THE ROLE OF DESIGN ATTRIBUTES IN SHAPING USERS' VALUE ASSIGNMENT: THE CASE OF PORTABLE DIGITAL AUDIO PLAYERS

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DAMLA GEDİKLİ

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submitted by **DAMLA GEDİKLİ** in partial fulfillment of the requirements for the degree of **Master of Science in Industrial Design Department, Middle East Technical University** by,

Prof. Dr. Canan Özgen _____
Dean, Graduate School of **Natural and Applied Sciences**

Assoc. Prof. Dr. Gülay Hasdoğan _____
Head of Department, **Industrial Design**

Assoc. Prof. Dr. Gülay Hasdoğan _____
Supervisor, **Industrial Design Dept., METU**

Examining Committee Members:

Assist. Prof. Dr. Fatma Korkut _____
Industrial Design Dept., METU

Assoc. Prof. Dr. Gülay Hasdoğan _____
Industrial Design Dept., METU

Assist. Prof. Dr. Naz Börekçi _____
Industrial Design Dept., METU

Inst. Dr. Figen Işık _____
Industrial Design Dept., METU

Burcu Derer Omay, M. Sc. _____
Industrial Designer

Date: 11.02.2011

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last Name : Damla Gedikli

Signature :

ABSTRACT

THE ROLE OF DESIGN ATTRIBUTES IN SHAPING USERS' VALUE ASSIGNMENT: THE CASE OF PORTABLE DIGITAL AUDIO PLAYERS

Gedikli, Damla

M.Sc., Department of Industrial Design

Supervisor: Assoc. Prof. Dr. Gülay Hasdoğan

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Users evaluate and assign value to products regarding several factors, one of which is design attributes. The attributes can provide certain consequences, which can, in turn, serve to users' desires or ultimate goals in life. Value is attributed regarding the desirability of the sequential chain of attributes, consequences and goals. Considering value creation for the users as designers' main responsibility; they should focus on how these chains are shaped while designing products.

This study mainly concentrates on this relation between design attributes, the consequences these attributes provide, and the ultimate goals of users these consequences satisfy. Three main types of consequence and user goals, which are together called as value types, are identified in the literature: pragmatic, experiential and symbolic. How these value types can be provided by design attributes is examined both with literature review and a research on users' pre-purchase value assignment to portable digital audio players.

The research on portable digital audio players is conducted using laddering technique. After the interviews with 30 respondents, the value types identified in

the literature review as pragmatic, experiential and symbolic value are supported by the data; and and an extension is suggested within the subgroups of experiential value. The salient design attributes that are valued at pre-purchase, and outstanding relations between designed attributes, consequences and user goals are identified.

Keywords: User Value, Value Chain, Product Design, Laddering Technique

ÖZ

TASARIM ÖZELLİKLERİNİN KULLANICILARIN ÜRÜN DEĞER TESPİTİNDEKİ ROLÜ: TAŞINABİLİR DİJİTAL MÜZİK ÇALARLAR ÜZERİNE BİR ÇALIŞMA

Gedikli, Damla
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Kullanıcılar ürünlere değer atfederken birkaç etmeni göz önünde bulundururlar; bunlardan biri de ürünün özellikleridir. Bu özellikler, kullanıcıların hayattaki arzularına ve hedeflerine hizmet eden belli sonuçlar yaratır. Değerin atfedilmesinde; özellikler, sonuçlar ve hedefler sıralamasının kullanıcıların isteklerine ne kadar uygun olduğu dikkate alınır. Tasarımcının temel sorumluluğunun kullanıcı için değer yaratmak olduğu düşünülürse; ürünler tasarlanırken, kullanıcı için bu sıralamanın nasıl oluşacağı dikkate alınmalıdır.

Bu çalışma, tasarlanan ürün özellikleri, bu özelliklerin sağladığı sonuçlar ve bu sonuçların tatmin etiği kullanıcı amaçları arasındaki ilişkiyi araştırmaktadır. Sonuçlar ve kullanıcı amaçları literatürde birlikte ele alınmakta ve “değer tipleri” olarak adlandırılmaktadır. Yazında tanımlanan üç temel değer tipi şunlardır: pragmatik, deneyimsel ve sembolik. Tasarım özelliklerinin bu değer tiplerini nasıl sağladığı hem literatür taraması, hem de kullanıcıların satın alma öncesi taşınabilir dijital müzikçalarlara değer atfetmesi hakkında gerçekleştirilmiş olan örnek çalışma ile araştırılmıştır.

Dijital müzikçalarlar üzerine yapılan çalışma merdivenleme metodu kullanılarak gerçekleştirilmiştir. Literatür taramasında belirlenen pragmatik, deneyimsel ve sembolik değer tipleri, 30 katılımcıyla yapılan görüşmeler sonrasında elde edilen verilerle de desteklenmektedir. Bunun yanı sıra deneyimsel türün alt kategorilerine bir ekleme önerilmektedir. Ayrıca satın alma öncesinde değer atfederken sıkça bahsedilen tasarım özellikleri ve öne çıkan özellik-sonuç-amaç ilişkileri belirtilmektedir.

Anahtar Sözcükler: Kullanıcı Değeri, Değer Zinciri, Ürün Tasarımı, Merdivenleme Tekniği

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CHAPTER 1

INTRODUCTION

1.1. PROBLEM STATEMENT

By the developing technology, the products has become more manufacturable at decreased costs. Consequently, the products in the market has started to be more and more similar to each other. While before companies competed by trying to find internal solutions like quality management or reengineering (Woodruff, 1997), as well as communicating messages through advertisements, the changing conditions has made companies find new ways to survive in the market, and shift their focus to creating value for the customer. This shift has been reflected also in the academic studies. The term "experience" has started to be widely used in the literature, especially in business and design related studies. While marketing's aim has become delivering a better consumption experience (Holbrook, 1999), similarly, the focus of design has shifted to emotions created by these experiences.

Now design studies are so much focused on creating emotions through products that they tend to take the functions for granted, and draw the attention away from the functions. However, the aim of design is to create value for the user; so a value based approach which comprehends all of the outcomes provided by design should be adopted.

There are limited resources examining design and value. The *user* is the one who evaluates the product and make the final decision on its value, however, *design* gives the product the potential for delivering value via product attributes. Thus

both sides should be examined to explore how users assign value, what they seek for in a product and how design attributes can contribute to this value creation. By this way, better products can be developed. While the user experience is enhanced, the companies can become successful in the global competition.

1.2. AIM OF THE STUDY

This study aims to explore the linkages between products' design attributes and the consequences it provides, as a step through value focused design. By the identification of the outcomes that users desire and expect to be realized by product attributes, and the attributes providing these outcomes; better products can be designed, which can increase user satisfaction.

Therefore, the main research question of the study is defined as follows:

- How does design contribute to users' value assignment?

The sub-questions are listed below:

- Which outcomes do users value? Can they be categorized?
- Which designed attributes provide these outcomes?
- Which outcomes are outstanding?
- Which design attributes are outstanding?
- What are the salient relations between design attributes and the outcomes?

1.3. STRUCTURE OF THE STUDY

This study consists of three main parts:

1. Literature review: Chapter 2 and Chapter 3
2. Research on Portable Digital Audio Players: Chapter 4
3. Conclusions: Chapter 5

In Chapter 2, the concept of value is examined. After reviewing the different definitions of value, a definition with regard to aim of this study is established. The value assignment process in the literature is explained in two different phases as pre-purchase as post-purchase phases.

In Chapter 3, different types of consequences or end-states (goals) are examined together as “Value Types”. How design attributes can create these value types is investigated through design literature.

In Chapter 4, the users’ value assignment to products are examined through a study on portable digital audio players using laddering technique. The study focuses on the role of design attributes in pre-purchase value assignment; it is designed and structured accordingly. The answers to the research questions are sought for pre-purchase phase. Four digital audio players are used throughout the research, and they are presented to the respondents as pairs for comparison. The important design attributes, consequences and end-states users mentioned are identified from these comparisons. The salient relations between attributes and consequences are highlighted.

In Chapter 5, the conclusions of the study are reviewed. The results of the study on portable digital audio players and the findings from the literature are discussed.

CHAPTER 2

THE CONCEPT OF VALUE

Value is an ambiguous term the meaning of which varies. It can either stand for what the customer can deliver from a company/producer point of view, or what the customer perceives/receives from a product or service (Woodall, 2003). Within the scope of this study, the interest is on the latter. However, even from a customer point of view, the term 'value' is generally used in different phrases like "customer value" (Woodruff, 1997; Khalifa, 2004; Smith & Colgate, 2007; Graf & Maas, 2008), "customer perceived value" (Ravald & Grönroos, 1996; Sweeney & Soutar, 2001), "consumer value" (Holbrook, 1999), "user value" (Boztepe, 2003), consumption value (Sheth et al., 1991) and "value for the customer" (Woodall, 2003). Though 'customer value' is used very often in the literature, it is not chosen as the basic term for this study. Customer value is preferable for marketing related studies, as it is in the literature. Since the attention is on the relation between design attributes and value within this thesis, the term "user value" is thought to be more appropriate for this research.

This chapter is an attempt to make a comprehensive review of the concept of user value. First, the objective and subjective theories of value is reviewed. Second, user value definitions in the literature are analyzed. Third section consists of user's value assessment process. In the final section, the relation of value and user satisfaction is examined.

2.1. VALUE THEORIES

This section includes the review of the nature of value; whether it is an objective or a subjective phenomenon. Then the value definitions are examined from three different perspectives, and based on these definitions, a new definition is built for this study.

2.1.1. Objective and Subjective Theories on Value

The value definitions in the literature is explained in the next section in detail, but now as an introduction, value can simply be defined as a product's physical or abstract benefits which the user perceives.

The objectivity-subjectivity debate lies between two phrases: "Something is valuable because I value it." or "I value something because it is valuable.". The first phrase suggests the view that the value of an object is determined by the user, while the second one advocates the value is included in the object, independent of the user's judgment.

Since value forms an important basis for the further development of the cores of economics like price, money, supply, and demand, the objectivity-subjectivity debate is theorized in many schools of economic thought. Economic theories are primarily interested in the concept of exchange value that is the relative proportion with which the product is exchanged for another product, and of which price is a function. So, exchange value is not the same with the user value which is the subject of this thesis. However, on the determination of the exchange value, there are two different views which are also related with user value.

The objective theories are based on Adam Smith's Labor Theory of Value. According to this theory, since every commodity includes labor, the exchange value should be identified according to the amount of labor for the production of

the commodity. This theory suggests that every product has also a “use value”. The use value is the utility of a product for the users, which is similar to what is defined as “user value” within this study. Since the labor is put into a product for creating particular functions, all products are produced for creating utilities, and thus include use value (Groll, 1980). However, the amount of use value may differ for every individual. Therefore, according to the objectivists, the exchange value of a product cannot be identified according to the use value. They suggest, the exchange value should be independent from the subject, but rather dependent on the labor which makes it a fair value. So, objectivists tend to ignore the use value, but theorize it as always being in the object, though the amount may be different for different users.

Other view suggests that use value is important in the determination of the exchange value. Unlike objectivists, subjectivists claim that a commodity does not always include value, since it may not have use value for people. The ‘use’ of products highlights the outcomes of the properties rather than properties themselves in user’s value perception (Woodall, 2003).

Consequently, the objectivist defends that value exists prior to valuation while the subjectivist claims that it is the valuation that constitutes value. In the recent studies a middle position is adopted.

Throughout the thesis, the concept of “value” is thought to be linked to the usage and possession of a product and to be appreciated by the user. In the next section, definitions of value which are from a user point of view are examined, among others.

2.1.2. User Value Definitions

User value can be examined from three different perspectives as: benefits and sacrifices, value chain and axiology.

2.1.2.1. Benefits and Sacrifices

As described in the previous section, in economic terms, other than its exchange value, 'value' is approached as the utility (use value) in the commodity from a subjective view. In recent literature, several theorists adopt this subjectivist approach, and consider the utility and disutility of owning a product in their value definitions. Zeithaml's (1988) definition of value can be used to reflect the general point of view of these theorists. Zeithaml defines value as "*Consumer's overall assessment of the utility of a product (or service) based on perceptions of what is received and what is given*". So, user assesses the benefits and sacrifices of the product, and assigns value to the product accordingly.

Though the perceived benefits and sacrifices are thought to be the source of value by these theorists, there are different views on what constitutes benefits and sacrifices. For instance, authors like Monroe (1990) and Gale (1994) take benefits as the product properties and sacrifices as the price paid (as cited in Woodruff, 1997). On the other hand, according to Zeithaml (1988), benefits can be not only the properties or functions of a product, but also more abstract end-states like prestige. She also proposed that sacrifices are not limited with the price; time and effort in using the product can be counted as a sacrifice as well.

2.1.2.2. Value Chain

"Value chain" is the model proposed by Woodruff and Gardial (1996) based on the means-end chain model of Gutman (1982). They suggest that customers assign value in a means-end way. Users desire certain product attributes for achieving specific consequences, and these consequences satisfies users' ultimate goals and

purposes. For instance, a user may desire a mobile phone that includes several games (attribute), so s/he can play the games whenever s/he wants and have fun (consequence). Having fun, further, serves to the ultimate goal of happiness or joy of life.

So, according to Woodruff and Gardial (1996), products and product attributes are means for achieving to desired consequences and goals for the users. After buying and using products, users evaluate them according to their desired attribute, consequence, goal structure, and assign value to the products. The value chain model is examined in detail in section 2.2.

As a result of adopting the value chain model, Woodruff (1997) defines value as: "A customers' perceived preference for and evaluation of those product attributes, attribute performances and consequences arising from use that facilitate (or block) achieving the customer's goals and purposes in use situations". He claims he still agrees with the theorists who define value from a benefits and sacrifices perspective. According to Woodruff also, the user assesses the benefits gained from the product as well as the sacrifices made for owning the product. However, with his definition, Woodruff brings a more complex and multi-dimensional view of value. The benefits - either the product attributes or the consequences - are evaluated according to their fit to users' goals and purposes for obtaining a product. Moreover, in his definition, the use situation plays a crucial role in the attribution of value.

2.1.2.3. Axiology

Axiology is the study of the notion of value. Many authors have used axiology in their studies of value: Danaher and Mattsson (1994, 1998); de Ruyter et al. (1997); Hartman (1967, 1973); Huber et al. (2000), Lemmink et al. (1998); Mattsson

(1991), Holbrook (1999). Holbrook is one of the most cited and favored author among them.

Holbrook (1999) defines value as “interactive relativistic preference experience”:

- He claims the object has a potential value but the subject is the one who evaluates and appreciates it. Thus the value is created interactively; both with the object and the subject.
- He uses of “relativistic” in his definition stands for different meanings. First, value assignment is relativistic, since every individual has different needs, desires and standards in evaluating value. Second, the user makes comparisons among objects to assign value, so the user evaluates a product with respect to another one. The value of an object may differ, if the compared object is changed. Lastly, value is relativistic; because when the use contexts of objects differ, the value judgment may differ too.
- The term “preference” may include but not limited to “affect (pleasing vs. displeasing), attitude (like vs. dislike), evaluation (good vs. bad), predisposition (favorable vs. unfavorable), opinion (pro vs. con), response tendency (approach vs. avoid), or valence (positive vs. negative)”.
- Finally, he supports the view that consumption is an experience and products serve us in our activities that create experiences. The experiences are, in turn, for satisfying needs or wants. Thus, for him, the value resides not in the product but in the consumption experience that the object accompanies.

Until now, user value definitions are examined from three different perspectives. Below, Table 2.1 summarizes these definitions.

Table 2.1 Different Approaches to Value Definition

Perspective	Theorists	Value is...
Benefits & Sacrifices	Monroe (1990), Gale (1994), Zeithaml (1988)	Benefits minus sacrifices
Value chain	Woodruff and Gardial (1996), Parasuraman, 1997	Perceived preference for and evaluation of product attributes, consequences in use situations and end-states
Axiology	Danaher and Mattsson (1994, 1998); de Ruyter et al.(1997); Hartman (1967, 1973); Huber et al. (2000), Lemmink et al. (1998); Mattsson (1991), Holbrook (1999)	Interactive relativistic preference experience

2.1.3. A Discussion on the Definition of User Value

Economic theories take the user as homo economicus - who can make rational decisions and choose the alternative which offers the most utility (Thaler, 2000). In the benefits and costs perspective which uses the utility as the base for value, users make a rational assessment for the value of a product. However, this perspective is criticized claiming that "value is a complex construct that involves more than a mere rational assessment of utility" (Sánchez-Fernández & Iniesta-Bonillo, 2007). Motivation research carried out by Ditcher in 1947 (as cited in Sheth, Newman, & Gross, 1991) also supports that non-cognitive and unconscious motives can manipulate users' choices.

Holbrook (1999), based on the axiology, brings a complex definition to value. However, though his definition is a combination of the value properties, it is needed to explain all four elements separately in the definition to comprehend it

fully. Moreover, he explains that value “resides” in the experience in his text, but in his definition value “is” the experience, which may create confusion. is not agreed that value “is” the experience in this study.

