental actions, where the first trials on aspects of functionality, comfort and satisfaction are generated. These subjective aspects are directly affecting the possible subsequent actions to the product [8] and even the desire and positive buying decision.

The designer can control and experiment with the formal, constructive, utility, semantic and ergonomic aspects of the furniture, in order to positively impact the user emotional responses; and generating commercial success of its products.

The objective of the study is to identify the emotional value factors from the users during the election of a contemporary living room and its relationship to design elements, to generate an acceptance and a positive purchase decision. The experiment consists of controlling nine design elements in virtual living room models and to determine which of them positively influence the user emotions, and furthermore to identify which of them can be translated into a positive decision of purchase.

2. Background

2.1. Furniture Industry Context

The Guadalajara Metropolitan Area is a leader in the furniture industry in Mexico and leads the gross domestic product (GDP) contribution in the sector. It consists of 2,344 companies with more than 16,403 jobs, according to government reports. The exports to the United States concentrate the 91.7%, outstanding among all, products like bedrooms (32.5%), dining rooms (9.2%) and living rooms (5%); which represented earnings of 123.4 million dollars from January to May of 2012.

These quantities are opposed to the losses suffered by manufacturers in the making of prototypes that are never purchased by users. It is estimated that in a period of three years, the money invested in unsold prototypes is 36'000,000 Mexican pesos (2.5 million USD), between the 100 registered members in the furniture chamber of Jalisco.

Currently, the furniture with a contemporary style is dominating the sales; the main purchasers are women between 25-45 years of age, who normally buy at department stores, and to those Bucker attributes the greater influence by aesthetic values. In this study, it was decided to experiment with living rooms because they contain a great complexity of manipulable design elements.

2.2. Emotional Factor in Buying Decision

The usability of products is composed of the elements of effectiveness, efficiency and satisfaction, even though, they are evaluated after the user had a physical interaction with the product. However, physical interaction with products implies a previous perceptual and mental activity, in which users generate the first evaluations concerning the product. Even the satisfaction dimension from the point of view of usability may be understood in relation to previous expectations held by the individuals.

Even if different furniture items are in the same range of quality, price, materials and comfort, not all of them are accepted by users; in these cases, the user perception has a greater importance as a trigger for an action, such as the real use or purpose of purchase.

Only with the action of looking at the products, people attempt to predict their satisfaction and the factors which determine the purchase decision emerge [2] The real desire of purchase occurs when the product gather the requirements of functionality, usability and aesthetics [1]; this last requirement is related with sensations and pleasant emotions. However, subjective factors of satisfaction on usability have been included; such was the case of the studies conducted by Nielsen [6], Jordan [5] and Han, Yun, Kim and Kwahk [3].

The study of subjective evaluations from the aesthetic values seeks to respond why we like certain things, as in the case of Pinker [7] who tried to decipher and propose a logic for the aesthetic pleasure; according to Hekkert [4],

the attributes that influence the aesthetics of the product are the shape (geometry), composition (arrangement and proportion) and physical elements (color, texture, lighting and material).

3. Methodology

3.1. Participants

The sample was performed by convenience. The inclusion criteria were to be a woman of age between 25 to 45, who reside in the metropolitan area of Guadalajara (Mexico) and that had bought a living room in the last five years.

We counted with a sample of 45 people in the first phase, the second phase had 50 participants; for phase three the turnout was 67 women; and finally, in the last phase he had a sample of 131 people.

3.2. Materials

Phase 1

A questionnaire for the semantic search was developed; on which the participants selected the terms that could express the emotional value towards the products.

Phases 2 and 3

Seven virtual models of living rooms were made in white and with a contemporary style. Four of these models represented the living rooms that are not sold; for example, see Fig 1, and three represented that ones that are normally sold; for example, see Fig. 2.

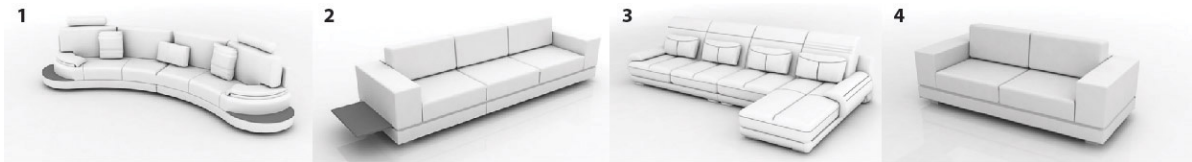


Fig. 1. Four models of contemporary living rooms that are not sold



Fig. 2. Three models of living rooms that are normally sold.

