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Sustainability Criteria for Selecting Soft Finishing Materials for residential spaces

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ABSTRACT:

Soft finishing materials for residential spaces are usually selected based on traditional criteria such as aesthetic characteristics, functional performance and economic factors. In recent years sustainable criteria gained more attention in the selection of soft finishing materials. These criteria appear in many publications for basic construction materials such as brick, concrete, stone, wood, metals, glass, plastic and plaster. However a recent literature review shows that not much information is available on sustainability criteria for the selection of soft finishing materials such as upholstery covering, wall covering, floor covering and panel surfaces.

In comparison to the basic construction materials soft finishing materials are less durable. While this may appear to be a disadvantage, it is actually a major reason for using soft finishing materials in interiors. Since, like paint, they require regular renewal and are easy to change. They regularly provide an opportunity to redesign a space with new color and texture using new fabrics.

This paper investigates the relevance of the following general sustainability criteria to the process of selecting soft finishing materials:

- *Total life cycle cost, including maintenance, durability, and embodied energy.*
- *High recycled material content, recycled, salvaged, or reused, to address end-of-life issues.*
- *reduced material use*
- *Healthy and safe indoor environment: low- or no-VOC paints, sealants, and adhesives.*
- *Blocking the spread of contaminants, warn occupants of indoor pollutants, and improve light quality*

The relevant sustainability criteria will then be used to design three surveys to evaluate the importance of sustainability criteria in the selection of soft finishing materials in three different groups namely designers, customers, and suppliers. The survey will be carried out during the International Exhibition for Interior Design, which will be held in Abu Dhabi, United Arab Emirates during the period from 29 to 31March2010.

The findings of the investigation will be used to compile guidelines for the selection of sustainable soft finishing materials to be used by all involved in the selection process.

Conference Topic: The 1st International Sustainability Conference

Keywords:
Soft Finishing Materials, Traditional Criteria, Sustainable Criteria, Echo Label, Abu Dhabi.

1. INTRODUCTION AND BACKGROUND:

Among the many materials that contribute to the design of a complete interior, soft finishing materials have a particularly important role. They introduce a sense of softness, curvature, and flexibility into a static space, making a hard- or bare-looking room seem soft, comfortable and humane. With their vast range of colors, textures, and qualities, they offer unlimited design possibilities.
Functionally they are used to control natural light, provide privacy without solid walls Insulate, Protect from heat and cold, and absorb noise; they also provide comfort as upholstery for sofas and chairs.
Aesthetically soft finishing materials are flexible and can be manipulated to create any kind of mood or characteristic, they come in an unlimited variety of colors patterns and textures and can be easily changed or replaced, soft finishing materials are excellent as a unifying element throughout an interior space and can be integrated with elements of interior design. Soft finishing materials are basically categorized as either textiles or skin materials (leathers).

Soft finishing materials most often appear in interiors as upholstery cover materials for chairs, sofas, and cushions; as bed and table covers; and in window treatment, usually called by the traditional term drapery. Soft finishing materials also appear as woven floor coverings, which refers to carpets and rugs .Lesser uses include curtains in locations other than windows (at door openings, for example) and as wall-covering material.

In comparison with the basic construction materials (brick, concrete, stone, wood, and plaster) that are likely to line a raw space, soft finishing materials are less durable. While this may appear to be a disadvantage, it turns out to be a major reason for soft finishing materials' significance to the interior. Since, like paint, they require periodic renewal and are easy to change, they regularly provide an opportunity to do over a space with new color and texture. Indeed, the Phrase ' to redecorate ' implies new paint and new Soft finishing materials as the primary means of renewal.
It is probably because of this sense of soft finishing materials impermanence that designer feel free to be somewhat adventurous in their choice of fabric colors, textures, and patterns. This, in turn, has encouraged designers and manufactures of finishing materials to offer a tremendous variety.

The selections of soft finishing materials should always be made after a fresh review of what is currently available. It may be because of their inherent decorative possibilities that finishing materials have generally been selected almost entirely on the basis of their aesthetic qualities.
As interior designers have become increasingly responsible and professional, realization has developed that soft finishing materials play structural and functional

roles no less important than those of any other materials. Designers are assumed to be aware of a large number of characteristics of soft finishing materials that impact their selection.