Woodruff’s (1997) definition is the most favorable one among three perspectives. It covers the definitions of other two perspectives. The *benefits* and *sacrifices* are included in the definition as “product’s ability to *facilitate* or *block* users’ goals and purposes”. Besides, like Holbrook, Woodruff states that value stems from a *preference*. He also states that value is a *perceived evaluation*. “Perceived” evaluation means value attribution is a result of personal judgment that may differ from one to another, which is stated as *relativism* by Holbrook. Furthermore, the importance of different use contexts in value attribution is also mentioned by Woodruff. As in the other two perspectives, he adopts the intermediate position on the issue whether value is intrinsic or extrinsic. Product attributes lead to certain consequences and end-states, which the user evaluates. Thus, both the product and the user affects the value judgment, which is similar to what Holbrook refers by *interactive* creation of value.

The only problematic side of Woodruff’s definition is that value seems like it can be stemmed from only the usage of a product. However, users can attribute value to a product not just by using, but also by possessing it. For instance, Apple computers are thought to be used by “creative” people, and a user may buy it to establish an image as a creative person in the eyes of the society. Regarding this problematic side, Woodruff’s definition is adapted below:

> *User value is the perceived evaluation of and preference for product attributes, attribute performances and consequences arising from using or possessing the product, that facilitate (or block) achieving user’s goals in use situations or desired end-states.*

2.1.4. What User Value is not?

The word “value” has a vague nature; other terms such as “quality” and “values” are mistakenly interchanged with ‘value’ (Day & Crask, 2000). Quality is a source for assessing value to a product; so quality is a means while value is the end (Band, 1991; Holbrook, 1999). According to Rokeach (1968, 1973), the term ‘values’ represents important personal beliefs like right and wrong or good or bad, standards, norms, ideals, rules, criteria or goals (as cited in Sánchez-Fernández and M. Ángeles Iniesta-Bonillo 2007). Our values influence us in every aspect of life, including our consumption decisions. Holbrook (1999) states value, as singular, is “the outcome of an evaluative judgment”, and the judgment is made on the basis of values (plural). In the value chain model of Woodruff and Gardial (1996), which is explained briefly in section 2.1.2.2., product attributes lead to certain consequences, and these consequences can satisfy or block the ultimate goals of the user. It is stated that, these ultimate goals are generally the “values” of the users.

There is also a term which is not agreed upon whether to use as the same with value or have relation with it: satisfaction. Woodruff (1997) and Day and Crask (2000) suggest that value is the antecedent of satisfaction; however, in her study in 2002, Day states that there is no isomorphic relation between value and satisfaction. The issue still needs attention for further research. The relationship between value and satisfaction is reexamined in this chapter later.

2.2. USERS’ VALUE ASSIGNMENT

There are limited studies about users’ value assignment to products. From the literature, it is inferred that the important elements of value assessment are the linkages between product attributes, use consequences and user goals and end-states, which is called as consumer value hierarchy; and the desires and expectations of the users. Also, value assignment differs at pre-purchase and post-

purchase. Below, the important elements are examined in detail, and then value assisgnment processes at pre-purchase and post-purchase are analyzed.

2.2.1. Consumer Value Hierarchy

In order to explain value assignment, Woodruff and Gardial (1996) adapted the means ends theory of Gutman (1982), which was for showing users' categorization of product information in their memories. According to Woodruff and Gardial, users want certain product attributes for their ability to provide desired consequences. These consequences help users to achieve their desired end-states and goals. Users attach value to the product by evaluating this contiguous chain of attributes, consequences and end-states. The attribute, consequence and end state relationship in shown in Consumer Value Hierarchy model (Figure 2.1), which is extracted from Woodruff and Gardial (2004).

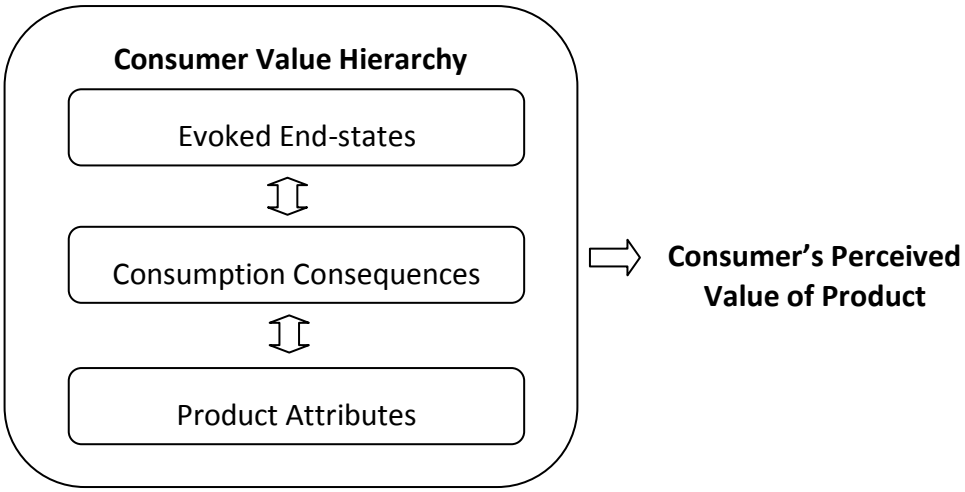

Figure 2.1 Consumer Value Hierarchy (Adapted from Woodruff and Gardial, 2004)

2.1.1.1. Attributes

Woodruff and Gardial (2004) divide attributes into two as concrete attributes and abstract attributes. Concrete attributes are the ones which are directly perceived such as physical properties, brand name and price. Abstract attributes are not measurable or cannot be perceived through senses, but rather learned, such as reputation and quality. Two types of attributes affect each other; for instance certain materials or colors (concrete attributes) may be associated with quality (abstract attribute), or reputation (abstract attribute) may result in a higher price (concrete attribute).

Alternatively, Zeithaml (1988) suggests that product attributes can serve as cues about the value the product delivers, and divides product attributes into two in her study as extrinsic cues and intrinsic cues. Intrinsic cues include physical compositions of the product, the design attributes. Extrinsic cues are non-physical attributes of the product such as brand name, price, and level of advertising. She states some attributes, most of the time the package, can be included in both of the categories. The package as a container is an intrinsic attribute, but the text and promotions on the package serve as extrinsic cues.

When the two views on attributes are compared, it is inferred that both of Zeithaml's intrinsic and extrinsic attributes are concrete attributes. Moreover, the abstract attributes seem to be stemmed from the concrete ones most of the time, except reputation's serving as a cue for high price. For instance, Zeithaml states brand name and level of advertising, which she takes as extrinsic attributes, are indicators of quality, which is one of the examples of Woodruff and Gardial to abstract attributes.

The two views on attributes are combined in Figure 2.2. Attributes are divided into two as concrete and abstract. Concrete attributes include intrinsic and extrinsic

components. Design attributes and package as a container are examples to intrinsic attributes, while brand name, price, and package as text are examples to extrinsic attributes.

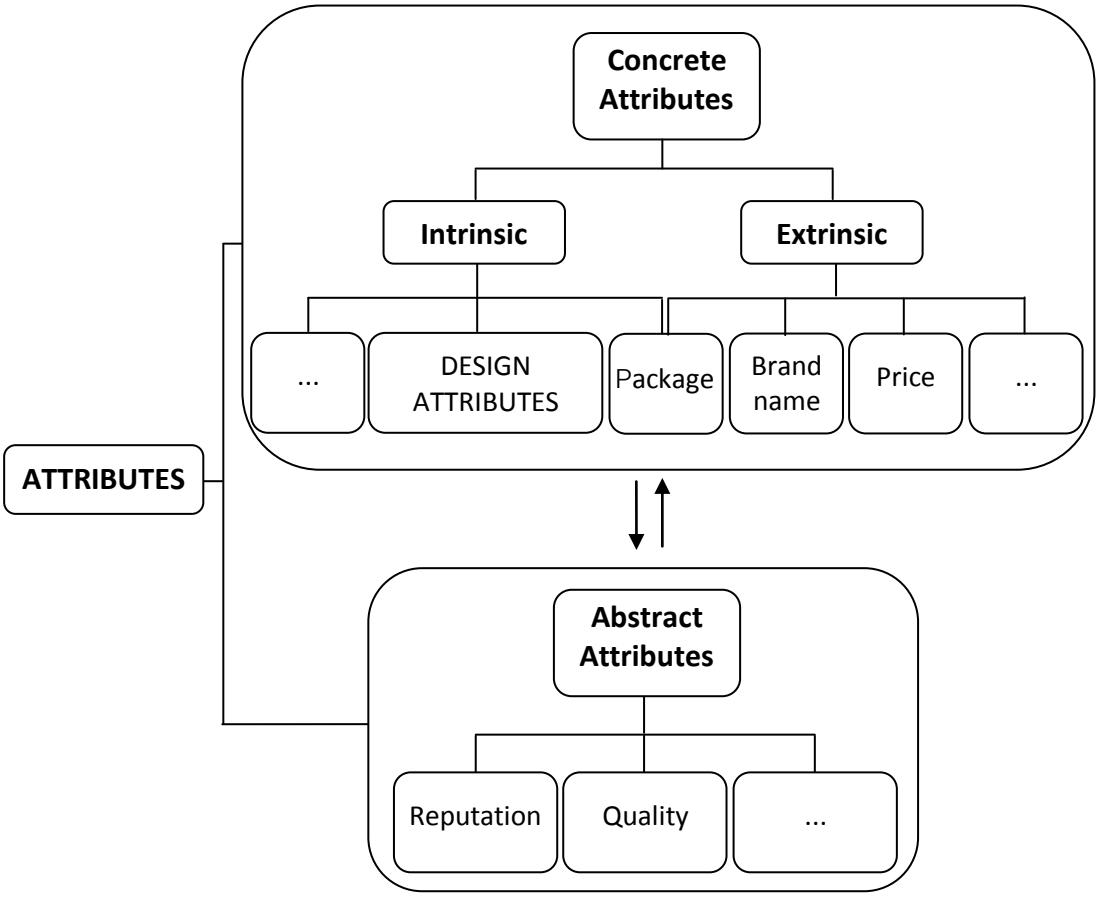

Figure 2.2 Types of Attributes

Zeithaml (1988) claims that at pre-purchase phase, users depend on both intrinsic and extrinsic cues to form expectations about the higher levels of the means ends

chains, and so the value of the product. She states that whether intrinsic or extrinsic cues are more salient to the user at the point of purchase depends on the existence of *search attributes*, which are intrinsic cues that can be evaluated and sensed by the user. When search attributes are absent, user relies on extrinsic cues. This may be exemplified with a users' preference for a specific brand of soap since it includes aloe-vera which s/he believes is beneficial for the skin. If no alternatives include it, then s/he may make his/her choice according to extrinsic attributes such as brand name, price, etc. On the other hand, Zeithaml states that there are individual studies which show extrinsic cues can be more important in the evaluation of the products, and whether intrinsic attributes or extrinsic attributes are more important in evaluating products should be further investigated.

2.1.1.2. Consequences

Consequences are the outcomes formed via the attributes of the products. Consequences are brought by a product attribute or bundle of attributes. For instance a pan's material may lead to durability, a chair's color may make it look more modern, and the whole attributes of a game console may entertain the user. Consequences may be either positive or negative, and in case they are positive, they may include pragmatic, experiential, or symbolic benefits, which will be examined in detail in Chapter 3.

2.1.1.3. End-States

End-states represent the most abstract level of the consumer value hierarchy. They are the ultimate goals of consumption (Woodruff, 1997). Generally cultural values or human values are accepted as end-states. Accomplishment, happiness, safety, social recognition may be given as examples to values. Cultural values affect the perception of the consequences in terms of positivity or negativity. End-

states may generally include hedonic or symbolic benefits, which will be examined in detail in Chapter 2.

Users learn to prefer some attributes over others for their ability in providing certain consequences and end-states. Similarly, they learn to avoid from certain attributes for the negative consequences they bring. Moreover, the number of linkages between attributes and consequences, and between consequences and end-states may change from a person to other. For a user an attribute may lead to several consequences, while another links the same attribute to a single consequence.

2.2.2. Desires and Expectations

Research has proven that both desires and expectations affect the user value judgment. Though they seem similar, desires and expectations are different concepts.

Desires are *what the user prefers for each level of the consumer value hierarchy*. The preferred relationship between attributes, consequences, and end-states represents the "desired value hierarchy" (Woodruff, 1997; Jensen, 2001). Desired value hierarchies may depend on the use contexts; when the use context changes the desired value hierarchy may also change. On the other hand, desired value hierarchies may be achieved only by possessing the product. For instance, the emotional states achieved by the aesthetic appearance of a product create value for the user, which is not linked to the use of the product.

Desires are obviously shaped by needs. However, as well as needs, previous experiences, the innovations in new products, the ideals those are promoted by the brands and the culture affect the desires (Caddote et al., 1987).

User also forms expectations about products before using them. Like value, expectation is a vague term, which stands for different meanings in the literature (Santos and Boote, 2003). In this study, expectations are taken as *beliefs and predictions about a particular product's ability to satisfy the levels of the hierarchy*. Jensen (2001) draws attention to the role of expectations in consumer value assignment. The expected relationship between the levels of the value chain for a product is called as "expected value" within this thesis.

Users form expectations by the manipulation of several sources: perceptions of current stimuli (the product), information from others, memories of actual experiences, and inferences drawn from related or similar experiences (Van Raaij, 1991). The search attributes of products and marketers' efforts for promoting the product influence the perception of the product, and so the expectations. Previous experiences with the same or similar product affect the interpretation of the search attributes and influence the perception of the current product. Moreover, if in the previous experience, the product has a property or does a particular task, users may form expectations that the new product will also have it or does that, without the existence of information about it. Other's advices or negative criticisms also lead users to form expectations. It is important to emphasize that desires have a significant role in forming expectations with these mentioned sources. Desires influence the amount and type of information acquisition about the product (Gardial et al, 1994); the salience of search attributes, information gathered from promotions and other people may change according to desires.

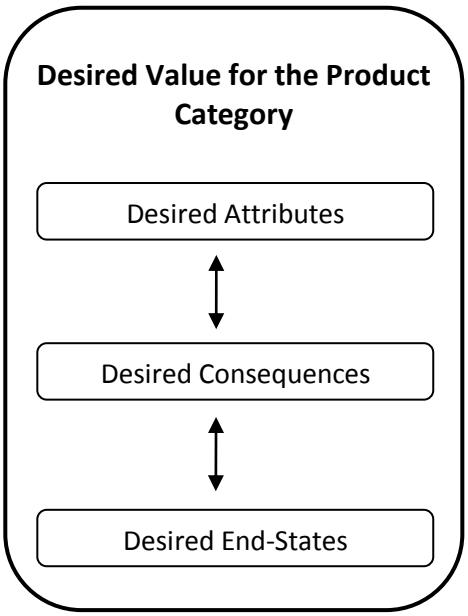

Figure 2.3 Desired Value Hierarchy

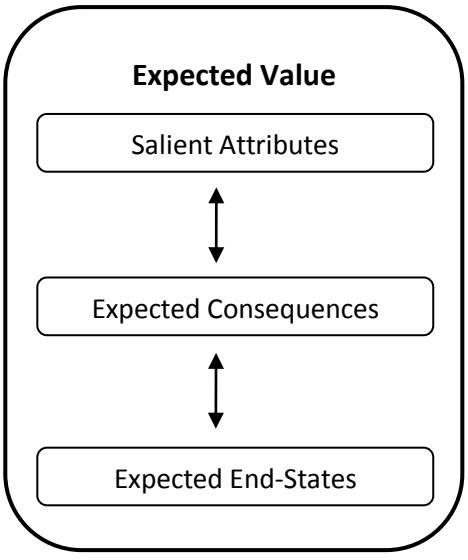

Figure 2.4 Expected Value Hierarchy

2.2.3. Value Assignment at Pre-Purchase

Jensen (2001) claims that desires and expectations are sources of pre-purchase value assignment. At pre-purchase phase, users have a desired value hierarchy for the product group sought. They form expectations for the product alternatives, and regarding their desired value hierarchy, they assign value to these alternatives (Figure 2.6). Factors that may have an effect on desired and expected value hierarchies are also shown in the figure.

It should be noted that Jensen does not mention about one of the extrinsic attributes, the price, which can create value. In terms of price, value is not expected, but rather received at pre-purchase. Since, it is a single item; it is not shown in Figure 2.6., which represents pre-purchase value assignment.

The numerical match between received benefits, expected benefits and desires is important in value assignment. However, the desires' degree of importance is deterministic as well (Spreng et al., 1996 in Jensen, 2001). If a product is expected to do the task A, B and C, while another product is expected to do only task A and B; the latter product may be preferred since it is expected to show a better performance in task A which is more important for the user. This condition is also valid for sacrifices, since decreasing the sacrifice is a valuable benefit for the user. Though an alternative is expected to show a poorer performance than another which is still tolerable, the user may choose that one since the sacrifice component of value, the price, is lower.