An online questionnaire was conducted; it contained 9 questions, with a value scale of 1 to 5, where participants were asked to assign a value for each one of the emotional factors. For example, see Fig. 3.

Phase 4

Nine virtual models of living rooms were proposed, in each one of them the nine design elements were independently modified. For example, see Fig. 4.

In this phase, the questionnaire from the phase 2 and 3 was applied to the nine living room models.

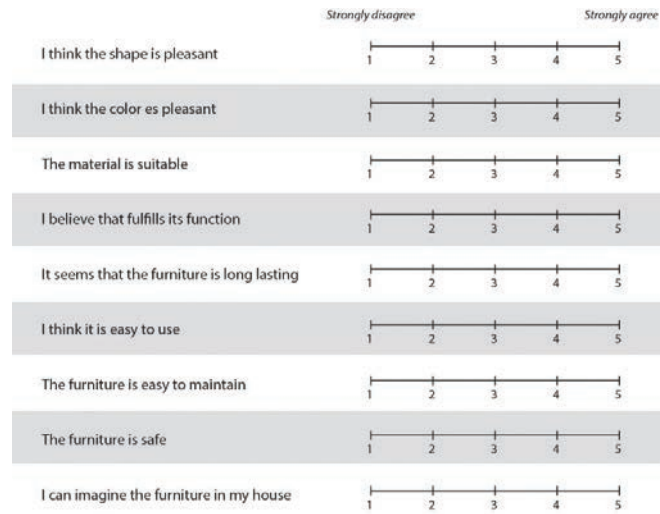


Fig. 3. Perceived factors questionnaire.

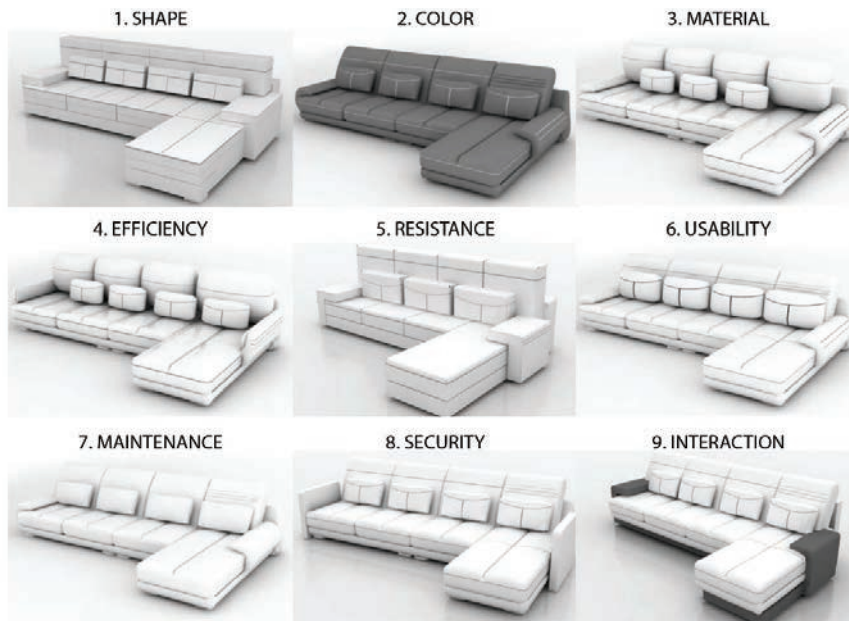


Fig. 4. Variations of the nine design elements on the most rejected living room.

3.3. Procedure

Phase 1

The participants answered a series of questions that aimed to express verbally keywords used by people to define furniture at the moment of purchase decision.

The exploratory questionnaire contained open-ended questions where semantic concepts of value were identified. These concepts were used to validate the selected instrument for the next phases.

Phase 2

Each of the four virtual models of living rooms that are not sold were randomly showed to the participants. After each one, they had to answer the questionnaire. There was no time restriction, but they could not return to change the answers.

Phase 3

Each of the three virtual models of living rooms that are not sold were randomly showed to the participants. After each one, they answered the questionnaire. There was no time restriction, but they could not return to change the answers.

