

Apparel design evaluation process from users' perceived values

Jungsook Kim[†]

Dept. of Clothing & Textile, Seowon University, Korea

Abstract

Apparel design is an economic activity to create values for users over the value chain of a product. In this paper, the contribution of apparel design is defined as the enhancement of users' perceived values by improving users' experience of products. In this context, the value of a product corresponds to compensation for experience or a promise for experience of a product. Experience can be sensory or psychological benefits to users. To evaluate the value of apparel design, the researcher identified and analyzed the apparel design parameters affecting users' experience and benefits of products such as macro-, micro-environmental factors, value chain factors, apparel designer factors, and user factors. For an analytical modeling of the values of apparel design, this paper introduces the concept of a utility function from economics. In economics, utility is a measure of desirability or satisfaction that can be correlative to need or desire. The measure of value can be found in the price which a user is willing to pay for the fulfillment or satisfaction of need or desire via the experience of a product.

Keywords: utility function, apparel design, perceived values

I. Introduction

In the 21st century, apparel design economics based on apparel design and related activities, such as: apparel design skills, methods and processes for innovation and creativity has been increasingly important in resolving issues and problems for the enhancement and sustainability of lives on the earth. If IT based digital economics has been the growth engines of the latter part of 20th century, design economics will play great roles in this era (Design Council, 2007; Sentance & Clarke, 1997). Contribution of apparel design can be tangible in the form of economic value and benefits, or intangible, philosophical, and psychological.

This paper confines the contribution to be tangible, measurable, and exchangeable, which extends from hard values derived from functional and material capability through to immaterial or soft values relating to emotional/psychological elements.

Latest social/cultural trends have been reshaping the behaviors of customers and market. A survey of the rating of subjective values shows that the more individual factors such as physiological pleasure (comfort, pleasure), self-love (self-satisfaction), and empathy (sharing, connection) rather than convenience (ease, efficiency), are seen to acquire a growing significance (Workshop on "Value added design", 1998).

Norman (2005) introduced the concept that product design should address three different levels of cognitive

Received 5 December 2013, revised 7 January 2014, accepted 10 February 2014.

[†] Corresponding author (jsk@seowon.ac.kr)

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/3.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

and emotional process: visceral (most immediate level of react to visual and other sensory experiences), behavioral (refers to the actions or reactions of a user to the environment, to a product. Influenced by pleasure and effectiveness of use, functionality, accessibility and usability), and reflective (conscious reasoning and reflection on past experiences). The first two levels are mostly relying on sensory and physical experiences and reaction to the functionality and emotional aspects of products. The third level deals with cognitive processing of reason and thought, resulting in psychological experiences of a product. Users' cognitive processing on products develops opinions on products and leads to a value judgment.

In this paper users' experiences and cognition are correlated to the value of a product. Users are willing to compensate the benefits from the experience and cognition of products with the values that users perceive appropriate, and willing to yield for exchange.

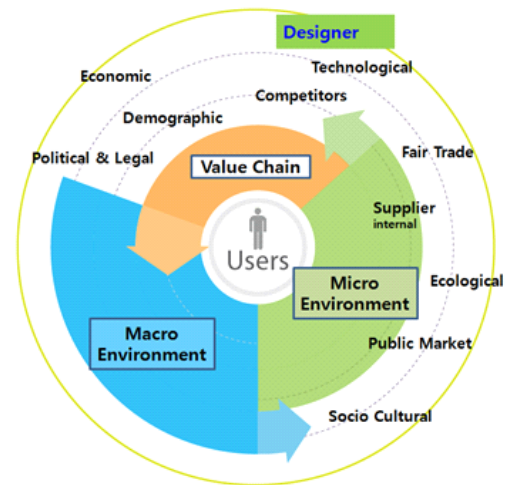
To evaluate the value of apparel design, identified and analyzed the apparel design parameters affecting users' experience and benefits of products. For an analytical modeling of the values of apparel design, this paper introduces the concept of a "utility function" from economics and developed equation to evaluate the value of apparel design.

II. Background

1. Defining an apparel design space for creating values

To analytically approach complex apparel design value problems, this paper introduces the concept of a apparel design value space. A apparel design value space is any portion of the universe isolated for the purpose of investigating the change/creation of values within it. A apparel design value space is under the influence of numerous environmental factors such as social, global, national, ecological, and marketing/technology issues. <Fig. 1> depicts a comprehensive form of a apparel design value space. Key value

groups in <Fig. 1> are user, Value chain contributors,



<Fig. 1> Apparel design value space

micro- and macro-environment factors, and apparel designer (in the form of apparel design thinking).