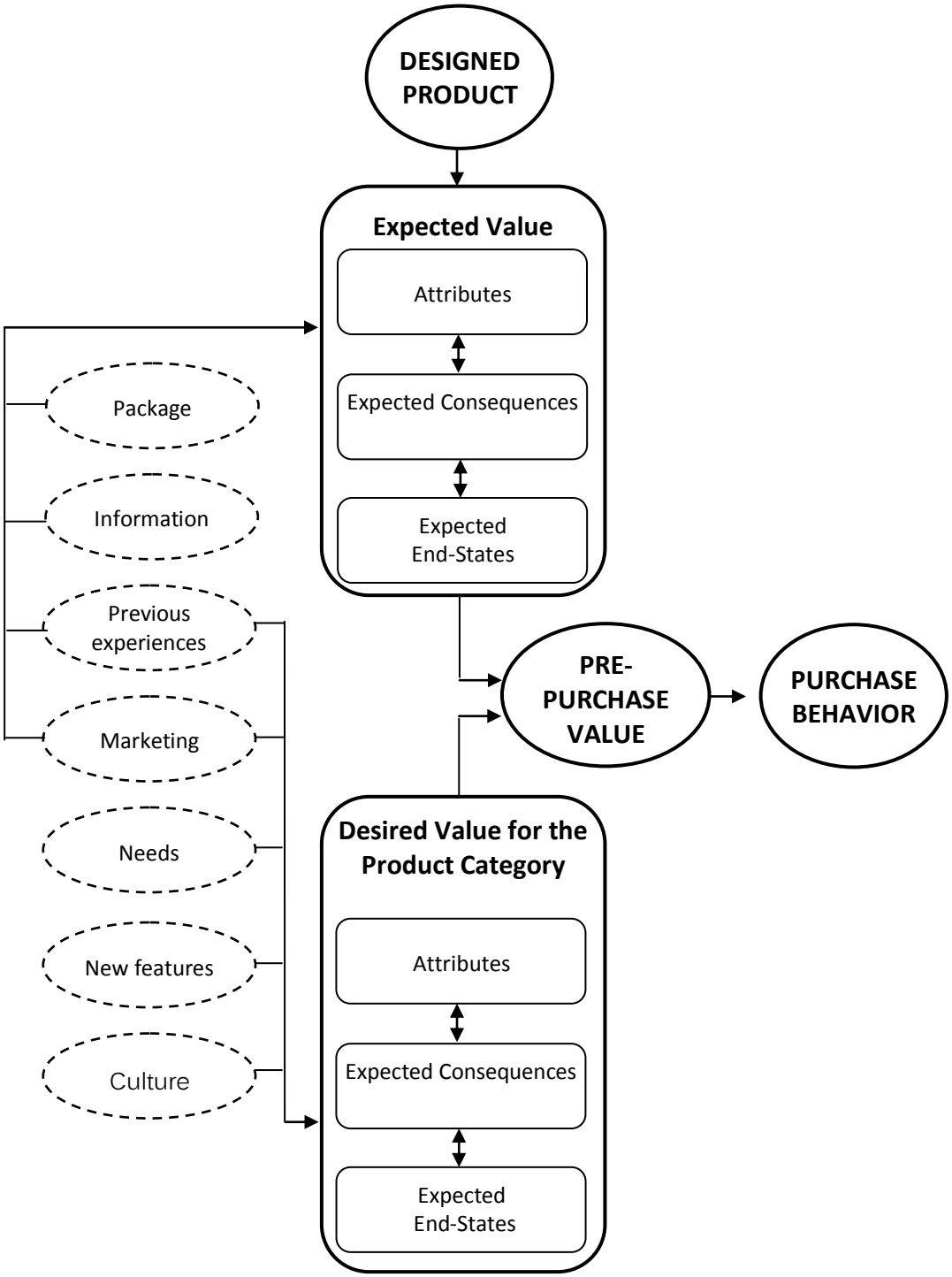

Figure 2.5 Pre-Purchase Value Assignment

2.2.4. Value Assignment at Post-Purchase

At post purchase, value of the product is perceived according to the match between what is received and what is desired in the means-end hierarchy. But what is expected is also plays a key role in the value judgment. For a user who received what s/he expected, the performance of a product may constitute value, while another user disvalues or attributes low value to the product with the same performance. The match between received value and desires are called product value, while whether the received value reflected post-purchase expectations is called information value. Then, the received value is said to be composed of product value and information value which leads to overall post-purchase value. Consequently, pre-purchase value affects post-purchase value. Making the users form the right expectations by design attributes at pre-purchase phase is also important for post-purchase value.

2.3. USER VALUE AND SATISFACTION

Though this study does not intend to find out the relation of value and satisfaction, it should be noted that many studies suggest that they are related with each other, which shows the importance of creating value for the user.

Satisfaction is the result of the perceived value according to Woodruff (1997). In their related study, on the other hand, Day and Crask (2002) could not find out a relevant relation between value and satisfaction. However, Kano's model (Khalifa, 2004) can explain why they may not be seen to be related all the time.

Kano separates the product characteristics into three as dissatisfiers, satisfiers and delighters in his model (Figure 2.7). He makes this classification according to 'expectations'. But since he does not make a certain definition of 'expectation', and a separation between 'desire' and 'expectation', here the definitions are adapted regarding both concepts.

Dissatisfiers:

The value chains that are desired and expected from a product and taken for granted are dissatisfiers. Meeting these expectations does not satisfy the user, but rather brings them up to neutral. The absence of the expectations, on other hand, annoys the user. A silence mode in a mobile phone is expected to be there and its presence does not enough for satisfaction. However, if the phone does not have that property, the device dissatisfies the user.

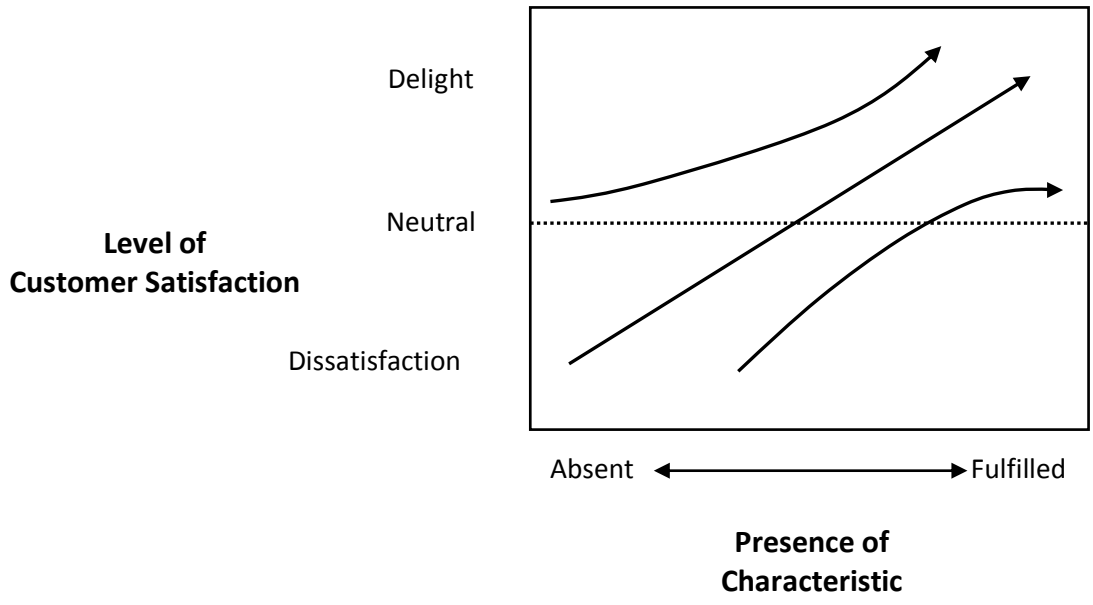

Figure 2.6 Kano's Model of Satisfaction (Source: Khalifa, 2004)

Satisfiers:

These characteristics are also desired and expected, but they can move the users above neutral and satisfy them. They are explicitly requested by users. The better they are met, the more satisfied the user. But if they are not met, user is

disappointed. Continuing with the mobile phone example, if a user desires a camera in a mobile phone that can take high resolution photographs, and buys a mobile phone with a high resolution camera, s/he has an expectation that s/he will be able to take high quality photographs. If the device does the task poorly, then the user is dissatisfied.

Delighters:

Delighters are characteristics that are not desired or expected until the user is aware of them. They surprise the user in a positive way when s/he has the information that the product has these characteristics. If the user realizes that his/her mobile phone can provide visual talk, though s/he does not have a previous desire or expectation about it, s/he may be satisfied with that property. Delighters are generally new features or innovations in a product. Their absence has no negative effect, since the user has not any desire or expectation about it.

Consequently, attributes that create value may not always bring satisfaction, but rather prevent unsatisfaction, which can still be counted as a relation of value to satisfaction. Thus, it is still possible to conclude that value creation and user satisfaction are linked to each other.

CHAPTER 3

VALUE TYPES AND THEIR RELATIONSHIP WITH DESIGN ATTRIBUTES

Value chain is composed of the relations between attributes, consequences and end-states, as examined in Chapter 2. To examine the role of design in creating value, the designed attributes, following consequences and end-states should be put forward. In the literature, *what is valued* is not examined with respect to these three items. Rather, a broader approach, which is mostly called “value types” or “value typology” is adopted.

This chapter consists of three parts. First the value typologies of different authors are briefly reviewed. Second, based on these typologies, a comprehensive value typology is suggested. Then the value types are examined according to the suggested typology. In the last part, how products and their design attributes can create these value types is investigated.

3.1. REVIEW OF THE VALUE TYPES IN THE LITERATURE

There are several approaches to the value types in the literature. In the next section, the different value types are tried to be combined in , there In his axiological model of value, Hartman (1967, 1973) makes a separation according to whether the value is achieved because of the product itself, or because of the consequences it causes (as cited in Sánchez-Fernández & Iniesta-Bonillo, 2007). Extrinsic value explains the utilitarian value to which the usage of a product is instrumental in reaching. The value does not sourced by the product, but rather its consequences; so the product is a means to the valued end. Intrinsic value

describes the emotional appreciation of the product, which the product is the end itself. Systemic value is “the rational or logical aspects of inherent relationships among concepts in their systematic interaction”, like the benefits-sacrifices approach to value.

Later on, Mattson (1991) adapts Hartman’s framework (as cited in Sánchez-Fernández & Iniesta-Bonillo, 2007). He refers to the extrinsic value as the “practical” dimension of value, which is related with the physical and functional aspects of consumption. The “emotional” dimension is adapted from the intrinsic value, which focuses on the feelings of consumers. “Logical” dimension of value stems from the systemic value, which is related with the rational and abstract characteristics of the consumption.

In their theory of “consumption values”, Sheth et al. (1991) state five different types of value. They claim that these consumption values explain consumers’ decisions on buying or not buying (to use or not to use), choosing one type of product or service over another, and choosing one brand over another. These forms of value are functional, social, emotional, epistemic, and conditional. Functional value is a product’s performance in functional, utilitarian, or physical terms, like it is in Mattson’s practical dimension of value. Emotional value is a product’s association with specific feelings or ability to arise feelings, which is also stated by Mattson. Social value refers to the object’s ability to communicate a social image or to fit to the users’ social environment’s norms. Epistemic value relates to the novelty, curiosity and the desire for knowledge. Lastly, conditional value refers to products that are used only in certain situations or set of circumstances.

Utilizing the consumption-value theory, Sweeney and Soutar’s (2001) findings identify four value dimensions (emotional, social, quality/performance and

price/value for money), but their exploratory study does not generate items for epistemic value and conditional value as they are in consumption value theory.

Wang et al. (2004) adapts the framework of Sweeney and Soutar (2001), but they suggest including sacrifices other than price such as time, effort, and energy (as cited in Sánchez-Fernández & Iniesta-Bonillo, 2007).

Holbrook's (1999) value typology is one of the most cited and most comprehensive approaches in the literature. From an axiological perspective, he first classifies the value sources into three: extrinsic/intrinsic, self/other oriented, and active/reactive. Extrinsic/intrinsic dimension, which is also stated in Hartman's framework, explains whether the product is an end itself or a means to an end, in terms of achieving value. Self or other orientation is related to whether the value is achieved by self appreciation or other's reaction. For instance, the functional value of a camera is appreciated by the user, so it is self-oriented. But, the user may also want to communicate a message that he is an intellectual person who is deeply involved in taking photos by using a professional photographer camera. Regarding the active/reactive dimension, when a user manipulates the product or does something with the product, the value is active. When the value involves "apprehending, appreciating, admiring, or otherwise responding to some object", it is reactive. For instance, while cleaning with the vacuum cleaner, the value is active; but when one appreciates the beauty of a chair, it is reactive. Then he states 8 different value types: Efficiency, excellence, play, aesthetics, status, esteem, ethics and spirituality.

Table 3.1 Holbrook's Value Typology (Source: Holbrook, 1999)

	Extrinsic	Intrinsic	
Self - Oriented	Efficiency - convenience	Play - enjoyment	**Active**
	Excellence - quality of product or service	Aesthetics - beauty of offering	**Reactive**
Other - Oriented	Status - success communicated to others via offering	Ethics - virtue communicated to others via offering	**Active**
	Esteem - reputation communicated to oter via offering	Spirituality - faith embedded in offerng	**Reactive**

Boztepe (2003) simplifies Holbrook's framework and identifies four broad types of value: utilitarian, emotional, social and altruistic. (Table 3.2.)

Table 3.2 A simplified approach to Holbrook's Value Typology (Source: Boztepe, 2003)

	Extrinsic	Intrinsic	
Self-oriented	**Utilitarian** Efficiency (e.g. Convenience)	**Emotional** Play (e.g. Fun)	Active
	Excellence (e.g. Quality)	Aesthetics (e.g. Beauty)	Reactive
Other-oriented	**Social** Status (e.g. Impression Man.)	**Altruistic** Ethics (e.g. Justice)	Active
	Esteem (e.g. Possession)	Spirituality (e.g. Sacredness)	Reactive

Smith and Colgate (2007), after studying on previous approaches, identify four major types of value: Functional / instrumental, experiential / hedonic, symbolic / expressive, and cost / sacrifice.

Table 3.3 summarizes all of the different approaches to value types.

Table 3.3 Different Approaches to Value Types

Study	Value Typology
Hartman (1967, 1973)	Extrinsic, Intrinsic, Systemic
Mattson (1991)	Practical, Emotional, Logical
Sheth et al. (1991)	Functional, Social, Emotional, Epistemic, Conditional
Sweeny and Soutar (2001)	Emotional, Social, Quality/performance, Price/value for money
Wang et al. (2004)	Emotional, Social, Quality/performance, Sacrifice
Holbrook (1999)	Efficiency, Excellence, Play, Aesthetics, Status, Esteem, Ethics, Spirituality
Boztepe (2003)	Utilitarian, Emotional, Social, Spiritual
Smith and Colgate (2007)	Functional/Instrumental, Experiential/Hedonic, Symbolic/ Expressive, Cost/Sacrifice

3.2. RE-CATEGORIZATION OF VALUE TYPES

Having reviewed the literature, this study has attempted to re-categorize the value types. It should be noted that this re-categorization is derived from the typology of Smith and Colgate to a great extent, since their way of grouping seems to be one of the most comprehensive approaches among the reviewed studies.

Value types can be first divided into two as pragmatic value and hedonic value. Pragmatic value can be sourced by the subcategories of efficiency, excellence and economic benefits. Hedonic value can be examined under two groups as experiential value and symbolic value. Experiential value is related to aesthetic pleasure, fun/enjoyment, epistemic benefits and relational benefits. Symbolic value, meanwhile, includes self worth, personal meaning and conditional meaning.

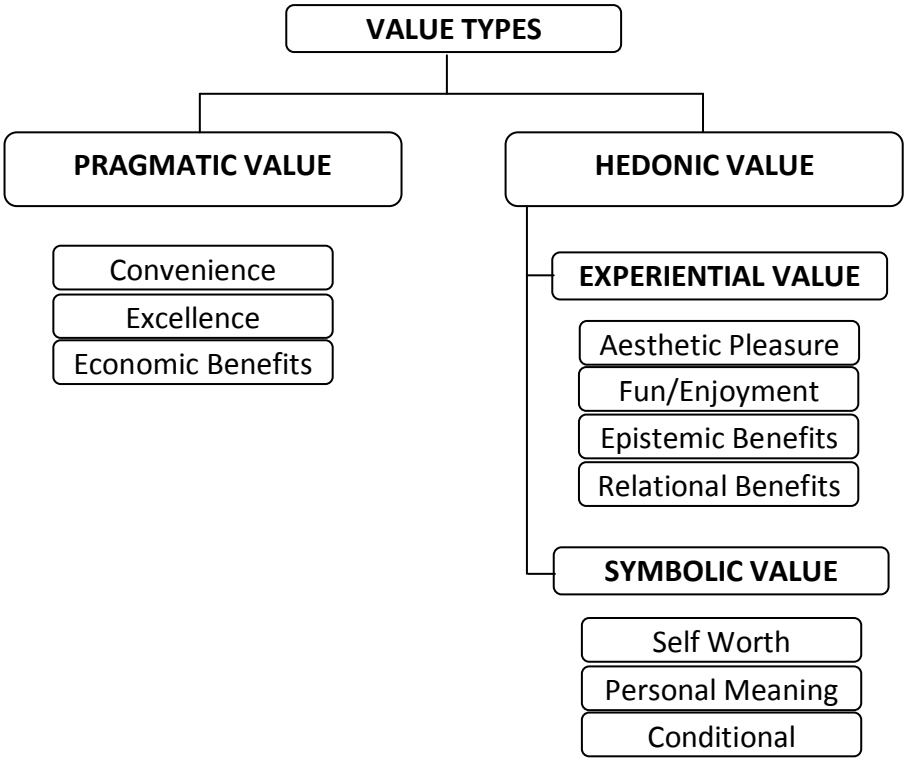

Figure 3.1 Re-Categorization of Value Types

3.2.1. Pragmatic Value

Pragmatic value mainly includes practical and more concrete benefits of a product. A product's being instrumental in doing tasks in an appropriate way (Hassenzahl, 2005), its goodness in doing the tasks or its providing economic benefits are pragmatic.