Phase 4

Based on the results of phase two and three, the model of the living room that scored the lowest points on the perceived value for the users was selected. Taking this model as a reference, nine different virtual versions were designed, each with a modification on a specific design element factor. Modified factors are shown in Table 1.

Each of the nine virtual models was randomly shown to the participants; later, they answered the questionnaire of perceived value.

Table 1. Design factors modified in the least accepted living room.

Model number	Factor	Original Aspect	Modification
1	Shape	Rounded	Angular corners, square appearance
2	Color	White	Gray
3	Material	Upholstered	Paddedupholstered
4	Efficiency	Armrest attached to the seat	Armrest moved and placed on one side of the seat
5	Resistance	Rounded, light volume	Angular shapes, higher volume to all parts
6	Usability	Small cushions	Bigger cushions
7	Maintenance	Visible seams	Elimination of seams
8	Security	Armrest unsupported	Larger side arms, with floor support
9	Interaction (Empathy)	Monochrome between seat and backrest	Piece with color contrast to emphasize the structure

4. Results

4.1. Phase 1

In semantic search, the factors perceived as positive and negative aspects of the furniture were obtained. These factors were translated into variables that directly impact the design. The first results are shown in Table 2.

Table 2. Positive and negative factors and their association with design elements.

Positive Factor	Design Element	Tendency	Negative Factor	Design Element	Tendency
Large	Shape	7.98%	Expensive	Interaction	7.98%
Spacious	Shape	7.98%	Nonfunctional	Usability	7.98%
Clean	Maintenance	7.34%	Complex	Usability	7.34%
White	Color	7.02%	Nuisance	Usability	7.02%
Comfortable	Usability	7.02%	Unadaptable	Usability	7.02%
Minimal	Shape	7.02%	Impractical	Usability	7.02%
Actual	Resistance	7.02%	Ancient	Usability	7.02%

4.2. Phase 2

In the second phase, it was confirmed that those living rooms which furniture makers say that they are not sold are negatively perceived by users. The best and worst scores are shown in Table 3.

Table 3. Perceived factors scores in living rooms that are not sold.

Worst scores	Perceived factors	Model number	Best scores	Perceived factors	Model number
2.89	Material	3	3.56	Usability	4
2.98	Color	1	3.56	Security	4
3.08	Material	4	3.56	Usability	2
3.10	Material	1	3.54	Resistance	2
3.13	Color	2	3.51	Efficiency	3

The living room that fewer participants would buy was the model one, with a 74.36% of rejection, compared to 64.10% for model two, 62.16% for model three 61.11% for model four. The room model with the worst overall average score was the model three with 3.12, compared to 3.14 for model one, 3.21 for model four and 3.28 for model two.

4.3. Phase 3

During this phase, the perceived factors by users in living rooms that are sold regularly were evaluated. The best and worst scores are shown in Table 4.

Table 4. Perceived factors scores in living rooms that are sold.

Best scores	Perceived factors	Model number	Worst scores	Perceived factors	Model number
3.86	Usability	1	3.04	Interaction – Empathy	2
3.81	Usability	3	3.06	Interaction – Empathy	3
3.80	Security	3	3.17	Color	3
3.60	Usability	2	3.22	Shape	3
3.59	Security	1	3.24	Color	1

The living room with the best overall average score was the model one with 3.49, compared to 3.44 of models two and three, respectively.

4.4. Phase 4

During phase four the modifications made to the unsold model three were evaluated, this evaluation gathered scores for each of the perceived factors by users. Table 5 shows the scores for each of the nine versions of the living room which represents one specific design factor.

Table 5. Comparison of factor scores in the worst living room, before and after the modifications.

Manipulated factor	Original score	Score differences in the manipulated living rooms*								
		1	2	3	4	5	6	7	8	9
Shape	3.19	-0.29	0.17	-0.23	0	-1.54	-0.19	0.01	-0.36	-0.32
Color	3.14	-0.07	0.29	-0.33	-0.33	-0.52	-0.22	-0.26	-0.26	-0.27
Material	2.89	0.56	0.82	0.18	0.11	-0.13	0.30	0.19	0.28	0.24
Efficiency	3.51	-0.20	0.10	-0.36	-0.28	-1.24	-0.24	-0.19	-0.26	-0.16
Resistente	3.27	0.59	0.66	0.32	0.27	-0.46	0.25	0.13	0.23	0.12
Usability	3.41	-0.27	0.30	-0.19	-0.14	-1.22	0.13	-0.01	-0.03	-0.19
Maintenance	3.16	0.15	0.73	-0.05	0.03	-0.62	0.15	0.04	0.01	-0.03
Security	3.35	0.27	0.58	0.21	0.19	-0.75	0.19	0.05	-0.02	-0.13
Empathy	3.24	-0.83	-0.24	-0.94	-0.74	-1.74	-0.62	-0.48	-0.74	0.28