Macro environment factors are external to the direct interaction and involvement of apparel designer and users. Macro-environment factors are analogous to the macro environmental factors in the marketing and economics study. Key macro variables are global trends/issues, technology evolution, industry/market structural change, socio-cultural change, political/economical, and demographical change.

Micro environment factors exist within the industry where the object product belongs to. A sample list of micro-environment variables are: supplier internal (finance, human resources, organization), supplier externals (outsourcing, materials, logistics, supply chains), technology (service specific), competitors, sales channels, public (banking, government regulation, fair-trade).

The value chain is a conceptual network that links up all value adding activities during the course of production/delivery/consumption of products. Players over the value chain exist within the same organization or outside of apparel designer's organization. Typical value contributing activities can include outsourcing, R&D, producing, marketing, sales, logistics, and services.

Apparel designer and users are two main factors

affecting products and the values of products. These two items are further elaborated below.

1) Values based on user experiences (☺)

Users are located at the core of the apparel design value space as the main contributor of values in <Fig. 1>. Users are the sources of values in the space of apparel design value. All market variables revolve around users as the planets revolve around the sun. As the sun nourishes all planets of the solar system, the users influence, lead, and nurture the planets of apparel design.

Products acquire value in offering experiences and benefits to users. The perceived or expectation of emotional and/or functional/material experiences and benefits influences the value of a product. Users are willing to compensate the experiences and benefits of a product with the price that users perceive appropriate, and are willing to yield for exchange.

Values that users perceive important are equivalent to apparel design requirements and apparel design goals. For 'good apparel design', it is important to understand what constitutes user perceived values. This paper divides users' experiences and corresponding values into three categories: functional apparel design values, emotional apparel design values, and psychological/transcendental apparel design values.

The functional and material dimension of products, have the advantage of being open to quantitative analysis in terms of either technical performance or return-on-investment analyses and has been the focus of more traditional value analyses. However, the emotional or psychological dimensions of products bring us beyond the threshold of quantitative assessment where intangibles enter the frame. Qualitative assessment is typically also associated with a value statement on emotional or psychological benefits which is dynamic and derives from various cultural influences. In moving on from issues of quality to the even more intangible, 'soft' dimensions of emotional and psychological satisfaction, evaluation of emotional

and psychological 'experiences' of users is required.

This paper divides users' experiences and corresponding values into three categories: experiences of functionalities, emotional experiences, and psychologically gratifying experiences.

(1) Functional values

A product acquires value in the delivering of its required functions or benefits, functional aspects of products are divided into two groups: operation related functionalities, and quality/safety related functionalities.

Functional goals can be further classified into essential functionalities (a basic and minimum objective of apparel design similar to non-negotiable constraints) and supplemental functionalities (analogous to negotiable constraints). As an example, the essential functions of the garment are temperature control and skin protection from the risk of accidents or safety. Additional functions are individual expression and identity as represented socio-cultural features. Of particular interest or core value to the customers is user-interface. User-interface plays important roles in enhancing convenience of customers. Convenience orientation refers to a person's general preference for convenient goods and services. Intrinsic to consumers' perceptions of service convenience are the time and effort required to buy or use a service. Time and effort are non-monetary costs customers must bear to receive the service. There can be many definitions of convenience such as use of ease, access, transaction, decision, and benefits/post benefits (Berry et al., 2002).

As technology advances, quality/safety values are often taken for granted. However, these values are very important regardless of the nature of products or services. There can be several issues related to users' safety or quality concerns. Most important quality/safety issues are preventing users' physical and financial damage during experiencing the core benefits of products and services such as waterproof and windproof functions of climbing clothes, retro reflective functions of street cleaner uniform, pollution prevention functions

of hospital medical staff uniform and patient gown. Depending on the characteristics of products or services, the severity of quality/safety values varies.

(2) Emotional values

Sensory effects are the results of cognition by five senses (sight, hearing, taste, smell, and touch). Emotions are reflection of users' five sensory capacities. Customers use five natural senses to perceive information about products or services; that information helps customers make decision and choose the right actions to take. Design based on emotional values are becoming more important lately (Norman, 2005; Workshop on "Value added design", 1998).

User cognitive values, particularly, emotional values can be very subjective, and it may be difficult to have clear cut classification of different emotions because all these emotions are mixture of human mind and complex process of thought. Users' emotional reactions can be reflected as one of entertainment/hedonic values, aesthetics values, relational/empathetic values, Intellect values, and self-esteem values as summarized in (Table 1).