Intended structural use of soft finishing materials can include these obvious categories

- Drapery (window treatment or other)
- Upholstery covering
- Wall covering
- Floor covering
- Panel surfaces

2. TRADITIONAL CRITERIA FOR SELECTING SOFT FINISHING MATERIALS FOR RESIDENTIAL SPACES:

The selection of soft finishing materials depends on their specific use within an interior space.

Some soft finishing materials are selected for their aesthetic characteristics; others may focus on function-related performance, maintenance, and installation factors; and some may be determined by economic factors.

The selection of soft finishing materials is often associated with the choice of furniture, hard floor coverings, and paint colors as a key element in the designer's contribution to a design project.

Soft finishing materials selection may seem a simple matter of casually choosing some attractive colors and textures-but the subject is actually complex and merits more careful attention.

Selecting soft finishing material from the vast collection of materials available will involve consideration of such traditional criteria.

Table.1 Shows the traditional criteria for selecting soft finishing materials (textiles or leathers) (Rosemary Kilmer, P.1992)

Table (1)

TRADITIONAL CRITERIA	CHARACTERISTICS/CONSIDERATIONS
AESTHETIC CRITERIA	
1. Appearance	Color, pattern size & repeat, visual textures, style.
2. Tactile	Touch: rough, smooth, soft; fabric weight and drape ability.
3. Visual Coordination	Coordination with other interior elements.
FUNCTIONAL CRITERIA	
1. Durability	Abrasion and tear resistance; light fastness; color and texture retention; soil resistance; structural stability and flame resistance.
2. Performance properties	Reparability. Value for acoustical, static, isolative, and light control properties.
3. Maintenance needs	Clean ability, stain removal and touch up requirements.
ECONOMIC CRITERIA	
1. Material Costs	Material,
2. Labor Costs	Delivery, and installation costs
3. Maintenance Costs	Maintenance, warranty, and replacement costs

2.1 Aesthetic criteria:

Often a soft finishing material is selected because of its aesthetic appeal; however, a designer must be sure that the fabric or textile is also durable and appropriate for its intended use.
Three attributes of soft finishing materials that form the basis for aesthetic judgment are color, pattern, and texture. Soft finishing materials can also be judged on good design principles within them self and on how they will coordinate with other materials.
Color preference is sometimes the most important factor in the selection of fabric. Coordinating color schemes of fabrics with other materials in an interior space should support, enhance and complement one another, not compete or cause visual irritation.

Pattern expresses the personality and character of a soft finishing material. Pattern within textiles should be well proportioned and exhibit good design composition. Pattern can also be used to relate a particular fabric to a period of time. Coordination of period styles and their patterns and motifs must be consistent to produce an authentic genuine effect.

Textural characteristics range from a smooth and refined quality (satin, velvet, damask) to a coarse and sturdy quality (tweed,matelasse, frieze).
Textural relief within a textile refers to the three-dimensional quality of the surface.
Weight of a soft finishing material is also important in the selection process. Soft finishing material can be classified into four basic weight categories: sheer and/or thin, lightweight, medium-weight, and heavy.weight.
Sheer and/or thin textiles are typically used for window curtains or draperies, lightweight fabrics can also be used for curtains, draperies, and top treatments, medium-weight fabrics are used for upholstery, draperies, shades, rigid top treatments and heavier curtains. They can also be used as wall and partition \ coverings. Heavyweight fabrics are applied as furniture upholstery, wall coverings or hangings, and heavy bedspreads.

2.2 Functional criteria:

Functional characteristics include serviceability expectations. As well as design and performance qualities. Some soft finishing materials will wear out faster than others because of the fiber, yarn, or construction method, and may wear out aesthetically because of functional weakness, such as fuzzing or pilling problems with colors fading or crocking (color rubbing off), or being difficult or impossible to clean.
A designer must also be aware of performance requirements, such as flame resistance, static reduction, or structural stability. Soft finishing materials installed in commercial applications must meet minimum requirements for durability, colorfastness, and fire safety.
A designer should be aware of a soft finishing material's ability to hide soil and still look good. The clean ability of a soft finishing material is based on the fiber content, construction method, and durability of finishes.
Similar to the other basic construction materials (stone, wood, brick, and plaster), soft finishing materials come from a natural or raw state and go through an average of six finishes to become marketable or usable as finished products.
Before specifying or selecting soft finishing materials for an interior space, the interior designer must understand the qualities of the basic materials, the process that fibers undergo in order to be transformed into soft materials and the finishes and applied ornamentation of the textiles.