So, pragmatic value is related either with the functional (1) or economic (2) benefits:

1. Functional benefits mostly called as "functional value" in the literature. Functional value is defined by Sheth et al. (1991) as "the perceived utility of an alternative resulting from its inherent and attribute or characteristic-based ability to perform its functional, utilitarian, or physical purposes". Functional benefits can be generalized as efficiency and excellence (Holbrook, 1999). Though at first glance these seem to be similar concepts, Holbrook (1999) makes a distinction suggesting that efficiency results from the users' active usage of the product, while excellence is reactively appreciated.
2. Economic benefits may include low price or use economy.

Excellence, efficiency and economic benefits will be examined in detail below.

Convenience

Convenience is related with the practical outcomes of the usage of a product. According to Boztepe (2007), convenience may contain appropriateness, accessibility, compatibility with the use context, and time management. Examples to convenience can be found in her empirical study on value assignment to kitchen appliances. The capacity of the refrigerator allows the user to put enough food, so it is appropriate for the circulation of food. Having the enough food inside the refrigerator also means the food is accessible to the user whenever s/he wants.

Moreover, capacity may allow the user to shop bulky, so becomes compatible with the user's shopping behaviors. The frost free product property of refrigerators can lead users to manage time by freezing the food and shifting the cooking activity to a later time. In addition Boztepe's categorization of convenience, durability and reliability can be counted as a category of convenience, since they refer to the accessibility of the product in later times. Reliability and multi-functionality can be counted as examples of excellence.

Excellence

According to Holbrook, excellence refers to the concept of quality which is perceived by the admiration of a product (and its attributes), because of its capacity to realize tasks, but without a need for using the product. His example is quite explanatory in understanding what is meant by "not using": A Ferrari's ability to accelerate very quickly, an attribute which a person is not allowed using in traffic because of safety issues, can still be admired. However, the approach to excellence in this study will be different than Holbrook's, and more close to Boztepe's. Excellence here is taken as not necessarily reactive, it may also arise by the usage of the product, as it is in Boztepe's functional value category "quality and performance". In this sense, excellence is the superiority of the attributes and products that lead outcomes which are desirable or more than desirable. This definition still includes reactive appreciation of products. In the example above, the bundle of attributes of a Ferrari provides the quick acceleration which is a more than desired outcome. So, superior performance like effectiveness or productiveness,

Consequently, functional benefits tend to be more concrete than other value types in general. Functional benefits may create other types of benefits. A printer's having both black and white and colored cartridge (attributes) can lead to print the

documents properly (convenience). This consequence may lead to higher level consequences like getting a good grade and being successful (self worth) and being appreciated (expressive), which will be explained in detail in the next sections.

Economic Benefits

Zeithaml's (1988) definition of value includes what is given as well as what is received by the product. Considering the given costs part of this definition, the economic outcomes can be valuable for the user. Economic outcomes can be related with price, and can be delivered at purchase like low price or installment plans, or can have long term effects to the users' budget like the capacity of a refrigerator's letting users bulk buying which helps saving money (Boztepe 2007). Boztepe states that economy in use is also important for users which can be exemplified by freezing the remaining food with frost free property of a refrigerator.

3.2.2. Hedonic Value

Desmet and Hekkert (2007) states that, "Hedonic outcomes are related with the affective states and pleasurable experiences. Affective states are psychological responses to a perceived goodness or badness, pleasantness or unpleasantness.". The hedonic value types are examined under two categories as **experiential value** and **symbolic value.**

3.2.2.1. Experiential Value

Aesthetic experience and emotions, feelings or moods are thought as affective (Bloch, 1993; Desmet & Hekkert, 2007). Smith and Colgate (2007) include social experiences like doing something together with friends in experiential/hedonic benefits. These experiences can create affective states like fun, enjoyment, or pleasure of connectedness.

Aesthetic Pleasure

Aesthetics is equated with sensory pleasure and delight (Smith & Colgate, 2007; Hekkert & Leder, 2008). Bruchert (1996) defines aesthetic experience as "immediate, dynamic, unified, meaningful, pleasant, and vividly felt, emerging from the perception of an object" (Wagner, 1999). In aesthetic experience, the product is not admired since it is instrumental to reach something. As Bruchert puts it, "It is disinterested, detached and distanced from practical concerns". Rather, the product is the end itself, which means it is purely enjoyed for its own sake (Bloch, 1995).

Aesthetic experience may include all types of sensory pleasure, visual, touch, smell, and taste (Desmet & Hekkert, 2007). Aesthetic response can be to overall form like gestalt or individual design elements. However, since here the focus is on appearance, the aesthetics will be covered on the visual domain.

There is a debate whether beauty is objective or subjective phenomena. There is no consensus of what is beautiful; it is hard to communicate with words. Certain aesthetic principles were accepted by objectivists. Certain proportions are thought to be pleasing like the Golden Section, or certain shapes and colors are thought to be attractive. Gestalt rules, which are principles believed to bring pleasure by regarding order and harmony, influenced the designs. For instance, geometric and symmetrical forms were reflected in the products of Bauhaus School. Crilly, Moultrie and Clarkson (2004) mention that symmetry, proximity, similarity, continuance, repetition and closure are among these rules.

The subjectivist view suggests that since people have different tastes they live different aesthetic experiences with the same object. Crilly et al. (2004) state that different cultures, economics, history and technological factors affect tastes of the users. Crozier (1994) suggests that "the presence of demonstrable differences

between peoples' judgments makes it difficult to believe in universal aesthetic principles [and that] inherent responses [may be] a mirage (as cited in Crilly et al., 2004). Personal experiences may also affect aesthetic experience since they influence familiarity and novelty which can have influence on it.

Epistemic Outcomes

A product's ability to arise curiosity, provide novelty and fantasy, or satisfy a desire for knowledge is epistemic benefit (Sheth et al., 1991, Smith & Colgate, 2007). A new product or a change in an existing product may create epistemic benefits (Sheth et al, 1991). Searching for new products and switching behaviors may stem from the need and desire for epistemic benefits such as exploration, novelty seeking or variety seeking (Hirschman, 1980). However, as it is also suggested in the aesthetic benefits part, people seek for an 'optimal' degree of complexity and novelty.

Play/Enjoyment

Literature differs in approaching to pleasure in consumption. Mostly, the literature with a focus of pleasure and emotions takes all outcomes together which include arousal. These outcomes can be related with aesthetics, identity, fun, or enjoyment. However, for studying value these are better to be categorized differently, as they are in value literature, since they are not that similar with each other though they create affective response from the user.

Play/enjoyment which is mentioned by Holbrook (1999) also as play, but mostly as emotional value (Smith & Colgate, 2007), is part of hedonic consumption. Playful consumption includes activities which include enjoyment, fun, pleasure and satisfaction. According to Calder and Staw (1975), they may be interesting or exciting (as cited in Holbrook, Chestnut, Oliva & Greenleaf, 1984). Leisure time

activities or hobbies tend to be examples to playful consumption such as playing piano, games, sports, taking photographs.

Relational Benefits

Relational benefits are related with the user's social relations. Smith and Colgate (2007) explain relational benefits with social bonding/connectedness, personal interaction, developing trust or commitment, and responsiveness.

In his examination of the ways people consume objects or experiences, Holt (1995) mentions about the relational benefits of consuming. He states the autotelic (the interaction is not instrumental for achieving an ulterior end, but it is done for its own sake), but interpersonal actions are important aspects of consuming; people interact and develop relationships with other people by consumption objects. He examines the relationships under two categories: communing and socializing.

In communing, the interaction with the object becomes a mutual experience; "consumers share how they are experiencing the object with each other". When others join to consuming and the interaction with the object becomes a group interaction, the joy from the experience increases. Holt exemplifies this with the spectators in a baseball game. Spectators commune by pumping fists in the air or yelling, when a special position occurs in the game.

Consumers may also socialize by telling their ideas about or experiences with the object to interact with each other. Under the topic of the consumption object in the conversations, they entertain each other in a reciprocal style.

When a product leads to relational outcomes, it can deliver play/enjoyment outcomes also. For instance playing tennis is both an example of emotional benefits and relational benefits, since it both includes fun and strengthens social bonds between the players.

3.2.2.2. Symbolic Value

The product attributes and the whole product may lead to symbolic/expressive consequences or end states. These are certain symbolic meanings that products are associated with, independent from what they really do or are used for. Symbolic value includes three categories:

1. Self Worth
2. Personal Meaning
3. Conditional Meaning

Before examining these categories, it is needed to review the literature about consumption culture, to later clarify the concept of self worth.

"Symbolic/expressive meanings" are taken as signs in the consumer culture literature. Lucas, the Frankfurt School, Benjamin, Haug, Lefebvre, Baudrillard and Jameson have worked on the objects as communicators of signs (Featherstone 1982, 66). Baudrillard, one of the most important contributors, claims that "Advertising, packaging, display, fashion, 'emancipated' sexuality, mass media and culture, and the proliferation of commodities" created spectacles about commodities and attached them new utilities as signs (Kellner, 2007). The commodity does not signify what it can do as a function; but it rather signifies prestige, luxury, power, etc. Thus, Baudrillard claims:

> *Commodities are not merely to be characterized by use-value and exchange value, as in Marx's theory of the commodity, but sign-value. The consumption of the commodities has turned into the consumption of the signs as messages or images.*

According to McCracken (1986), symbolic/expressive meanings stem from the "the culturally constituted world". He states that culture constitutes the world in two ways. Firstly, individuals see the world from their cultural lens; holding in mind

cultural meanings which may be certain beliefs and principles, and categories like social classes, genders, leisure and work times, etc. Second, culture also affects the "social action and productive activity" and "the objects that issue from both".

From the culturally constituted world, meanings are moved to the products. Products are endowed with cultural meanings merely by advertising and fashion system. From the product, the meaning is transferred to the user. The movement of meaning is shown in Figure 3.2.

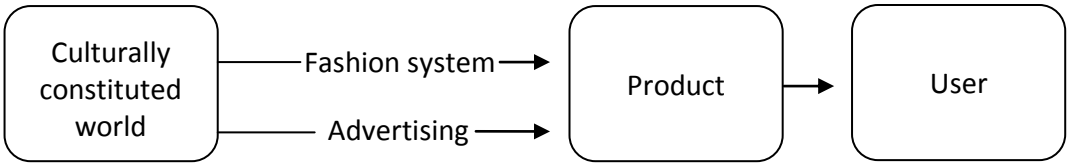

Figure 3.2 Movement of Meaning

About products' expression of cultural meanings, McCracken (1986) states that:

> *…goods allow individuals to discriminate visually among culturally specified categories by encoding these categories in the form of a set of material distinctions. Categories of person divided into parcels of age, sex, class, and occupation can be represented in a set of material distinctions by means of goods. Categories of space, time, and occasion can also be reflected in this medium of communication.*

Consequently, a code system is created through advertising and fashion system in which users know the "code", what products signify (Featherstone 1982, 7). Consumers can buy the commodities accordingly and communicate the right

messages with each other, since they know what using one specific product rather than another means. So not only what a commodity signifies, but also its relationship with other commodities and what they signify are important in this code system.

Self Worth

The objects we consume help us to communicate our identity to other people and also to establish our self definition. Besides their functionalities, Slater states that the symbolic meanings products have are consciously or unconsciously reasons of choice (as cited in Wattanasuwan, 2005); since we use these symbolic meanings for our "self creation project" (Wattanasuwan, 2005). According to Grubb and Grathwohl (1967) Banister& Hogg (2004) the self concept is one of the most important motivational drivers of consumer behavior and decision making (as cited in Hogg, Banister & Stephenson, 2009). Wattanasuwan (2005) states that "In order to feel alive in this saturated world, we crave for a sense of meaningfulness in our pursuit of being. And it seems that we can symbolically acquire it from our everyday consumption."

Reflecting personalities, tastes, values, and unique aspects of the self through products is a common behavior (Smith & Colgate, 2007). The agreed upon meanings of products in the society help people in communicating the self. Since people know what the products symbolically mean, they evaluate the others according to the products they are surrounded with (Crilly et al., 2004).

The inward and outward communication of the self via products is done in two ways. By producing or personalizing actions, people may contribute to their self definitions, and integrate their self concepts with the products (Holt, 2003). In producing, user has control over product's production to some degree. Holt's example of producing is about an experience (baseball game) rather than a

product. For explaining a product case, a bookshelf may be given as an instance. A bookshelf may offer several construction options which is left to the user by the producer, and the user may construct it according to his/her tastes, needs, etc. So the user contributes to the production of the bookshelf in a way.

In the case of personalizing, the user adds something to the product or tailors it in a way so that s/he may extend her/his self concepts into the product, reflect tastes or give the product other meanings than the common meaning of it. The difference between personalizing and producing is that, in producing user's actions are still defined by the producer; while in personalizing users manipulate the product's producer defined content by himself/herself to singularize the product. Adding a sticker to a bookshelf, or cutting a part of it to use it for another purpose can be examples of personalizing.

Giving products may be counted as a way to express our identity to ourselves. Giving products to others may contribute to our self definitions. Smith and Colgate (2007) states that giving products to others can also make a person feel good about himself/herself, and increase self worth. They exemplify this with a person's giving a diamond ring to the spouse.

Also, behaving within our ethical values, and consuming accordingly, may increase our self esteem. Though Holbrook (1999) takes this as "spirituality" as an other-oriented outcome, within this study, as it is in Smith and Colgate's (2007), it is thought to be a self oriented outcome, since it increases self worth. Using environment friendly products may be an example to consume within ethical values.

The other way of communicating the self is **role playing.** It is different than the above mentioned communication. In the above mentioned case, people are

already in a role like a father, an academician, a photographer, etc., or have certain tastes, lifestyles, etc., which are communicated to others by choosing particular products. On the other hand, in the role playing case, a person wants to gain an identity that he does not have. They want to be categorized as in that role. So, he buys the products that are associated with that identity. He thinks of how other people evaluate his character by using the material cues he surrounds himself with. His image in other's eyes, either real or not, encourages him, and he behaves that fits to the shared meaning of the product or to the lifestyle the product is positioned in. Then he approaches to the desired identity. Role playing Buying luxury goods to be seen as having a prestigious status may be given as an example to role playing.

Role playing is also the same with what Dittmar (1992) mentions as "categorization" (as cited in Crilly et al., 2004) and Holt (2003) as "assimilating". Playing roles is categorizing the self; playing the role of a business man means being in the business men's status which is supposed to be prestigious. Holt observed a baseball game as a consumer good in order to explore the dynamics of a consumption experience. He suggests that by assimilating themselves with the consumer good, people act like a real user of that good, do what the real users do. Assimilating is a part of integrating the self concept with the consumer good.

Lastly, it should be noted that communicating the identity to other people also holds a purpose expressing the identity to the self. A person has thoughts of how other people see them. With this thought of other's evaluation of himself/herself, s/he defines his/her own image in his/her mind, which is called as reflexive evaluation (Solomon, 1983). So, reflexive evaluation can be thought as part of a self defining process. Thus, all impression management and role playing actions contribute to our self definition. Reflexive evaluation is also why our image in

other's eyes encourages us to behave like having the desired identity in role playing.

As well as using products for identity related purposes, we also avoid using particular products since we or other people associate them with undesired identities, those which we are afraid of becoming (Hogg, Banister & Stephenson, 2009). This *anti-consumption* is for protecting self esteem, and so not decreasing the self worth.

To summarize, we use objects to increase our self worth in the eyes of others and ourselves. We can use products to gain an ideal identity (role playing), or communicate the identity we already have (impression management). While doing these, the culturally shared symbolic meanings of products help us. A watch is functional in knowing the time, but it may also connote status, since the "code" is known by the society. We use products that are compatible with our characters, while we avoid those destroy our self definitions and decrease self worth. We may also produce and personalize products for integrating them with our self concepts which again increases self worth.

Personal Meaning

Smith and Colgates (2007) defines personal meaning as products' associations with other people or events that only have meaning to a particular user. A product may be valued since it is a gift from a loved one or since it reminds the user memories of the past.

Consequently, a product has personal meaning only for a particular individual. However, producers still put efforts for integrating products with these personal meanings. Scenes about personal ties with the loved ones shown in advertisements may remind some people their own relationships; so they can

associate the product with personal meanings. Designs that resembles to an old product may remind to a certain segment their childhood memories when the referred product was used.

Conditional Meaning

Conditional meaning is related with the seasonal products or cultural events (Smith and Colgate, 2007). Like the tree and ornaments in Christmas, or red accessories for the communication of love on Valentine's Day.

3.3. VALUE AND DESIGN

In Chapter 2, value is defined as something assigned by the user, if there is an offer for value in the product. The valued offers in a product are realized by the collective efforts of designers, engineers, and marketers. Among these professions, the subject of matter for this study is design and the starting point of this thesis is the question of how design can contribute to value creation.