(3) Psychological value

Beyond users' self-centered spirit and ego, there can be self-actuation or even self-transcendence values that can be offered to users as part of or attachment to products such as high morale, high standard of ethics, or contribution to the society, and philanthropic work. Sometimes spiritual values of products can appeal to users. As an example, if a fixed percentage of revenue from the sale of a product is donated to a charitable organization, this strategy can enhance the value of the product to some users of the product.

2) Apparel designer factors (E)

Apparel designer, in the form of "apparel design thinking", is positioned, at the outer circle of the apparel design value space, and should be able to embrace and interpret the significance of all market variables and their impact on products. Apparel designer,

with creativity, intuition, and insight, carefully and scrutinizes all the interactions among value contributors in (Fig. 1).

Apparel designer incorporates the effects and impacts of these variables into apparel design so that customers can experience these value factors indirectly. As an example, a macro-market variable, ecology factors, should be reflected into the apparel design, and customers can experience the effects of a high cost price. Similarly, variables of (Fig. 1) can generate innumerable value variables, which should be carefully and thoroughly identified and analyzed.

A single word or a single thought process may not be sufficient to comprehensively define apparel design thinking because it deals with the complex state of human mind, and complex marketing problems. Basically, apparel design thinking is a methodology for practical, creative resolution of problems or issues that looks for an improved future result. As a style of thinking, it is generally considered the ability to combine empathy for the context of a problem, creativity in the generation of insights and solutions, and rationality to analyze and fit solutions to the context. Some of key attributes of apparel design thinking from various researches can be found as process oriented, strategic, holistic, multi-disciplinary, customer-centered, group-thinking, and dialectic approaches.

The following apparel design thinking parameters can be proposed:

Creativity causes to differentiate from those of existing logics such as deductive or inductive logics, for alternative forms of functional, aesthetic, formative and emotional values. Creativity helps attain a leap to the apparel design idea.

Innovation aims for definitive upgrade or differentiation at the universality level in an evolutionary mode.

Knowledge Management is to accumulate and systematize individual, organizational and external groups' knowledge, insights, and experiences to be utilized as part of the apparel design process.

Dialectic can be useful, especially in the group-thinking environment to come up with a totally different concept from the proposed or existing product. Also, this can be considered as a critical apparel design review process of modern times.

Transformational managerial and holistic innovation aspect of apparel design thinking is how to achieve the apparel design goals with given resources by upgrading the organization and operational processes.

The apparel design thinking process can affect apparel design more than any other apparel design parameters. It is important to integrate, and engraft apparel designer factors into the apparel design model to encourage and bring out apparel designers' creativity potentials.

III. Results and Discussion

1. Apparel design evaluation process

This paper introduces the concept of a utility function from economics to evaluate the value of apparel design. In economics, utility is a measure of desirability or satisfaction that can be correlative to "needs or desire". "Need or desire" cannot be measured directly, but only indirectly, by the outward phenomenon that they cause to exist. The measure can be found in the value or price which a consumer is willing to pay for the fulfillment or satisfaction of users' "needs, wants, desires" (Berry et al., 2002).

A utility function is a means of measuring the desirability of various types of goods and services, and the degree of well-being experiences that those products provide for users. This measure is normally presented in the form of a mathematical expression, and can be utilized with just about any type of good or service. In other words, utility is proportional to value. In this paper, 'value' and 'utility' terms are used exchangeable.

In a grossly simplified form, the utility (or the value) of apparel design is determined by two value factors as equation 1.

Where ΔU is the change of utility (i.e., the changed "desirability or value of a good and service"), Q is input materials and W is work of apparel designer. Equation 1 implies that change of utility in the apparel design value space equals to the amount of input materials (Q) supplied to the space plus apparel designer work (W) performed on the apparel design value space.

$$\Delta U = W + Q$$

Equation 1: Utility of apparel design

To apply this concept to more realistic and complex apparel design value problems such as depicted in <Fig. 1>, a general utility balance equation can be derived from equation 2. Where, ΔU has four 4 variable groups: environmental groups (f) customer factors (C), apparel designer factors (D), and apparel design input materials (U_i). Compared to equation 1, equation 2 has two additional terms: customer factors (C), and environmental factors (f). Environment factors group has 4 elements: macro-environment factors (X), micro-environment factors (x), value chain contributors (V), and time factors (T). The implication of apparel design utility, equation 2 is that the total utility of users for a given product is affected by environment factors, users, apparel designer (work), and apparel design input materials.

$$\Delta U = f\left(\sum_1^J T_i + \sum_1^K X_i + \sum_1^L x_i + \sum_1^M V_i\right) + C\left(\sum_1^N N_i\right) + D\left(\sum_1^O C_i\right) + U_i$$