2.3 Economic criteria:

Cost is a more complex issue than it may seem. It is a mistake to consider only the first cost of material.
Soft finishing materials are available in a vast range of prices from quite minimal to very high, but the simple per-yard price of a soft finishing material is only one factor in the total cost.
The initial cost of soft finishing material yardage tells nothing about the soft finishing material's lifetime cost, which takes into account its durability, cleaning costs, and replacement cost. (This last becomes important with frequent redecoration)
The cost of drapery and upholstery includes the work of making up curtains or covers plus the cost of additional materials, such as linings and hardware. (These costs generally do not depend on the type of fabric chosen.)

A better soft finishing material at a higher price may be more economical in the long run than a cheap material with a short life. However, if the user plans to change soft material frequently, this may not apply. Such intangibles as user satisfaction and aesthetic qualities are important criteria that cannot be priced.
Cost of fabrication, hardware, and installation of drapery and other window treatments and, for all soft finishing materials, cost of maintenance over a long term and the duration of useful life before replacement are all factors in the true total cost of a selected textile. The work involved in reupholstering furniture is particularly costly and often leads to a decision to replace the entire chair or sofa as more economical.

3. OTHER CRITERIA:

3.1 Comfort:

In selection upholstery covering, consideration should be given to the length of time a person is liable to use the item of furniture. Some synthetic materials can become uncomfortably sticky, particularly in a hot environment, while certain woven natural soft materials can be comfortable to the skin.

4. SUSTAINABILITY:

The most commonly used definition for sustainable development comes from a report by the World Commission on Environment and Development—"To meet the needs of the present without compromising the ability of future generations to meet their own needs." (Penny Bonda and Katie Sosnowchik,P.2007)& (http://www.saltsorganic.com/sustainable_clothing_production.html)
Sustainability is recognized as the first step toward ensuring survival of the growing human population and the Earth. (http://www.accessscience.com/popup.aspx)
The dictionary defines sustainability as "the attempt to provide the best outcomes for both human and natural environments both now and in the indefinite future."

Sustainability means thinking about creating buildings and interior environments now, but also considering how they will be used 50, 100, or more years from now. It also includes strategies such as the use of environmentally friendly materials, recycling, and energy efficiency.
Concepts of sustainability extend to include avoiding pollution, conserving resources, and utilizing materials and furnishings that are made from renewable resources with long life spans and requiring minimal upkeep. Sustainability is a healthy and educated mind-set about living and working to support rather than deplete natural resources. Ultimately, sustainability means creating long-lasting buildings and environments that tread lightly on the environment.

4.1 Sustainable materials:

A sustainable material is a material that fits within the constraints of a sustainable material system. In order to be sustainable, the material must be appropriate for the system and the system must be appropriate for the material. (http://www.accessscience.com/popup.aspx)

4.2 Sustainability of soft finishing materials:

Sustainability of soft materials refers to any method utilized to attempt to make the production of that soft materials more environmentally friendly. Soft materials refer to any product that is made from textiles and skin materials, and there are several stages involved in making fabric, and therefore there are many ways in which each stage can be altered to make the production of that textile more environmentally friendly.
In basic terms, what does this mean when used in sustainable textiles production? It means that ever effort is made from the fiber to finished product to ensure the least harmful and most natural materials are used. Also using the least energy possible to produce and distribute the textiles. Starting at the fiber, using natural, easily renewable fibers like bamboo help lessen the amount of land and energy used. Using organic cotton instead of regular cotton prevents chemicals from getting into the surrounding natural and human environments.

4.2.1 Green specification and soft finishing materials:

Green specification describes selection of materials that produce a sustainable environment-the materials have come from a renewable source and removing them will not harm the earth's environment.

Green products will also have been green-manufactured with no adverse effect on the environment, and can usually be recycled or reused. These kinds of products are free from harmful toxins, are made of renewable resources, and have not created environmentally harmful by-products in the manufacturing process.
Green products are items that are environmentally friendly because they do little or no harm to the environment or because they are made of postconsumer recycled materials.
Soft materials have a generally minor to moderate impact on green issues, natural fibers produced from plants, such as cotton and linen, have continually renewable sources, as do many materials with animal origins, such as wool, horsehair and goats' hair, leathers, and silk. Only the products obtained from endangered animal species -furs and certain skins, such as leopard and zebra, threaten the natural world through the possible extinction of wild animal populations.