What designers do while creating a product may be categorized with Kumar's classification. He identifies three design categories as utilitarian design, kinesthetic design and visual design. Utilitarian design concerns with functioning, while kinesthetic is related with the human factors and the ease of interaction. Visual design is about the appearance. So, following these categories, it can be stated in a very general sense that designing a product involves creating functions, usability (ergonomics) and the look of the product which are provided by the combination of forms, materials, colors, texts and graphics, and details.

Then how the three outcome types mentioned in the previous section are linked to these designer activities and the designed attributes? In this section, the design literature will be covered regarding the valued outcomes under three types of outcomes.

3.3.1. Pragmatic Value and Design

As obvious from the match between their names, pragmatic outcomes are covered in Noble and Kumar's (2010) study under the utilitarian design. Design can create effectiveness, durability, reliability, safety, multifunctionality and architecture, which are given as examples of concerns of utilitarian design in Kumar's study. How pragmatic outcomes are created through designed attributes is a huge subject that is not possible to generalize, but some examples will be given here to clarify the concept. For instance, the whole product, by the combination of several designed attributes can create efficiency. A vacuum cleaner by a body, handle, etc. helps the user do the cleaning job (appropriateness for cleaning - efficiency). The single attributes may also lead to pragmatic outcomes as the width may help cleaning in a short time, and may lead to time management (convenience-efficiency). Also, design can enhance excellence; a tough material can help decreasing the sound, which is an excellence outcome.

From a value creation perspective, what kinesthetic design (which involves ergonomics and human factors) aims can be counted as creating pragmatic outcomes. The traditional focus of ergonomics is on the "usability" issue. Usability is defined as "…the effectiveness, efficiency and satisfaction with which specified users can achieve specified goals in particular environments" (Jordan, 1998). While the satisfaction and pleasure is a matter of hedonic outcomes, the effectiveness and efficiency are pragmatic outcomes. For instance, ease of use, which can be defined as making the interaction with a product simpler by an attribute or bundle of attributes, can be regarded as leading to pragmatic outcomes such as effectiveness (excellence). Controlling a device with less number of buttons can be given as an example for easing the interaction and leading to effectiveness. Bigger texts or well fit with the body can decrease physical discomfort, and can be valued for appropriateness. So attributes that can make the product "usable" in the eye of the user may create efficiency or excellence.

After usage, people are aware of the pragmatic outcomes, but also at pre-purchase they may make guesstimates about these pragmatic outcomes by design cues. For instance, while comparing two hair dryers, the user may think a large hair dryer is probably more powerful (excellence) than a small one (Creusen & Schoormans, 2005). All products communicate something about themselves; intentionally or not, “design makes statements”. A product can give clues about its function, performance, operation, etc. by the visual and sometimes auditory properties it has. The design cues that communicate these functional benefits are mentioned in the literature as the **product semantics.** Product semantics may be defined as what a product is seen to say about its function, mode-of-use and qualities (Crilly et al., 2004).

According to Monö (1997), there are four functions of product semantics (as cited in Crilly et al., 2004). Product can represent its purpose and tell how it is used which Monö calls as description. So, users can understand the function and operation of the product from the description. Product’s representation of the properties it has is called expression. For instance, if a product is made from stainless steel, users may infer that the product will be durable. Representing product’s demands from the user for the correct and safe usage is *exhortation*. Signaling when a door is not closed or making a part which should be handled carefully from a fragile material. Representation of the origin and affiliation of a product is i*dentification.* The manufacturer, product type, product range, product family and connections with the system may be communicated by design semantics.

Design attributes such as form, material, texture, graphics, and color, and also sound may communicate the semantic information. Using these characteristics, integrating clues into the product enhances users’ understanding of the product. Thus, users can evaluate the product regarding the values it delivers for them in a

better way. This understanding is also good for the product not to make wrong promises and increase user expectations, which can cause disappointment after usage.

Besides semantic communication, Norman (2002) also explains three visual properties that can improve the way users perceive and comprehend the product, and assign value to the product at pre-purchase. These are affordances, constraints and mappings.

Affordances: ‘‘The term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used.” A chair with its flat surface, height and size affords sitting. Knobs provide turning. Şener and Demirbilek (2003) exemplify semantic information with shapes or forms telling “I move in this direction” or “I fit into that part of your body”, buttons directing us to press them.

Constraints: To prevent certain behaviors and misusage of products, constraints can be designed not to allow certain actions. Affordances and constraints can work together to lead the user to handle the product properly. Norman exemplifies this with a pair of scissors. While the existence of the holes are affordances directing user to use his/her fingers, the size of the holes is limited to limit the number of fingers that holds the scissors from the holes.

Mappings: mappings are “the relationships between a user’s actions and the corresponding behavior of the system”. Norman exemplifies mappings with the electronic seat control panel of Mercedes (Figure 3.3). The buttons represent the seat itself; so without a need of operating and merely by looking, to which direction the seats moves when the buttons are pulled and pushed can be understood.

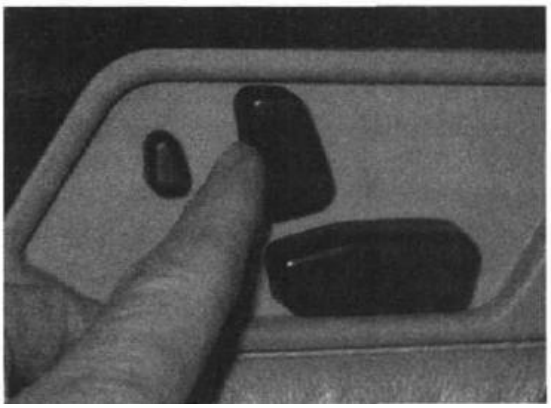

Figure 3.3 An example to mapping (Source: Design of Everyday Things, Donald Norman, 2004)

Lastly economic outcomes can be provided by design. Design can help lowering the price by decreasing the cost of manufacturing the product. Designing products in a more simplistic way, with less parts or the least intricate shape can lower the cost. Widely available standard materials and components can be used, or same parts can be used for similar products and this can provide economies of scale for the production of the components. The most processible materials can be used. There may be special processing capabilities which are exemplified with some plastics' providing living hinges or injection molded plastic parts' having color and surface texture when they come from the mold. Knowing these special processing capabilities designer can take advantage of them. Also, rather than too tight, liberal tolerances can be designed. The production operations can be decreased by design. Lastly, considering the quantity that will be produced can decrease the costs. For instance, since for a low level of production, the costs of the expensive materials or operations cannot be amortized, rather cheaper ones can be included in the designs.

3.3.2. Hedonic Value and Design

Hedonic value is examined in two groups which are experiential and symbolic.

3.3.2.1. Experiential Value

Experiential value includes aesthetic pleasure, fun/enjoyment, and epistemic outcomes.

Aesthetics

Aesthetic pleasure is related with our senses, and differs for every individual. Moreover, aesthetic tastes may change by aging, fashion, etc. However, still some principles exist for visual aesthetics. Adapting Hekkert and Leder's (2008) categorization of these principles, five aesthetic principles is explained below.

Hekkert and Leder (2008) states that "We tend to see things that are close together or look, sound, or feel the same as belonging together." As this phrase demonstrates, perceptual structure of appearance is important in aesthetic experience. Gestalt laws, such as symmetry, good continuation, closure, balance and contrast, are applicable in not only visual domain, but also auditory domain, like rhythms.

Designers may refer to other products, subjects, people, etc. with products. By using metaphors, or design elements like lines and forms which are similar to what is referred, users are communicated certain meanings, for instance childishness or masculinity. These symbolic meanings are, in fact, different than aesthetic experience and will be explained under "symbolic outcomes". However, they are thought to positively contribute to aesthetic pleasure in literature.

We may experience aesthetic pleasure towards familiar and prototypical objects, since our brains process them easier than novel ones, and also they may be seen us as safe choices. Hekkert and Leder (2008) see this similar to our feeling

comfortable at our homes or being loyal to the brands we own. However, contrary to familiarity and prototypicality, we also seek for unusual things around us. This is because “repeated exposure has its limitations and will at a certain point lead to over-exposure and saturation, and, consequently, boredom.” The novelty and innovativeness may create arousal for us. However, this arousal emerges when we are able to identify and understand what we see. So, a balance between familiarity and innovativeness is recommended.

The sought balance is between simplicity and complexity, in other words between unity and variety. It is assumed that our systems want to function in an economic way. Thus, we prefer the products which we put less effort in seeing, smelling, or hearing. However, we also seek complexity to a tolerable degree, which causes arousal.

Hekkert and Leder (2008), based on previous literature, explain this complex situation in “**maximum effect for minimum means principle**”. They state that “we prefer solutions, ideas, formulas and like that consist of as few elements or parameters as possible, while solving or explaining a range of problems or phenomena”. Following this assumption, if something is ambiguous and can be interpreted in different ways, it will not be attractive for the users. There are special cases in which the multi interpretations of a product are desirable.

The semantic communication of a product contributes to interpret the objects with less effort. Thus, for instance, metaphors or references in a product may communicate meanings economically and contribute to aesthetic experience.

Another theory, solving the problematic condition of seeking for familiarity while attracting from novelty, is called “**Most Advanced, Yet Acceptable** (MAYA)”. In 1951, Raymond Loewy stated that the correlation between typicality and novelty is

not perfect, so a balance between novelty and typicality can be established. While lasting the typicality, it is still possible to make innovations to a certain extent. By this way, the products may get advanced but still stay understandable for the users. Products which provide this balance are thought to be more aesthetic.

Coates also emphasized the balance between certain opposing properties bring aesthetic pleasure. These properties are information and concinnity. He divides both properties into subjective and objective components. While objective information is the contrast, subjective information is the perceived novelty. Concinnity is related with order in objective terms, and product's ability to make sense in subjective terms. He proposes that attractive products are those which can provide a balance between information and concinnity. It should be noted that, contrary to Coates, contrast is thought to be a property of unity and order by Hekkert and Leder (2008), since it helps us to identify the similar elements of a product.

Fun/Enjoyment

There is a shift in design from functionality and aesthetics to emotions and pleasure in user experience both in academic studies and in practical life. The issue has become the beauty of the interaction, or in other words delivering joy through interactions (Overbeeke et al., 2005). Many products have started to have additional qualifications other than their primary function. iPhone may be given as an example of this situation. iPhone offers a lot of fun options so that telephoning or even music playing capabilities become secondary benefits of it (Noble & Kumar, 2008).

There is a tendency towards considering fun and enjoyment within usability in the literature (e.g.: Jordan, 1995). This tendency may be useful for taking a comprehensive view of the user experience and result in designs that bring

consistent and better user experiences (Carrol, 2004). The product attributes that are useful in directing the user for the further activities, so that feed-forwarding the user may bring fun and enjoyment as well as ease of use (Overbeeke et al., 2005). Also, differentiating the control buttons of electronic products not only visually but also behaviorally, or increasing the richness of these control actions can ease the interaction and also evoke joy (Overbeeke et al., 2005). Thus, the enjoyable experience may include both fun/enjoyment and pragmatic outcomes.

On the other hand, a product which is not "usable" when usability is taken as the ease of use, and rather challenges or surprises the user may be preferred since challenge and surprise bring fun (Overbeeke et al., 2005). However, distractions which surprise us may be also annoying, rather than fun. Caroll (2004) states that "They are fun when we are both aroused and intrigued, and at the same time recognize an intention to communicate through design".

Other than challenge and surprise, seductive, playful, memorable, rewarding, inspiring, amusing, fascinating or moody experiences can result in enjoyment (Overbeeke et al., 2005). Since fun may include triviality, absurdness and spectacle, the products that are thought as funny may also include these (Blythe & Hassenzahl, 2005). Also, Caroll (2004) states that:

> *The interaction of cognition and affect is fundamental to the complexity of social behavior and everyday experience. Things are fun when they attract, capture, and hold our attention by provoking new or unusual perceptions, arousing emotions in contexts that typically arouse none, or arousing emotions not typically aroused in a given context. Things are fun when they surprise us; when they don't feel like they look, when they don't sound like they feel. Things are fun when they present challenges or puzzles to us as we try to make sense and construct interpretations, when they transparently suggest what can be done, provide guidance in the doing, and then instantaneous and adequate feedback and task closure.*

Though it is generally told as creating experiences, what design should create is rather the contexts for the experiences. Within these contexts, the user can build his experiences and enjoy the activities like cleaning, playing or eating.

Epistemic Outcomes

Products should provide new insights and opportunities for information acquisition so that they can stimulate users. McGrenere (2000) found in his study that %27 of the available Microsoft words functions are used, but only %75 of the Microsoft word users did not want the unused functions to be removed (as cited in Hassenzahl, 2005). Hassenzahl (2005) suggests that while the used functions are pragmatic, the unused functions are "future opportunities for personal development" and thus can be treated as hedonic. He also states that the stimulation provided by the interesting, novel or exciting functionality can help user to gain motivation for doing the functional task.

3.3.2.2. Symbolic Value

While advertising and marketing activities have a more significant effect on the construction of symbolic meanings of products, design's role cannot be overlooked. Identity related meanings can be integrated into products on purpose by designers.

The product attributes serve as links to certain meanings. Primary links communicate the function. Secondary links help to make more abstract meanings. Athavankar (1990) exemplifies this with a portable professional video camera. While certain attributes reflect its primary links with its "video cameraness", some others reflect secondary links with "portability" and "proffessionality". So secondary links can be thought as those letting users prefer a product among others by making them think they fit to their tastes, identities, styles, social classes etc. The sporty look of the product can deliver value to the ones who have a sporty

taste, who want to look sporty, or who dream for a lifestyle or identity the sports is associated with.

The secondary links can be created in two ways:

1. Characteristic visual clues from products, events, activities that reflect the non-functional meaning can be identified and integrated into the new product. For instance, for integrating a sporty look into a product, some characteristics from sport shoes can be borrowed such as color lines, bands, checks, stripes, netting, borders, patches, bold stitch marks, large buttons, zips, or soft surfaces.
2. Designer can visually interpret the related abstract concepts and reflect these in the product. Continuing with the sporty look example, designer can make visual abstractions of the concepts comfort, quickness, relaxation, etc. on the product.

Consequently, by visual clues the would-be-consumer of the product can be reflected (Du Gay et al., 1997). As this can be the people who have a sporty style in the above example, this can also be age (child, young, adult, etc.), gender, social status, profession, etc. Du gay et al. (1997) states that product are life-styled; which means they are designed and customized according to the target segment regarding both instrumental and symbolic meanings of the product. Since belonging to certain categories is important for the self-worth, the reflection of these categories by the product can create value for the users.

The symbolic meaning integration into design can also be discussed in terms of the center in its creation, if it is the human or the companies. By symbolic meanings, designer creates probably the most abstract non-utilitarian characteristics of a product to call for a very intimate level pleasure. However, especially when people's usage of products for putting themselves into roles and gaining desired

identities by products is taken into consideration, it can be discussed whether satisfying the need for desired identities by products is creating value or utilizing people's fantasies or inadequacies for profit purposes.

While most of the reviewed literature seems to relate self expression with visual design (form, material, metaphors, etc.), it is proposed within this study that technical or functional features of a product may also lead to identity related outcomes. Dant (1999) supports this view by giving the example of a car which can have access power that cannot be actually used on the road but makes the driver powerful (as cited in Kalviainen, 2002). Other than the appearance of the product, the attributes designed with an intention for creating pragmatic outcomes may also deliver symbolic outcomes. One of the consequences of frost free property of the refrigerator in Boztepe's (2007) empirical study is always being ready for guests, which in turn leads to group belongingness.

Since people want to reflect the unique characteristics of their identity, creating atypical products may also be a way of showing the "different taste" of the user.

Designing products in a way that leaves room for the user in its production can also be valued. The cost conscious strategy of the furniture company Ikea which leaves the montage to the user can also lead to symbolic outcomes. The user who connects the parts can then show the item proudly to others since "he connected it and decided to put parts in that way". Product can also stimulate users to develop rituals while using it, and create their own stories (Overbeeke et al., 2005). Designing products not for a pre-described rather for a user directed experience can serve to the consumption as "producing" and increase self-worth.

Design can also continue the characteristic look of a brand. If the meanings that are tried to attach to the brands via advertisements are accepted by the society,

the characteristic look of the product can remind the brand and the associated meanings.

Personal outcomes can also be supported by design since products can provoke memories (Hassenzahl, 2005). The products that reflect the taste of a particular time or that were used long before can be valued since they remind the memories of the old days.

CHAPTER 4

A STUDY ON PRE-PURCHASE VALUE ASSIGNMENT TO PORTABLE DIGITAL AUDIO PLAYERS

4.1. AIM AND STRUCTURE OF THE STUDY

In previous chapters, as a start to discover how design attributes can influence delivering value to the user, value assignment process is reviewed at first. Woodruff and Gardial's (1996) value hierarchy is adopted within this study, which suggests that products create value for the user by providing attributes which leads to consequences, end-states respectively. The value assignment differs at pre-purchase and post-purchase. At pre-purchase user forms expectations for the product. While assigning value to the product, user has a desired value hierarchy in mind which forms the basis for the evaluation of these expectations. So, with the desired and expected value hierarchies pre-purchase value is assigned. The pre-purchase value assignment process and factors affecting expected and desired values can be seen in Figure 2.6.