* Negative values indicate that the proposal received a negative perception

Subsequently the nonparametric Friedman test for paired samples was performed to analyze samples from the different experiments, which are shown in Table 6. The results indicate that the modifications implemented in the model improved the perception of the subjects regarding the analyzed characteristics. The difference in the values was statistically significant in all cases. The color and shape factors indicate a minor change in perception ($p < .05$). These results indicate a significant difference between the results of the unsold living room and the modifications.

Table 6. Friedman test for all the phases.

Phase	Critical level (Sig. asintót $p < .05$) in the perceived factors								
	Color	Material	Shape	Efficiency	Resistance	Usability	Maintenance	Security	Empathy
2	0.869	0.550	0.604	0.233	0.277	0.257	0.187	0.666	0.689
3	0.10	0.475	0.057	0.708	0.839	0.195	0.141	0.541	0.355
4	0.021	0.001	0.026	0.000	0.000	0.000	0.000	0.000	0.000

5. Conclusions

The study allowed to determine which design factors had a greater impact on the perception and acceptance of users.

In step two, we could discover that among the unsold living rooms, the aspect that seem to have a greater negative impact on users is the material, since it had the worst scores in three models of living rooms. This suggests that although the furniture seems to cover other important aspects and satisfy users, the perception of the quality of the material can negatively impact the purchase intention.

This phase also allows us to identify aspects that have a positive impact in users, even in living rooms that are unsold. Unquestionably the product usability is the most important factor for users, followed by security and

efficiency, all of them are ergonomics-related factors; this suggests that in everyday furniture, such as living rooms, the purchase decision must cover usability, safety and efficiency aspects; which are complemented by aesthetic design elements such as color, shape and proportion.

The phase three reinforces this approach since the best scores were assigned to usability and security, while the lowest scores of living rooms sold were empathy, color and shape. These results may suggest that even if the contemporary style is the most sold, this is not necessarily due to empathy with the user, but for other aspects unrelated to this factor.

In phase four, certain trends concerning the correlation between design elements and the impact on users were identified.

Such was the case of model two, concerning the color modification. This model was the only one that positively impacted eight factors, such as resistance, durability and maintenance; getting only a decrease in the value for empathy - interaction. This allows us to reaffirm the results of phase two and three, where we notice that even when most aspects are evaluated positively, empathy is not guaranteed. The empathy factor is strongly associated with the purely emotional aspects of the user.

However, the fact that the color change modifies the perception of ergonomic aspects such as usability and security, makes emphasis in the importance of psychological and cultural aspects. Why a dark gray living room is perceived as safer? The relationship is less complex with the maintenance factor since users consider that a living room in white is difficult to maintain with that color and is easily soiled.

Another interesting result was the model five, where the corners were sharpened and increased in size. Such modification had the objective to increase the perception of resistance, but this did not happen and also affected the nine factors evaluated, of which the most affected were empathy and efficiency. The modification in model one that also implied straight angles, adversely affected the results. It is suggested that the positive perception towards the furniture is achieved with smooth and rounded corners.

The case of model four which goal was to improve the perceived efficiency by removing the arms, was not achieved. This demonstrates how complex or practically impossible it is to evaluate the efficiency of a product without using it, since none of the nine models of rooms was able to improve the perception of this aspect.

The opposite case is the resistance factor, which showed an improvement with eight of the nine models of the experiment, although the one which showed no improvement was precisely that in which this factor was modified. It was thought that with straight angles and higher volume, the perception of resistance would be increased, but it did not happen.

The users' perception and subjective evaluation to design factors is complex, and even more in those linked to ergonomic factors such as usability, safety and efficiency.

Design elements such as color, smooth and rounded shapes and the use of recognized pieces as padded (cushions), were found to be those elements that impacted positively, and the proper use of them can result into an actual purchase.

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