Although some fibers and chemical finishes can have an impact on indoor air quality, the task of soft material is generally minor in this regard. However, adhesives used with textiles for wall or panel covering and particularly adhesives used for carpet installation, can present serious problems of off-gassing that merit special attention.

Soft materials used as window treatments, if chosen with green issues in mind, can have a positive impact on energy and liveliness requirements through their ability to provide some degree of insulation from heat and cold.

Soft finishing materials made of sustainable hemp and organic cotton and printed using only water-based pigment dyes, result in both eco-friendly and beautiful textiles.
We all have to do our part to save our planet. One big way to do that is to choose eco friendly products (recycled and chemical-free).
It is a good thing, then that many companies have started going green. Even if a product is labeled as green, eco friendly, or environmentally friendly, you can never be sure if it is the real thing. One way to make sure that a product is eco friendly is to look at the components, whether they are made of chemicals or natural substances (core).These fabrics are woven and treated with no additional chemicals. Also during the finishing process, water based products and environmentally approved dyes are used. After years of enjoyable use, these fabrics are eco-friendly.

5. SUSTAINABILITY CRITERIA

Table.2 shows the sustainability criteria for selecting soft finishing materials for residential spaces. (Penny Bonda and Katie Sosnowchik, 2007 & http://www.saltsorganic.com/sustainable_clothing_production.html.)

SUSTAINABILITY C RITERIA	**CHARACTERISTICS/CONSIDE RATIONS**
1. High sustainable and /or non-hazardous recycled material Reusable, recyclable	Fabrics made of sustainable hemp and organic cotton for example.
2. Minimal input (energy/water)and output(waste)Healthy and safe indoor environment	Fabrics made of natural materials, such as cotton, linen wool, horsehair, goats' hair, leathers, and silk.
3. Blocking the spread of contaminants, warn occupants of indoor pollutants, and improve light quality	Fabrics are woven and treated with no additional chemical.
4. Benefits indoor air environment /human health	Fabrics are woven and treated with no additional chemical.
5. Made without polluting or toxic chemicals	During the finishing process, water based products and environmentally approved dyes are used.
6. Fabric produce locally	Local is best, when items are made locally it is using less energy in transport. It is also great to shop local for from a community sustainability perspective. Shopping from a local reputable source also insures that fair

	labor practices are being used. Shipping is the final rung on the sustainable clothing ladder. Shipping less equals less energy and less environment damage.

6. PROBLEM:

After presenting and reviewing the traditional standards (aesthetic, functional and economic) which help in the selection of soft materials, in addition to sustainability criteria, we identified the key problem of the research, which is that the customers, designers and suppliers who are the users of these soft materials, may follow the traditional standards when selecting and using soft materials in their residential interiors. Rather than follow sustainability criteria in their use and selection of those materials, probably the hypothesis here is that such problem exists due to the lack of knowledge and absence of clarity of those standards and not much information is available on sustainability criteria for the selection of soft finishing materials such as upholstery covering, wall covering, floor covering and panel surfaces. In order to investigate this problem, field observation has been conducted.

7. METHOD

Quantitative research method using a survey was adapted in the investigation of this problem. The survey involved distributing a questionnaire among a number of customers, designers and suppliers to know any of the criteria used when choosing the soft materials. The questionnaire (Appendix A) was distributed in the International Exhibition for Interior Design, which was held in Abu Dhabi, United Arab Emirates during the period From 29-31March2010. The selection of this exhibition was based on the fact that it attracts different categories of customers, designers and suppliers from different countries.

8. FINDINGS AND RESULTS

After the unloading of the questionnaire and analysis of its results, doing statistics needed, we discovered that sustainability criteria is the lowest criteria used when selecting soft materials. The percentage of non-users of sustainability criteria was as follows: Clients 52.22%, designers 54.55% and suppliers 43.42%, while the percentage of users who used the traditional criteria in the selection of soft materials are much higher as follows: Clients: aesthetic criteria 59.26%.functional criteria 46.42% economic criteria 46.67%. Designers: aesthetic criteria 75.00%.functional criteria 65.20% economic criteria 63.46% and Suppliers: aesthetic criteria 60.68%.functional criteria 55.59% economic criteria 49.48%.
Charts 1.2&3 show survey results, and Appendix B, C &D show detailed customer, designers and suppliers survey result.