After reviewing the value assignment processes, the types of consequences and end-states are analyzed together under the term "value types". The value types are divided into two as pragmatic value and hedonic value. Pragmatic value types are convenience, excellence and economic benefits. Hedonic value types include experiential benefits (aesthetic, epistemic, relational and play/enjoyment experiences) and symbolic benefits (self-worth, personal and conditional meanings).

Then, the main interest of this study, the influence of design attributes on value assignment, is examined regarding these value types. How design can manipulate attributes and lead to the value types is inferred from the design literature.

However, to illustrate the value assignment process and design's relation with it in a more concrete way, a study on the value assignment for a product group is needed. The validity of the value types, re-categorized by reviewing the literature, can also be examined by this field study.

Furthermore, though creating value should be one of the main responsibilities of designers, design literature lacks research on this issue. Boztepe (2007) states empirical researches on value assignment to different product groups should be conducted.

Consequently, the aim of this study is to analyze the value assignment with a design focus and constitute a resource for the field of design. Since value assignment starts at pre-purchase, this study concentrates on the pre-purchase phase to constitute a basis for further researches on post-purchase value. This study is concerned with the top part of the pre-purchase value assignment process. When this part is extended, the product attributes are divided into two as concrete and abstract attributes, and designed attributes are located under concrete attributes (See Chapter 2). The product group selected for the field study is examined in terms of designed attributes, the following consequences and end-states which are either expected or received (Figure 4.1).

Accordingly, the main research question is defined as follows:

- How do design attributes contribute to users' pre-purchase value assignment in reference to the selected product group?

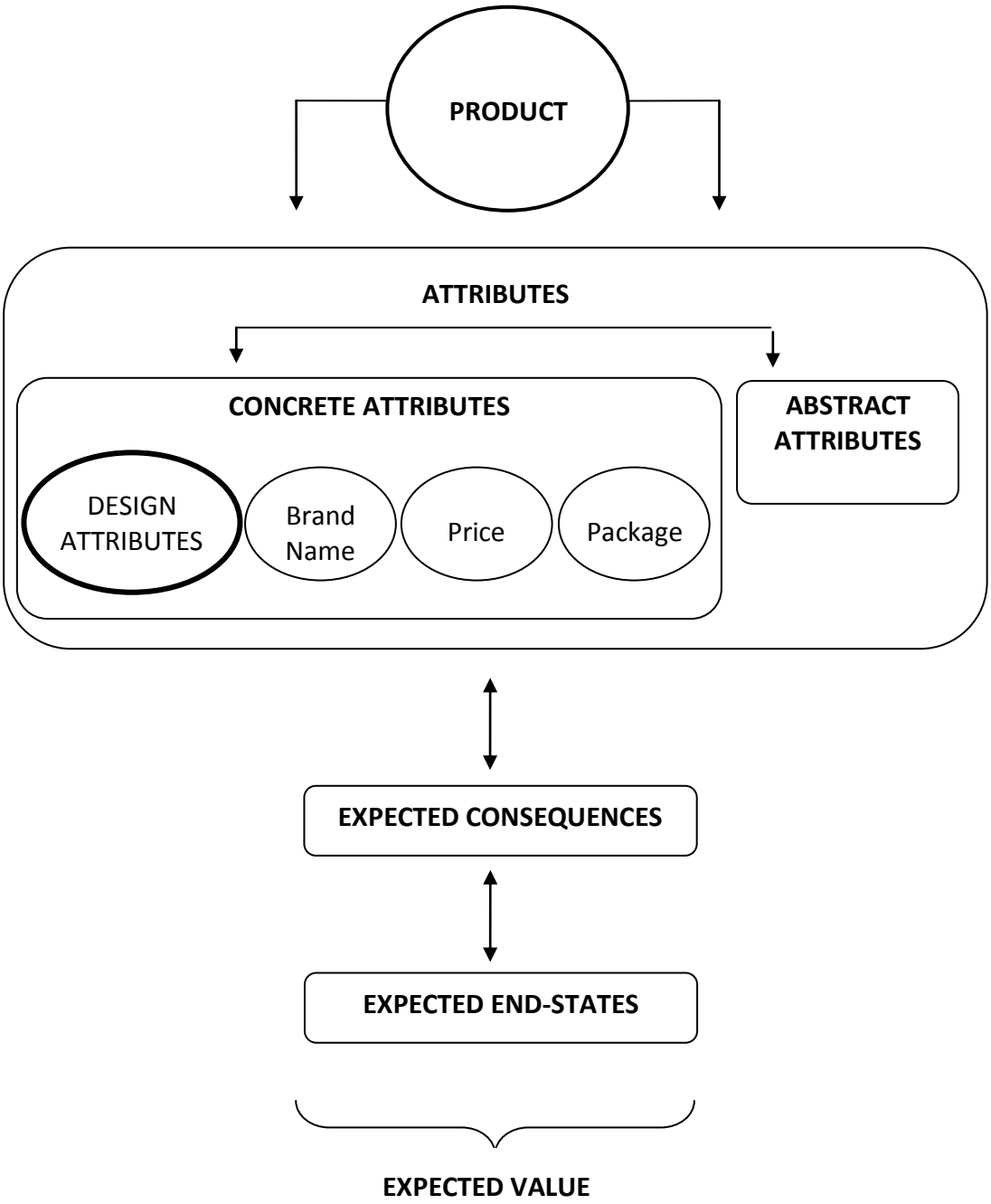

Figure 4.1 The Framework of the Research

The sub-questions are stated below:

- Which outcomes do users value? Do they match with the identified categories in the literature review?
- Which designed attributes are expected to provide these outcomes?
- Which relations between attributes and other outcomes are more salient?

4.2. METHODOLOGY

4.2.1. Research Technique

Consumer Value Hierarchy of Woodruff and Gardial (1996) examined in Chapter 2 takes Means-End Theory of Gutman (1982) as the basis. Means-End Theory suggests that product attributes lead to consequences which then link to human values (end-states). Woodruff and Gardial (1996) state that value is created when this chain is desirable for the user.

Based on Means-end Theory, laddering theory is developed for eliciting the attribute-consequence-end state linkages. Laddering is a one to one interviewing technique that involves a series of directed probes. The interviewee is asked why an attribute is important for him/her, and the response is similarly questioned again until end-states are elicited. It is exemplified as follows (Reynolds & Gutman, 1988):

flavored chip (A) – strong taste (A) – eat less (C) – don't get fat (C) – better figure (C) – self-esteem (V)

The chains or ladders obtained are thought to be reasons of distinguishing products in a product group (Reynolds & Gutman, 1988), and thus reasons of choice. As a result, laddering has been widely used for conducting marketing and advertising researches (Miles & Rowe, 2004). It is also used for comparing

cognitive structures of people from different cultures, and understanding consumer attitudes for the social psychology domain. Within the field of design, the technique is used by Boztepe (2007) to examine the relation of design with value assignment in her academic study. It is also proposed in the literature that laddering can be used for exploring new benefit areas and new product development.

So, since for the identification of attribute-consequence-end-state linkages, which is the main consideration of this study, laddering method is used in general, and also, since evidence is found in literature that supports its usage for design focused studies, laddering technique is selected as the research method.

4.2.2. Product Selection

Regarding the symbolic value type, a product that users could use while they are with other people would be appropriate for the field study. Since widely used, carried to everywhere, and other people see it, mobile telephones were selected at first. However, the pilot study revealed that the data would be very huge if mobile telephone was used as the product group for this study, since mobile telephones could create a lot of benefits other than telephoning. Since the attributes would also be kept large in number to serve the design focus of this study, unlike other researches laddering method was used, huge data would make the analysis harder and beyond the purposes of this study. In search for another product, since they are portable, widely used though not as much as mobile phones, seen by other people, and the benefits created are more limited than mobile phones, portable digital audio players are found appropriate for this study.

When the models in the digital audio player market are reviewed, it is possible to make a categorization among products according to their sizes or prices. In general, big ones have more qualifications compared to small ones and their prices

are higher than the small ones. The big ones can not only play audio files but also play videos and display photos generally. They may also include games, alarm, and further qualifications. The capacity of the big ones tends to be high. Small sized ones, on the other hand, usually do not have video displaying properties, and only some of them can display photos. Their capacities are lower in small ones.

It would be inappropriate to include two models one of which has apparently more qualifications than the other for the interviews. Including only big or only small ones could make choosing difficult for the participants who would use the size which is not displayed to them. Thus, to protect the balance, to reflect the market, and to collect reliable data, two pairs of digital audio players were decided to be displayed in two rounds during interviews.

The pairs were selected regarding the different designed attributes such as size, form, buttons, display size, and direct USB connection. The prices of the two products within a pair were similar. The difference of the technical details such as battery life or capacity were not taken as important, since they are out of the scope of this study and participants would be told to assume these details the same during interviews.

The selected products were iPod Nano 4th Generation, Sony NWZ-S545, Philips GoGear Spark and Sony NWZ-B143 Series. Photos of the product samples are provided in Appendix C.

4.2.3. Sampling

All respondents were selected among those who were actual users of digital audio players to increase the reliability of the research.

Sample Size

The number of respondents generally varies between 20 and 50 in the studies that are conducted with the laddering technique. However, in these studies, design is treated as the appearance of the product, and different design attributes such as form, size, color, etc. are not taken seperately. Since this study aimed illustrating the relation of each design characteristic, rather than general appearance, with the valued consequences and end-states, a large sample size would cause huge data which would lead to complexity in analyzing the data, and in the results. Thus, 30 was set as the sample size which would keep the data at a manageable level, but could also provide meaningful results.

Gender

Sample consisted of 15 male and 15 female participants. This is set intentionally to decrease gender effects on the results, and provide more reliable results and propositions for the study.

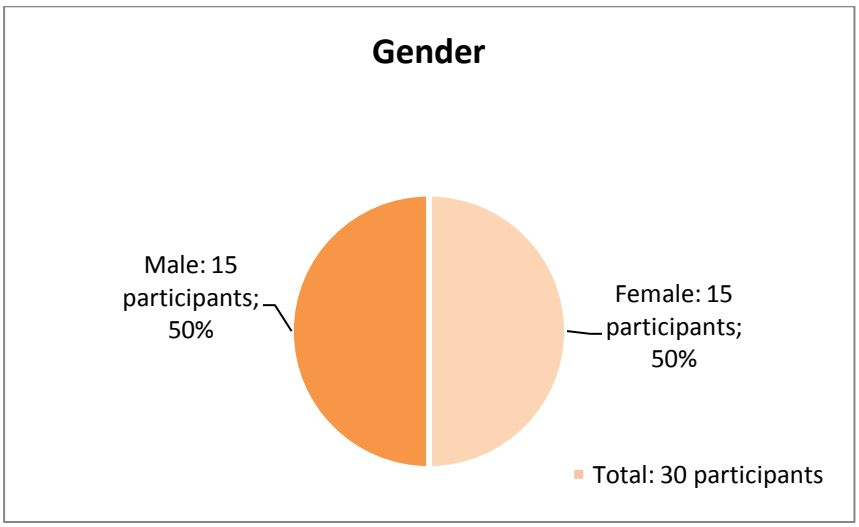

Figure 4.2 Gender Distribution of the Participants

Age and Occupation

In this study, the users who make their own purchasing decisions were selected as participants. So, university students or working people participated in the study. Previous studies show that digital audio players are primarily used by younger people, and usage of digital audio player decreases by age. Thus, the number of university students that would participate in the study was set as 20, 10 male and 10 female, and the number of working participants was set as 10, 5 male and 5 female. The age interval 18-24 shows the university students participated in the study, while age interval 25-41 shows the working participants.

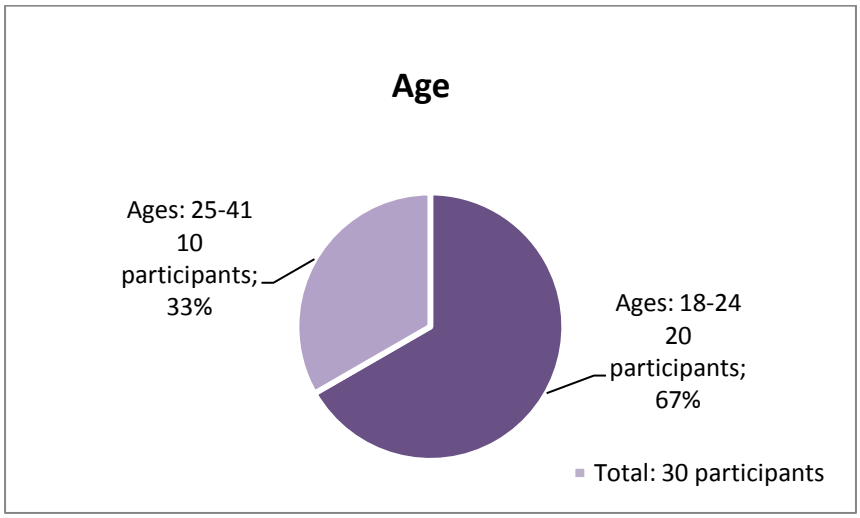

Figure 4.3 Age Distribution of the Participants

4 of the university students were post-gradute students, while 16 of them were undergrads.

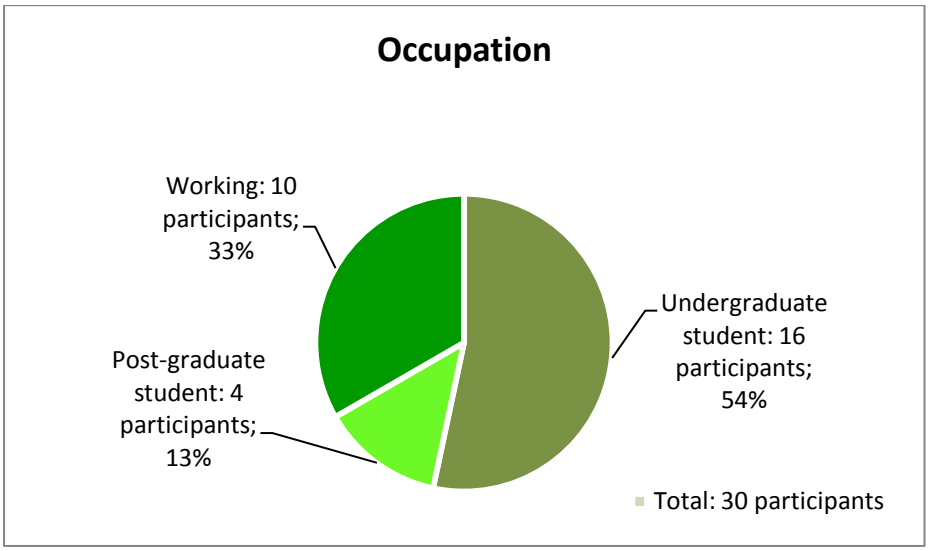

Figure 4.4 Occupational Status of the Participants

4.2.4. Procedure

Laddering technique requires asking why an attribute is important for the interviewee, and for this, the important attributes for the user is needed to identify. To elicit the important attributes that will be probed, different methods can be used such as triadic sorting, ranking, attribute list, free sorting and free/direct elicitation (Miles & Rowe, 2004). For this study, a combination of free/direct elicitation and attribute list methods is thought to be the most appropriate regarding the purposes of this study and the product selection. Since two products will be shown to participants at rounds, triadic sorting, free sorting and ranking methods which are more appropriate for researches with three or more items are elected.

In free/direct sorting method, participants are asked to choose between products and state the most important attributes that they consider while choosing. When attribute list method is used, the interviewees are displayed a list of attributes for

the selected product group, and are asked to pick the attributes according to some criteria, such as the importance for them. For this study, free/direct sorting method was used while participants compare the digital audio players. At the end of the two rounds, an attribute list was shown to them, to make sure, they mentioned all of the attributes that are important for them.

While preparing the attribute list, since the focus is on designed attributes, other attributes like brand, price, package, and technical attributes were excluded, and a list of designed attributes was prepared. The designed attributes shown to users included attributes that all products have: Size, form, color, material, general appearance, weight, and texts. The list also included attributes that are specific to the product group: built-in speaker, direct USB connection, display size, and button related attributes. The attribute list is provided in Appendix B.

The interviews started with obtaining the demographic information. Then interviewees are shown the first pair of digital audio players and asked which one they would prefer. After they make the selection, they are asked which attributes they thought important while making the decision. Then they are asked to explain why each attribute is important for them and the responses are probed until they told the end-states. After all of the attributes they mentioned is probed, the attribute list is shown to them and asked if any other attributes among this list is important for them. If they state any, those attributes are also probed similarly.

The same procedure is applied for the second pair of digital audio players, and the interview is finished. The total procedure of each interview took about 30-35 minutes. The interview script is provided in Appendix A.

4.3. ANALYSIS OF THE DATA

Within the proposed analysis technique for laddering method, there are 4 basic steps:

1. Establishing the content codes
2. Establishing the summary matrix
3. Establishing the implication matrix
4. Hierarchical value map

4.3.1. Establishing the Content Codes

Out of the entire data, which included attributes, consequences and end-states stated by the users, the similar ones were defined in one statement, which established a content code. For instance, consequence “I can quickly find the song I want to play” and another one “I do not want to confuse while navigating” were grouped into a content code: “easy access to the content”.