Equation 2: Balanced utility equation for complex apparel design value space

Similar to any physical or social problem, a complex apparel design system is an unsteady-state function, time being an independent variable. Time factors affect the value of apparel design as follows:

1) Target time of the object product. In general, the target time will be set to the current point of time,

〈Table 1〉 Apparel design value parameters

Value group	Value parameters	Value contributing elements
Apparel designer (as apparel design thinking) (D)	Creativity	Complete departure from existing values, cultures, logics
	Innovation	Upgrade of functionalities, costs, performance
	Knowledge management	Multidisciplinary, consilience approaches
	Group thinking (dialectics)	Group thinking, critical review
	Transformational	Organizational, process change
User (perceived values) (C)	Functional values	Operation, user interface
		Quality, safety values
		Benefits
	Emotional values	Entertainment, hedonic values
		Aesthetic values
		Belongings, relational, empathetic
		Intellect, high technology
		Self-esteem
	Psychological values	Self-fulfillment, spontaneity
		Spiritual, moral, ethical values
Environmental factors	Macro	Global trends
		Technology (IT, internet) effects
		Socio-cultural values
		Energy, ecology
		Demographical values
		Fair-trade
	Micro	Apparel designer internal (human, financial, organizational resources)
		Supply chain management: part suppliers, channels
		Competitors (same products, substitute products)
		Technology (same industry)
		Public (bank, government, local)
		Demographics
	Value chain factors	R&D
		Production
		Outsourcing
		Marketing
		Sales
		Logistics
		Services
	Time factors	Target time (retro, contemporary, futuristic)
		Realization time (launching time)
Life-cycle, life-span		

and apparel design represents contemporary trends and styles. Depending on the demand of the market and users, apparel design can also be retro or futuristic styles.

2) Materialization time, the time of materializing the apparel design or the launching time of a product.

3) Life cycle or life-span of apparel design: The market and the customers have expectation for the life span of products and services.

2. Definition of apparel design value parameters/variables

In summary, all value variables that affect users' perceived values in <Fig. 1> and equation 2 are included in <Table 1>. It should be noted, however, that depending on the type of products and services, apparel design value variables can be added or deleted. The variables in <Table 1> can be used as a guide line.

3. Estimation of value of apparel design

From equation 1, the contribution of apparel design (or work in general) can be estimated by the change of utility (ΔU) minus material inputs (Q) as following:

$$W = \Delta U - Q$$

Equation 3: Simple apparel design value equation

For a more realistic situation, the work (or contribution) of apparel designer can be estimated from equation 4. Where, the contribution of apparel design (W) can be estimated by the change of utility (ΔU) minus apparel design material inputs (U_i), ΔU has four 4 variable groups: environmental groups (f) customer factors (ζ), and apparel designer factors (D). Environment factors group (f) has 4 elements: macro-environment factors (X), micro-environment factors (x), value chain contributors (I), and time factors (T). The contribution of apparel design, equation 4 is affected by environment factors, users and apparel designer.

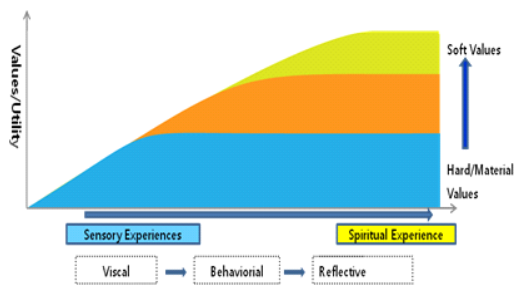
$$W = \Delta U - U_i = f\left(\sum_1^J T_i + \sum_1^K X_i + \sum_1^L x_i + \sum_1^M V_i\right) + \zeta\left(\sum_1^N N_i\right) + D\left(\sum_1^O C_i\right)$$

Equation 4: Contribution of apparel design for a complex model

The format and implication, equation 3 and 4 are identical. However, in equation 4, the scope of apparel designer work is expanded to not only include the traditional scope of apparel design area such as apparel design of artifacts, packaging, hardware, and software apparel design, but also apparel designer's interpretation and management of environment, user factors, value chain contributors in the form of apparel design thinking <Table 1>. Depending on where actual value creation activities are taking place, some items of equation 4 need be moved to the left side of equation 4 to be excluded from the contribution of apparel designer. As an example, if some value creation activities are performed completely outside of apparel designer's control, these items must be removed from the contribution of apparel designer.