Chart. 1 Customer Survey Result

Criteria	ESS essential	PREF preferred	N/A Not applicable

1)Aesthetic criteria	**59.26**	**30.56**	**10.19**
2)Functional criteria	**46.42**	**35.08**	**18.50**
3)Economic criteria	**46.67**	**32.96**	**20.37**
4) sustainability criteria	**22.59**	**25.19**	**52.22**

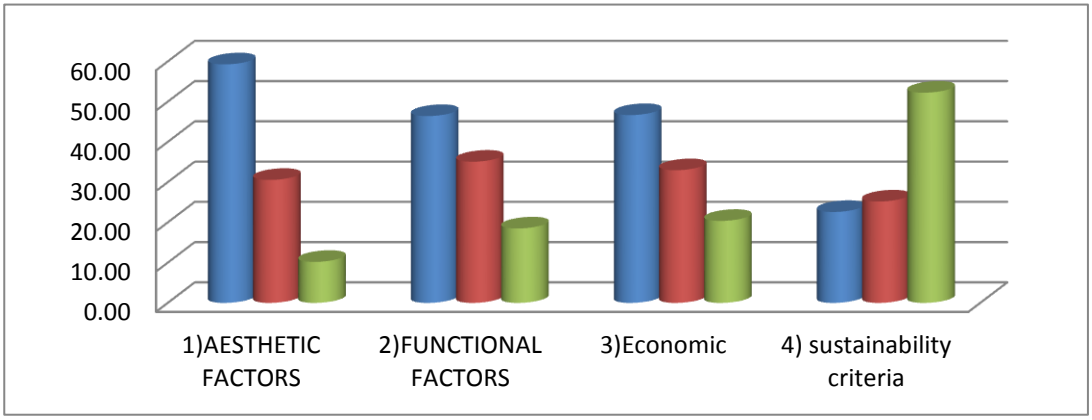


Chart. 2 Designers Survey Result

Criteria	ESS essential	PREF preferred	N/A Not applicable
1)Aesthetic criteria	**75.00**	**18.37**	**6.63**
2)Functional criteria	**65.20**	**23.81**	**10.99**
3)Economic criteria	**63.64**	**23.86**	**12.50**
4) sustainability criteria	**18.18**	**27.27**	**54.55**

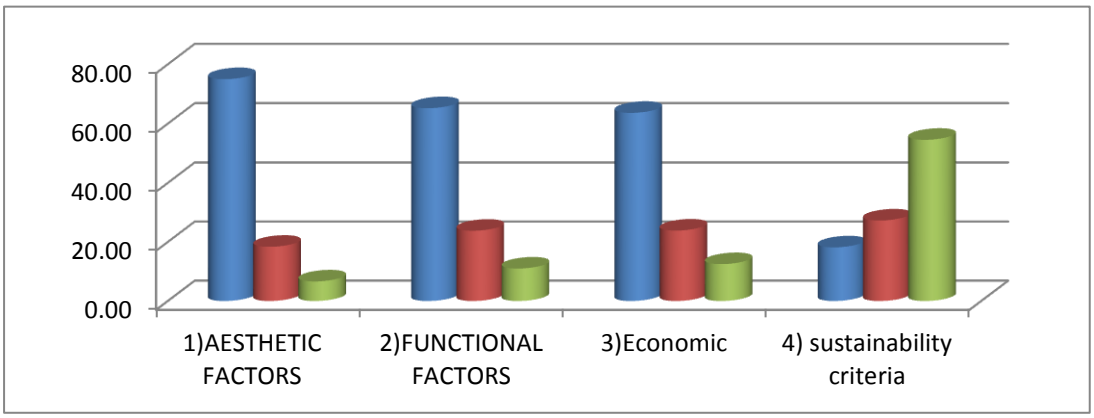
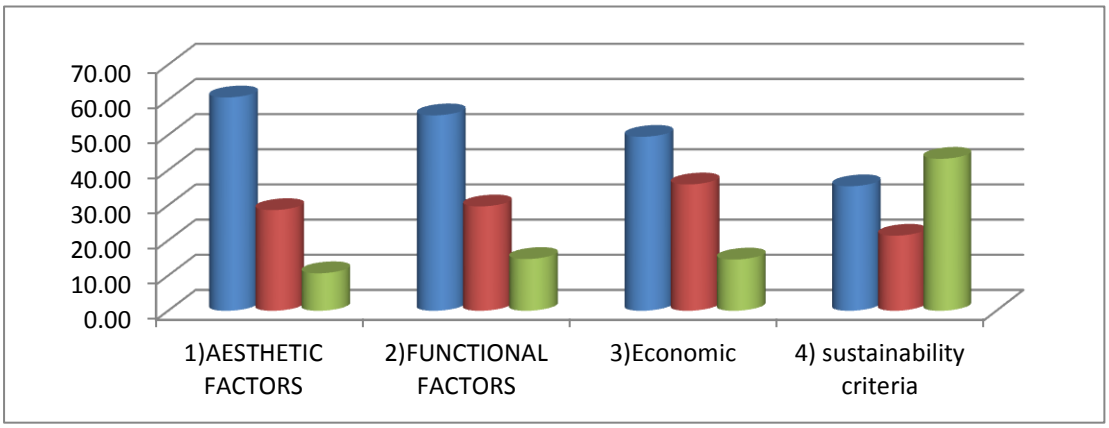