From the data, seventy content codes are inferred, which include sixteen attributes, forty six consequences and eight end-states. Normally, in the studies which used laddering technique, the total of the content codes vary up to fifty. However, what they include as a single item in the content codes as the “design of the product” or “the appearance” is divided into several attributes such as color, form, material, size, etc. Moreover, though the defined consequences can be united further, such as ease of use, or appropriateness of the functions; they are intentionally left much in number for the reader and the designer to be able to explore what the designed attributes exactly provides in terms of consequences. In other words, the aim in not uniting the consequences is to show what “ease of use” can mean for the user.

Below is the list of the content codes. The attributes are coded as a1, a2, a3…, consequences are coded as c1, c2, c3… and end-states are coded as e1, e2, e3…,

etc. How many respondents mentioned about that content code is also written in the cells.

Table 4.1 List of Content Codes

Code	Attributes	Number of Resp.
a1	General appearance	27
a2	Form	29
a3	Color/contrast	25
a4	Material	7
a5	Weight	13
a6	Overall size	26
a7	Texts	5
a8	Button type	28
a9	Button position	6
a10	Number of the buttons	18
a11	Display size	19
a12	Built in speaker	19
a13	USB connection type	24
a14	Light	1
a15	Hanging/Attaching options	3
a16	Earphone dock position	1
	Consequences	
c1	Compatibility with containers in which the device is carried while not in use	22
c2	Easy carriage (convenience)	14
c3	Compatibility with containers in which the device is carried while in use	10
c4	Suitability for viewing of lyrics/album covers (convenience)	6
c5	Suitability for watching videos/looking at photos (convenience)	7

Table 4.1. (Continued)

c6	Suitability for the checking of song information/time (convenience)	3
c7	Provision for ergonomic management (convenience)	29
c8	Comfort/free movement in use (convenience)	7
c9	Ease of vision (convenience)	6
c10	Ease of access to content (convenience)	23
c11	Ease of learning (convenience)	6
c12	Easy file upload/charge (convenience)	14
c13	Suitability for spontaneous charge (convenience)	2
c14	Suitability for spontaneous computer connection (convenience)	17
c15	Size as a reminder	1
c16	Safe use (convenience)	2
c17	Informing the user about the experience	2
c18	Song/song part selection (convenience)	6
c19	Availability for song play as desired (convenience)	7
c20	Availability for spontaneous data transfer (convenience)	15
c21	Decreasing carried weight	2
c22	Suitability for listening songs with other people(convenience)	13
c23	Control of the device in the pocket/Control of the device with one hand	6
c24	Avoidance of inadvertent noise in operation	1
c25	Looking/staying clean	3
c26	Durability against damage to the device or its equipment	8
c27	Protection from loss/forgetting the device or its equipment:	10
c28	High functioning	16
c29	Being appropriate to use context	22
c30	Substitution for another device	4
c31	Accessibility to photos of loved ones	1
c32	Saving time	1
c33	Allowance for communing/socializing	7
c34	Suitability for the recommendation of songs to friends	5

Table 4.1 (Continued)

c35	Suitability for the discovery of new things	12
c36	Easing tasks	11
c37	Saving money	14
c38	Allowing the user to have fun/Making activities enjoyable	24
c39	Visual beauty	28
c40	Providing tactile pleasure	2
c41	Playful interaction (play/enjoyment)	5
c42	Intrigue to the user	4
c43	Establishing harmony with clothes	1
c44	Making the user feel unique	4
c45	Ability to communicate taste/group/status to others:	17
c46	Provision of emotional stability	8
	End-States	
e1	Happiness/joy/leisure	29
e2	Personal meaning	1
e3	Social recognition	20
e4	Self esteem	4
e5	Success/fulfillment of responsibilities	11
e6	Caring for/sharing with/helping others	4
e7	Connectedness	8
e8	Well being/health	13

Explanation of the Content Codes

Attributes

a1. General appearance: Used for the responses in which the user stated appearance as an important attribute for them, although not specifying which attributes (form, color, etc.) were of particular importance. Also used to describe the ratio of attributes, and the harmony between them.

a2. Form: Describes the shape and thickness of the device.

a3. Color/contrast: Describes the color, and the contrast and harmony between colors.

a4. Material: Describes the material used for the hardware.

a5. Weight: Describes the physical weight of the device.

a6. Size: Describes the overall size of the device.

a7. Texts: Describes the button or logo text.

a8. Button type: Describes the form and size of the buttons, and also the differentiation between the touch wheel and buttons.

a9. Button position: Describes the different locations of the buttons, such as on the surface or on the sides, and the closeness of the buttons to each other.

a10. Number of the buttons: Describes the number of control elements.

a11. Display size: Describes the size of the screen on which the content is displayed.

a12. Built-in speaker: Describes the presence or absence of a built-in speaker.

a13. USB connection type: Describes the way data is transferred onto the device: Whether via a direct USB connection or a USB cable.

a14. Light: Describes the brightness of the display.

a15. Hanging/attaching options: Describes any clips, straps or other components used to hang or attach the device to the user.

a16. Earphone dock position: Describes the position of the earphone dock on the device.

Consequences

c1. Compatibility with containers in which the device is carried while not in use: How well the device can be stored on the user while not in use, such as in a pocket or bag.

c2. Easy carriage: Describes the ease with which the device can be carried, and its appropriateness to the human anatomy.

c3. Compatibility with containers in which the device is carried while in use: How well the device can be carried by the user while in use, such as in a pocket or on sports equipment.

c4. Suitability for viewing of lyrics/album covers: Describes how easily lyrics and details of album covers can be viewed.

c5. Suitability for watching videos/looking at photos: Describes the ease with which videos, subtitles and photos can be viewed.

c6. Suitability for the checking of song information/time: Describes how easily the user can view song information and the time bar; allowing the user to view particular song information and manage the listening experience.

c7. Provision for ergonomic management: How the user holds and controls the device, and the ability to use the buttons in a comfortable way.

c8. Comfort/free movement in use: Describes the comfort of use of the device when not being held or carried, but placed elsewhere, such as on a surface.

c9. Ease of vision: Describes how easily the display text can be viewed, i.e. the size of text and the minimization of stress on the eyes, and suitability for quick viewing.

c10. Ease of access to content: Navigation is effortless, quick, efficient and not confusing.

c11. Ease of learning: Learning how to operate the device does not require too much mental effort or time.

c12. Easy file upload/charge: The process of uploading files or charging the device is effortless, quick, and thus time saving.

c13. Suitability for spontaneous charge: When the battery is low, the user can charge the device at any time, meaning the device is always available.

c14. Suitability for spontaneous computer connection: The device can be connected to any computer at any time.

c15. Size as a reminder: The device is large enough to ensure the user notices its absence when going out. Thus, the size becomes a reminder to take the device.

c16. Safe use: Use of the device does not result in injury.

c17. Informing the user about the experience: The user can see what is being played, how long it is, and what is coming next.

c18. Song/song part selection: The user is able to select the song they desire according to their mood, or play only a part of a selected song.

c19. Availability for song play as desired: The user always carries the device, whether they know if they will use it on a particular day or not, meaning the device is ready to use as and when required.

c20. Availability for spontaneous data transfer: Data transfer from other people's devices usually occurs spontaneously. This code describes how ready the device is for data transfer with all the necessary equipment.

c21. Decreasing carried weight: The device can act as a substitute for another device (e.g. USB storage device), meaning the user need only carry the digital audio player.

c22. Suitability for listening songs with other people: Songs can be listened to without connection to a speaker or earphone, making listening available to more than one person at a time.

c23. Control of the device in the pocket/Control of the device with one hand: The former means that, taking the form or button position as a reference point, the user can recognize the buttons and manage the device without removing it from their pocket. In the latter, the device is designed in such a way that button position or size allows the user to operate it using only one hand. These two consequences are grouped as a content code since they are both related with the ease of use within a use context, such as walking.

c24. Avoidance of inadvertent noise in operation: The device is not noisy in operation, and thus does not disturb other people. Also it does not allow accidental noise through the unintentional pushing of buttons.

c25. Looking/staying clean: The device remains clean over time.

c26. Durability against damage to the device or its equipment: The device does not break down or become damaged easily.

c27. Protection from loss/forgetting the device or its equipment: The user does not forget to retrieve the device after use, for example after connecting to a public computer, or does not lose the device.

c28. High functioning: The device has the appearance of being high quality and a high functioning product.

c29. Being appropriate to use context: The device can be used efficiently within its intended use context, such as while walking, exercising or doing housework. The relationship of the device with other objects is well formulated, and the device responds the user needs in that context.

c30. Substitution for another device: The device can be used as a substitute for another device, such as a USB storage device or external hard drive.

c31. Accessibility to photos of loved ones: The user can upload photos of their loved ones for viewing as and when required.

c32. Saving time: In operation, the device does not waste the time of the user.

c33. Allowance for communing/socializing: The user can have fun with friends (commune) or talk with them while taking music as a common point (socialize).

c34. Suitability for the recommendation of songs to friends: The user can play songs they like via the built-in speaker with the purpose of recommending them to their friends.

c35. Suitability for the discovery of new things: The user can learn something new, discover album covers and lyrics, and satisfy their curiosity.

c36. Easing tasks: The device can help the user to complete tasks, or allow them to do the task easily or in a better way.

c37. Saving money: Value for money, or the ability to recoup the amount paid for the device through use, and avoiding loss of the device.

c38. Allowing the user to have fun/Making activities enjoyable: Promoting the enjoyment of the user by turning typically boring activities into enjoyable ones.

c39. Visual beauty: The desire of the user to experience the beauty of the device in terms of appearance.

c40. Providing tactile pleasure: The user enjoys touching the device or is not irritated by touching it.

c41. Playful interaction: The user enjoys operating the device and interacting with the hardware.

c42. Intrigue to the user: The user has a desire to discover the product and engage with it.

c43. Establishing harmony with clothes: The device acts in harmony in terms of color with the user's clothes.

c44. Making the user feel unique: The desire of the user to have a device that is personal and specific to them.

c45. Ability to communicate taste/group/status to others: The desire of the user to express their identity via the device.

c46. Provision of emotional stability: The user does not necessarily have fun using the device, but avoids negative feelings, stays neutral, or feels relaxed.

End-States

e1. Happiness/joy/leisure: The ultimate goal of being happy and enjoying time.

e2. Personal meaning: Having strong ties with loved ones.

e3. Social recognition: Desire to be accepted and appreciated by other people

e4. Self esteem: Desire to feel good about one's self.

e5. Success/fulfillment of responsibilities: The ultimate goal of being successful and the desire to fulfill one's responsibilities.

e6. Caring for/Sharing with/Helping others: Ethical values about being good to other people, placing importance in them.

e7. Connectedness: Friendship, closeness.

e8. Well-being: The ultimate goal of being healthy in both mind and body.

4.3.2. Summary Matrix

Each respondent had ladders which showed their connections of attributes to consequences and consequences to end-states. After the content codes were defined, the individual ladders were rewritten with the content codes. So the sequences of the respondents' statements were demonstrated with the content codes.

For instance, two examples from the ladders of respondent 6 are below:

a4 - c40 - c46 - e8

a12 - c 22 - c29 - c38 - e1

In the first ladder the material (a3) leads to tactile pleasure (c40), which further leads to relaxation/emotional stability (c46). This consequence serves to the ultimate goal of well-being.

In the second ladder, the built-in speaker (a12) is appropriate for playing publicly (c22). So the device is appropriate to the use context (c29) which is an activity with friends in this case. So the user can have fun/make the activity enjoyable (c38) which serves to the ultimate aim of happiness/joy/leisure (e1).

The entire individual ladders are provided in Appendix D. As it can be seen from the individual ladders, they do not always end with an end-state; the consequence may be the end of the ladder. Some of the consequences does not linked to an end-state, ladders ends with a consequence

4.3.3. Implication Matrix

The next step of laddering analysis was creating the implication matrix which summarized all of the data (Figure 3.4). In the implication matrix, a table was

created which had the attributes and consequences on the left column and consequences and end-states on the top row. All of the content codes could be written to both sides, but since there were no linkages between the end-states, the left column was written only the attributes and consequences. Since there was no attribute that led to another attribute, the above included only the consequences and end-states.

Benefiting from the summary matrix, the total numbers of linkages between the content codes were written in the cells. In the cells, both the direct and the indirect linkages were written as "**number of direct linkages.number of indirect linkages**". Direct linkage indicates that the two items are directly linked while indirect linkage means that there is at least one consequence between the content codes. Consequently, in the intersection cell of a11 on the left side, and c18 on the top, in it written as "3.1". This means, display size (a11) led to playing part of the song/song selection (c18) 3 times directly and 1 time indirectly.

In the implication matrix, if the number of direct linkages was between 2 and 8, the cell was filled with yellow; the ones between 9 and 17 were filled with orange and the ones which were or above 18 were filled with red, to illustrate the important relations in the matrix.

The implication matrix shows a one way relation. The codes on the row headings lead to the codes on the coloumn headings. For instance, the data reflected that c1, led to c19. So, in the matrix, the cell that corresponds to c1 (compatibility with containers in which the device is carried while not in use) on the row heading, and c19 (availability for song play as desired) on the coloumn heading shows the number of linkages between these items. There is no reverse linkage; c19 does not lead to c1.

It is also important that while the implication matrix was created, if a respondent linked a content code to another one more than once, it was still counted as one linkage. For instance respondent 4 has four ladders which includes a direct linkage between a12 and c22 (see Appendix D), but while in the sum of the direct linkages between a12 and c22 this is counted as one. Similarly, respondent 4 has three indirect linkages between a12 and c29, but this was reflected as one to the sum. This is because the respondent's number of mention times of a linkage between the two items did not meant that those items are more important for the respondent. Counting a linkage as much as it was mentioned could lead to wrong results.

Table 4.2 Implication Matrix

	c1	c2	c3	c4	c5	c6	c7	c8	c9	c10	c11	c12	c13	c14	c15	c16	c17	c18	c19	c20	c21	c22	c23	c24	c25	c26	c27	c28	c29	c30	c31	c32	c33	c34	c35	c36	c37	c38	c39	c40	c41	c42	c43	c44	c45	c46	e1	e2	e3	e4	e5	e6	e7	e8
a1											1.0																	4.0													27.0			1.0		1.0	10.0		0.27		0.10	0.1				
a2	9.0		9.0				13.0									2.0			0.1				3.0			3.0	0.1	3.0	0.9							0.4	0.9	18.0			1.0		1.0	1.0	0.4	0.22		0.1	0.1				0.6
a3																									1.0			2.0											14.1				1.0	2.0	17.1		0.14		0.17	0.2				
a4																									2.0	4.0		1.0									0.4		3.0	2.0						0.3	0.4							0.2
a5		12.0					7.0												0.3	0.2									0.1						0.2	0.1		0.4							0.4				0.1			
a6	21.0		10.0				11.0								1.0				0.6	0.4							2.1	2.0	0.10						0.3	0.3	0.3	0.12	2.0							0.2	0.13				0.3	0.1		0.2
a7										2.0																													1.0			2.0					0.3							
a8			1.0				25.0			0.19	2.0							1.0					2.0		1.0	3.0		2.0	0.2								0.3	0.1	7.0		5.0	2.0				0.7	0.14							0.10
a9							3.0			1.2													1.0																1.0							0.1	0.2							0.1
a10										10.0	3.0							1.0										6.0			0.1					0.1		7.0							0.4	0.7				0.1	0.1		0.4
a11				6.0	7.0	3.0			6.0	5.0							0.2	3.1								1.0		2.0	0.2		0.1		0.1		0.5			0.12	0.1							0.2	0.14	0.1				0.1	0.2
a12								7.0													0.2	13.0		1.0				1.0	0.13	0.2			0.8	0.5		0.1		0.13	3.0								0.14		0.5		0.1	0.2	0.8	
a13		5.0										14.0	2.0	16.0					0.5	0.16	0.2						8.0		0.1	0.2					0.12	0.11	0.10	0.3							0.3	0.12				0.11	0.2		0.3
a14									1.0																				0.1																0.1							0.1
a15		1.0																					1.0						0.1								0.1						1.0		0.1		0.1				
a16			1.0																							1.0											1.0							1.0							1.0
c1																			5.0	3.0							1.0								0.2	0.2	0.1	0.5							0.1	0.5				0.2			0.1
c2																			3.0	2.0															0.2	0.1		0.4								0.4				0.1			
c3																										1.0			10.0								0.1	0.10								0.1	0.10							0.1
c4																																			5.0			4.0									0.6						
c5																															1.0		1.0					6.0								0.6	0.1				0.1	
c6																	2.0	1.0																	1.0			0.1									0.2						
c7										20.0																																				5.6							0.7
c8																													2.0								0.2									0.2							
c9																													2.0								0.1									0.1	0.1							0.1
c10																																														8.0							0.8
c11																																														3.0							0.3
c12																																														1.0							0.1
c13																			2.0																0.2												0.2							
c14																				16.0	0.2								1.0	0.2					0.12	0.10	0.2	0.1									0.12				0.10	0.2		
c15																			1.0	1.0															0.1	0.1		0.1									0.1				0.1	0.1		
c16																																																						2.0
c17																																																						
c18																															1.0					0.1		5.0									0.5				0.1	0.1		
c19																																						7.0									0.7							
c20												0.2																		2.0					12.0	10.0	0.2	1.0									0.12				0.10	3.0		
c21																																																					
c22												0.2																	12.0	0.2			0.8	4.1		0.1		0.12									0.12		0.5		0.1	0.1	0.8	
c23																													3.0								0.3									2.3							
c24																																																			1.0		
c25																																							1.0									0.1						
c26																																				8.0		1.0								6.0	0.1						0.6
c27																																				10.0									4.0							0.4
c28																																																					
c29												0.2																		2.0			8.0	1.0		1.0		22.0								1.0	0.22		0.1		0.1	0.1	0.8	0.1
c30												4.0																								2.0																	
c31																																																1.0						
c32																																			1.0														0.1	0.1		
c33																																																			8.0			8.0	
c34																																																				5.0			
c35																																																				13.0			
c36																																																				11.0	1.0		
c37																																																						
c38																																																				23.0			
c39																																																				28.0			
c40																																																				1.0	1.0					0.1
c41																																																				5.0			
c42																																																					4.0			
c43																																																					1.0		0.1			
c44																																																						4.0		
c45																																																							19.0		
c46																																																									15.0

Number of direct linkages is between 2-8

Number of direct linkages is between 9-17

Number of direct linkages is 18 or above

4.3.4. Value Maps

From the implication matrix, two hierarchical value maps were created (Figure 4.2, Figure 4.3), which are the main findings of this study. Hierarchical value maps demonstrate all of the attributes mentioned by the respondents at the bottom. In the middle, there are consequences led by the attributes, and at the top end-states are displayed. The mentioned attributes were grouped into two as the general design attributes which all products have (Figure 4.2), and other attributes which are product specific (Figure 4.3).