This approach is useful not only in estimating the total value of apparel design, but also in evaluating value contribution by each individual apparel design variable such as macro-, micro-environmental, value chain factors, user and apparel designer. By this approach, value contribution by each apparel design variable such as ecology factor, or user experiences can be obtained. To add the sense of reality to analytical outputs, a customer survey will be designed and performed to assess users' perceived value influenced by individual market variables. Statistical analysis needs be performed using tools such as conjoint or SPSS to analyze the survey results.

<Fig. 2> qualitatively shows the value structure of apparel design. The user perceived values span a range starting from 'sensory experiences' derived from functional and material capability through to immaterial or soft values relating to emotional/psychological experiences. In <Fig. 2>, the lower bottom represents



〈Fig. 2〉 User experiences versus perceived values

functionality/material oriented values, ‘hard values’ such as functional or safety/quality related values. The next level shows values needed emotional experiences, and the top of the value hierarchy describes spiritual experiences and related values.

〈Fig. 2〉 shows several key attributes of user perceived values. User perceived values follow the marginal utility concept. The marginal utility concept is that once a certain level of experiences is satisfied, the rate of users’ perceived values by additional functionalities increases at a slower pace. This is similar to an analogy that the 2nd or 3rd bite of food may not be as tasteful as the 1st bite. Another attribute of the value of apparel design is that to enhance the value of products, functionality alone has the limit. Apparel design needs to appeal and satisfy users’ emotional and psychological experiences and values.

IV. Conclusions

Apparel design is a process of converting and optimizing the uncertainties arisen from the changing environments culture, market and technology into the useful and definite values. The focus of user value has been moving on from values of quality, functionality and materials to the more intangible, emotional and psychological values.

The customers’ values can be correlated with users’ “experiences or a promise for experiences of a product.” For the analytical description of customers’ cognitive values, the concept of the utility function

can utilized to entail all apparel design factors, and environmental factors as contributors to utility affecting the customers’ “want, need, and desire.”

A systematic apparel design process is needed to intelligently and creatively identify, classify, and select apparel design factors that affect the values of apparel design. A product acquires value in the offering of its required experiences and benefits to users. Values that users perceive important are apparel design goals and requirements. The proposed apparel design process should be able to help induce definitive and implementable apparel design goals that meet or exceed the customers’ and market expectation.

Beyond the functionality such as user-interface, users’ emotional and psychological experiences should be considered to enhance the value of products and services.

References

- Alfred, M.(1920). *Principles of economics(8th ed.)*. London: Macmillan.
- Berry, L., Seiders, K., & Grewal, D.(2002). Understanding service convenience. *Journal of Marketing*, 66, 1-17.
- Choi, S. H., & Lee, E. Y.(1990). A study on the role of emotions in forming an attitude toward the purchase of clothing. *Journal of the Korean Society of Clothing and Textiles*, 14(3), 222-228.
- Design Council(2007). *The value of design factfinder report*.
- Havlena, W. J., & Holbrook, M. B.(1986). The varieties of consumption experience: Comparing two typologies of emotion in consumer behavior. *Journal of Consumer Research*, 13, 392-404.
- Holbrook, M. B., & Hirschman, E. C.(1982). The experiential aspects of consumption: Consumer fantasies, feelings and fun. *Journal of Consumer Research*, 9, 132-140.
- Ka, Y. M.(2012). Effects of the product design on consumer's purchase intention: Focused on consumer

- value and design evaluation. Unpublished master's thesis, Tongmyong University, Busan, Korea.
- Kim, H. S.(2008). Lifestyle and clothing consumption value between groups depending upon ambivalent consumption. Unpublished master's thesis, Konkuk University, Seoul, Korea.
- Lee, E. K.(2009). A study on consumer values on oversea's famous fashion brand products design. Unpublished doctoral dissertation, Hanyang University, Seoul, Korea.
- Na, K. J., Lee, Y. G., & Yook, H. Y.(2010). The mediating effects of design values on the relationship between consumers' design evaluative elements and brand loyalty. *Korean Journal of the Science of Emotion & Sensibility*, 13(3), 511-522.
- No, M. J., Park, H. H., & Jang, H. U.(2011). An effect of the perceived value on the trust and acceptance intention of the smart clothing: Moderating effect of price involvement toward clothing. *Journal of Business Research*, 26(3), 123-147.
- Noble, C. H., & Kumar, M.(2010). Exploring the appeal of product design: A grounded value-based model of key design elements and relationships. *Journal of Product Innovation Management*, 27, 640-657.
- Norman, D. A.(2005). *Emotional design*. New York: Basic Books.
- Sentance, A., & Clarke, J.(1997). *The contribution of design to the UK economy*. UK: Design Council.
- Workshop on "Value added Design". (March 1998), Brussels.