Chart. 3Suppliers Survey Result

Criteria	ESS essential	PREF preferred	N/A Not applicable
1)Aesthetic criteria	**60.68**	**28.65**	**10.68**
2)Functional criteria	**55.59**	**29.69**	**14.73**
3)Economic criteria	**49.48**	**35.94**	**14.58**

4) sustainability criteria	**35.42**	**21.35**	**43.23**



9. DISCUSSIONS AND RECOMMENDATIONS

The results of the questionnaire show that there is a problem which is the non use of sustainability criteria for the selection of soft materials. So, we recommend that the information and specifications labels which are attached to the soft materials ,these labels should include and described the standard information such as (the name and number of the fabric, width, fibers, finish, and, sometimes, price)beside the necessary information about sustainability such as (products are environmentally safe, Manufacturing is done using eco-friendly materials and avoided harmful chemicals) ,or attached special labels such as Eco Labeling or Made in Green to guarantee certain environmental criteria for all sorts of soft materials and their manufacturing processes.

These special labels are for all those who provide or who are seeking textile products manufactured with the guarantee that they are free from substances harmful to health. This certifies that the product, throughout its traceability chain has been manufactured in factories which respect the environment and the universal rights of workers. The product, therefore is free from harmful substances, respects the environment and respects human rights. This well helps the users of the soft materials (especially non specialized users) to understand the structure of these materials and deal with them in the right way.
The vast variety of fibers, yarns and manufacturing techniques used in making soft materials and the complex terminology used in describing fabrics can seem confusing.

Consequently the customer can find a range of fabrics appropriate to the intended use by checking manufacturers' suggestions and directly assessing such qualities as texture, weight (density), and feel (or hand, as this quality is called in the textile trades. commerce), by balancing the fabric's aesthetic qualities of appearance, such as color, pattern, and texture, besides its practical qualities, such as durability, strength, and colorfastness, as well as its price and sustainable qualities.

Designers have an ethical responsibility to be aware of the impact their selections and designs have on the environment and subsequently on customers. That responsibility includes avoiding waste and pollution, as well as ensuring long life for design so that it will not be prematurely discarded. These are critical features of good design, and when design is good, both the environment and customers benefit.

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Appendix A

General criteria for selecting soft finishing materials for residential spaces

Textiles and leathers for interior use (U, D, WC, FC & V)

Name: ---------- Company or E-mail: ----------

Job title: ---------- P.O.B/City:----------

Below, list the General criteria for selecting soft finishing materials for residential spaces, Indicate whether criteria are "essential" (ESS) or "preferred" (PREF). Not applicable (N/A).

U = Upholstery, D = Draperies and/or curtains, WC= Wall covering, FC= Floor covering, V = various.

CRITERIA	CHARACTERISTICS CONSIDERATIONS	ESS essential	PREF preferred	N/A Not applicable
1) AESTHETIC CRITERIA				
A. Appearance	Color			
	Pattern size & repeat			
	Visual textures			
	Style.			
B. Tactile	Touch: rough, smooth, soft			
	Fabric weight and drape ability.			
C. Visual Coordination	Coordination with other interior elements.			
2) FUNCTIONAL CRITERIA				
A. Durability	Durability (the ability of the fabric to exist for a long time without significance corrosion Abrasion (Scratch) and tear Resistance			
B. Performance	Light fastness; color and texture; retention (continuation, keeping).			
	Soil resistance;			
	Flame (fire) resistance			
	Structural stability (stability of weight, weave)			
C. properties	Reparability. Ease of repair ,			

	Isolative properties.			
	Static properties.			
	Light control properties.			
D. Maintenance needs	Clean ability, stain (spot, blot) removal, and touch up (retouch), Replacement requirements.			
3) ECONOMIC CRITERIA				
A. Material Costs ,	Material, Delivery			
B. Maintenance Costs	Maintenance, warranty (guarantee) costs. Replacement costs.			
C. Labor Costs.	Installation costs.			
4) SUSTAINABILITY CRITERIA				
A. High recycled material content	Fabrics made of sustainable hemp and organic cotton for example.			
B. Healthy and safe indoor environment	Fabrics made of natural materials, such as cotton ,linen wool, horsehair ,goats' hair, leathers, and silk.			
C. Blocking the spread of contaminants, warn occupants of indoor pollutants, and improve light quality	Fabrics are woven and treated with no additional chemical.			
D. Made without polluting or toxic chemicals	During the finishing process, water based products and environmentally approved dyes are used.			

Appendix B

Detailed Customer Survey Result

CRITERIA	ESS essential	PREF preferred	N/A Not applicable
1) AESTHETIC CRITERIA			
A. Appearance	66.67	30.56	2.78
B. Tactile	53.33	30.00	16.67
C. Visual Coordination	57.78	31.11	11.11
	59.26	**30.56**	**10.19**
2) FUNCTIONAL CRITERIA			
A. Durability	55.56	31.11	13.33
B. Performance	42.78	37.22	20.00
C. properties	32.89	43.11	24.00
D. Maintenance needs	54.44	28.89	16.67
	46.42	**35.08**	**18.50**
3) ECONOMIC CRITERIA			
A. Material, Maintenance & Labor Costs	**46.67**	**32.96**	**20.37**
4) SUSTAINABILITY CRITERIA			
A. High recycled material content	17.78	33.33	48.89
B. Healthy and safe indoor environment	31.11	22.22	46.67
c. Blocking the spread of contaminants, warn occupants of indoor pollutants, and improve light quality A. Made without polluting or toxic chemicals	18.89	20.00	61.11
	22.59	**25.19**	**52.22**

Appendix C

Detailed Designers Survey Result

CRITERIA	ESS essential	PREF preferred	N/A Not applicable
1) AESTHETIC CRITERIA			
A. Appearance	78.41	15.34	6.25
B. Tactile	57.95	28.41	13.64
C. Visual Coordination	88.64	11.36	0.00
	75.00	**18.37**	**6.63**
2) FUNCTIONAL CRITERIA			
A. Durability	68.18	25.00	6.82
B. Performance	55.11	32.95	11.93
C. properties	54.55	28.18	17.27
D. Maintenance needs	82.95	9.09	7.95
	65.20	**23.81**	**10.99**
3) ECONOMIC CRITERIA			
A. Material, Maintenance & Labor Costs	**63.64**	**23.86**	**12.50**
4) SUSTAINABILITY CRITERIA			
A. High recycled material content	20.45	27.27	52.27
B. Healthy and safe indoor environment	20.45	27.27	52.27
c. Blocking the spread of contaminants, warn occupants of indoor pollutants, and improve light quality d. Made without polluting or toxic chemicals	13.64	27.27	59.09
	18.18	**27.27**	**54.55**

Appendix D

Detailed Supplier Survey Result

CRITERIA	ESS essential	PREF preferred	N/A Not applicable
1) AESTHETIC CRITERIA			
A. Appearance	58.59	32.81	8.59
B. Tactile	57.81	34.38	7.81
C. Visual Coordination	65.63	18.75	15.63
	60.68	**28.65**	**10.68**
2) FUNCTIONAL CRITERIA			
A. Durability	78.13	21.88	0.00
B. Performance	55.47	31.25	13.28
C. properties	32.50	34.38	33.13
D. Maintenance needs	56.25	31.25	12.50
	55.59	**29.69**	**14.73**
3) ECONOMIC CRITERIA			
A. Material, Maintenance & Labor Costs	**49.48**	**35.94**	**14.58**
4) SUSTAINABILITY CRITERIA			
A. High recycled material content	43.75	18.75	37.50
B. Healthy and safe indoor environment	40.63	25.00	34.38
c. Blocking the spread of contaminants, warn occupants of indoor pollutants, and improve light quality A. Made without polluting or toxic chemicals	21.88	20.31	57.81
	35.42	**21.35**	**43.23**