To be able to represent the relevant linkages in the value maps, a cut off level was defined as 2. So, the direct relations which were at least 2 or more in the implication matrix were taken into account while creating the maps. Value map building process is exemplified below.

In the implication matrix, a4, the material, has 5 different relations. However, 4 of it were demonstrated in the value map, since one of them is 1, which means that relation was mentioned only once. The relation of a4 with c25 (look/stay clean), c26 (protect user from damaging the device/equipment), c39 (visual beauty), and c40 (tactile pleasure) were put on the map. Moving to c25, since there is no relation at least 2 times, the ladder ends with that consequence. c26 has linkages with c37 (protect user from losing money/save money), c39 (visual beauty) and c46 (relaxation/emotional stability), but the number of linkage with c39 is 1, so c37 and c46 were illustrated in the map. c37 has no linkages, so the ladder ends. c46 is linked to e8 (well-being), where the ladder ends again.

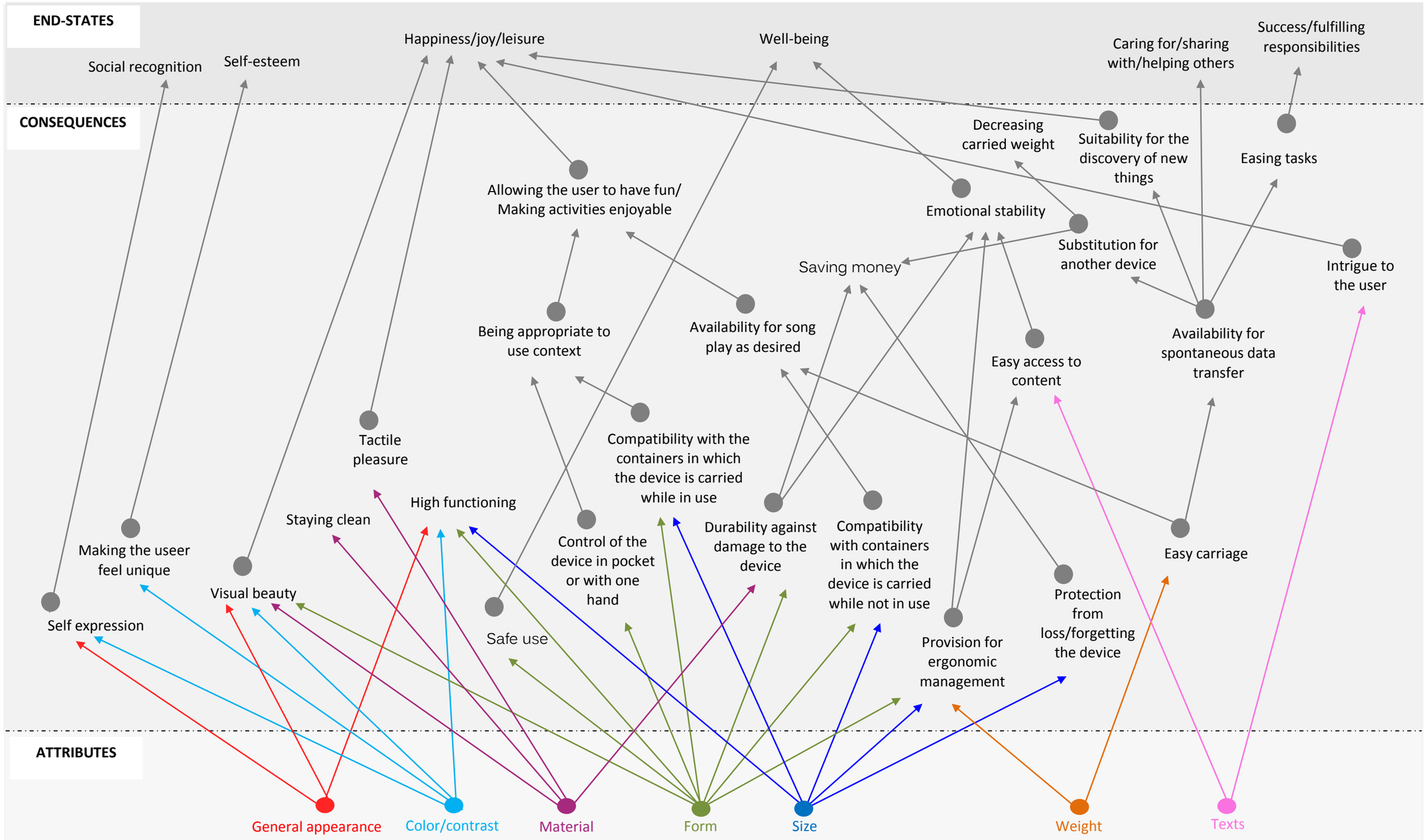

Figure 4.5 Value Map for the General Design Attributes

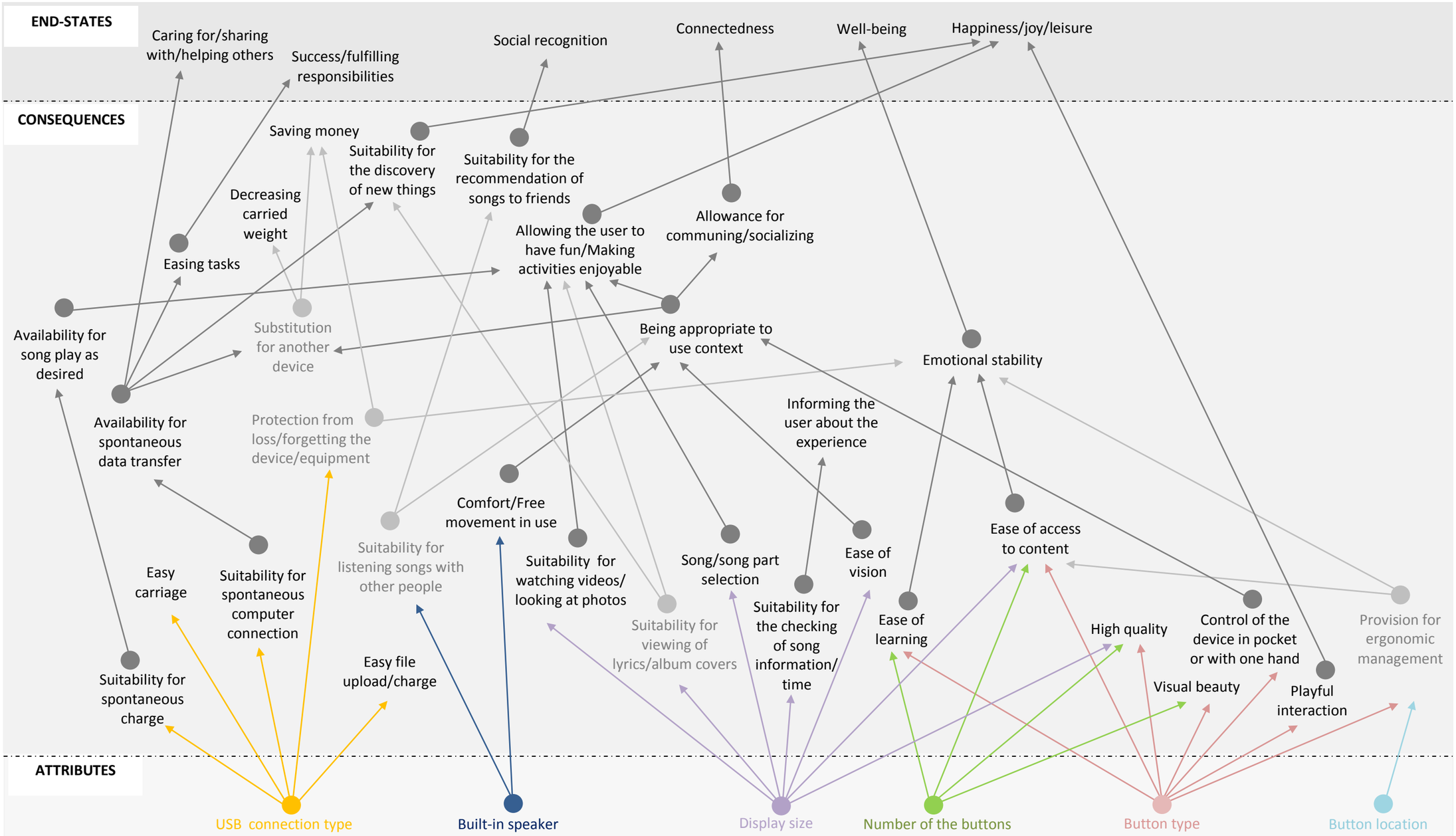

Figure 4.6 Value Map for the Product Specific Design Attributes

4.4. RESULTS

The consequences and end-states, which together have been called as value types within this study, occurred to be consistent with the re-categorization made in Chapter 3, benefiting from the literature. Within the re-categorization, value types were divided into two as pragmatic and hedonic, and the hedonic value types were examined under two categories as experiential and symbolic (see Figure 3.1). Below, first content codes which included *consequences* were grouped according to these value types. Then content codes which defined *end-states* were grouped in the same manner. While consequences included all three types of value as pragmatic, experiential and symbolic, end-states did not include pragmatic value type.

4.4.1. Pragmatic Consequences

Within the re-categorization of value types made for this study, pragmatic value types included three subgroups as convenience, excellence and economic benefits. 34 out of 46 consequences were pragmatic. In the case study, While 31 of them were about convenience, 2 of them were about excellence, and 1 was about economy. The pragmatic consequences are listed and examined below according to these the subgroups which are convenience, excellence and economy.

4.4.1.1. Types of Pragmatic Consequences

Convenience, excellence and economic benefits were identified as pragmatic consequence types.

a. Convenience

The consequences that provide convenience were identified as follows:

c1. Compatibility with containers in which the device is carried while not in use

c2. Easy carriage

c3. Compatibility with containers in which the device is carried while in use

c4. Suitability for viewing of lyrics/album covers

c5. Suitability for watching videos/looking at photos

c6. Suitability for the checking of song information/time

c7. Provision for ergonomic management

c8. Comfort/free movement in use

c9. Ease of vision

c10. Easy access to content

c11. Ease of learning

c12. Easy file upload/charge

c13. Suitability for spontaneous charge

c14. Suitability for spontaneous computer connection

c15. Size as a reminder

c16. Safe use

c17. Informing the user about the experience

c18. Song/song part selection

c19. Availability for song play as desired

c20. Availability for spontaneous data transfer

c21. Decreasing the carried weight

c22. Suitability for listening songs with other people

c23. Control of the device in the pocket/Control of the device with one hand

c24. Prevent making noise

c25. Avoidance of inadvertent noise in operation

c26. Durability against damage to the device or its equipment

c27. Protection from loss/forgetting the device or its equipment

c29. Being appropriate to the use context

c30. Substitution for another device

c31. Accessibility to photos of loved ones

c32. Saving time

c36. Easing tasks

b. Excellence

The only consequence that provided excellence was identified as follows:

c28. High functioning

c. Economy

The only consequence that provided economic benefits was identified as follows:

c37. Saving money

4.4.1.2. Comparison of Pragmatic Consequences Identified from the Data with the Pragmatic Value Types in the Literature Review

Pragmatic consequences identified from the case study supported the pragmatic value types in the re-categorization made based on the literature review; the identified pragmatic consequences were related with convenience, excellence or economic benefits.

Convenience is a vague term which can carry different meanings. In Chapter 3 it is mentioned that Boztepe (2007) stated convenience included appropriateness, compatibility, time management, accessibility, and avoiding from unpleasantness. As it can be seen from the content codes, this study has similar examples to Boztepe's. Convenience in this study included suitability (appropriateness) such as being suitable for watching videos or selecting songs, or for being appropriate for using the device in the intended use context. Convenience, also included compatibility, like fitting to the containers in which the device was put while using

or keeping the device. Saving/managing time was also counted as convenience in the analysis. In the study there were examples to accessibility, but the word "availability" was preferred instead of accessibility since it was better in defining the content codes of this study. Lastly, similar to "avoiding unpleasantness" that was found in the literature; preventing making noise was found from the data.

"Ease" and "comfort", which were not stated in the literature review as subgroups of convenience can be added to these general convenience categories. Also, C17 and playing part of the song can together constitute another category of convenience as "control". and durability

High quality as a type of excellence and economic benefits were both found in the literature review and from the interviews.

4.4.1.3. Design and Pragmatic Consequences

For examining the relation of design with the pragmatic consequences, the consequences that had indirect relations with the attributes were excluded, and the ones which had direct relations remained. Then, since convenience related consequences were much in number, they were further grouped regarding the similarities between them. The similarities were not identified according to the types of convenience such as appropriateness, compatibility, ease, etc.; rather the ones that served to a similar aim were grouped together. For instance, "charge everywhere" and "always able to connect the device to computer" were put in the same group as "keeping the device and its equipment available". By this grouping, the 22 consequences which were directly linked to attributes were summarized into 8 groups.

Below, in the paragraphs from a to I, the text examines the relation of design and the 8 groups of convenience. The other two paragraphs examine excellence and economic benefits respectively.

a. Properly functioning

The designed attributes can make the technical functions appropriate for the user. In this case, *suitability for watching video*, *viewing photos*, *album covers and lyrics*, and *suitability for listening with other people*, *were* mentioned by the respondents related with properly functioning. One of the respondents told that:

> *The ability to display videos is not the most important thing I look while buying an mp3 player, but no one says "no" to extra attributes like this, I think. Both of these (iPod and Sony NVZ series) can play videos, but I would not use iPod for watching videos, because the screen is not big enough. I could not read the subtitles of a film, for instance. So I would pick Sony; it has a huge screen.*

Though playing videos is a technical attribute, the size of the screen it is displayed should not be disregarded for creating value for the user. So, the design of the hardware of the device can make the technical functions usable, and contribute to value creation. Like watching videos, looking at photos, album covers and lyrics is related with the display size.

Another respondent told about the built-in speaker attribute:

> *I can connect the device to a speaker or a computer to listen to music with friends, but this built-in speaker is much more convenient. I do not have to deal with those extra machines or cables.*

So, built-in speaker can make the functions appropriate by simplifying the tasks that user does for achieving his/her goals of using the device. Direct USB connection, also simplifies the data transfer process for the user.

b. Ease of use

Design can make using the product easier, as it provides ease of access to the content in this case. Searching and navigating can be easier by changing the button type, or making the buttons appropriate to fingers. So the user can access quickly and effortlessly to the content without confusing. Also, the product should be easy to learn. Some of the respondents told that devices with a lot of buttons demanded time to learn, which they did not want to waste.

c. Extensive control over content to organize the experience

In this case, *selecting songs in a desirable way* and *playing parts of the songs* were desired by the users to have more fun from the experience. The *display size* was told as an attribute easing song selection. It was also thought to be important for playing part of the song, since when it was big the users could see timing of the song.

d. Use context considerations

The design of the attributes in terms of providing comfort/ free movement for doing housework, being compatible with containers like pocket or sports equipment while using the device were important. Also, controlling in pocket was important for the users who used the device while walking, and effortless carriage was stated as important by the ones who used the device while doing sports. Lastly, users did not want inadvertent noise, since they used the device in dormitory room or in public places.

e. Human factors in use

Design can make the device appropriate for human anatomy. In this case, among the general design attributes, *size, form* and *weight* were mentioned as the attributes providing *ergonomic management*. *Compatibility with containers* which is provided by size and form is also related with human factors, when the

container is the pocket. *Weight* is mentioned as a factor providing *comfortable carriage, when the user uses the device while walking.*

From the product specific design attributes, *display size* is important for *ease of sight*. *Built-in speaker* can contribute to *comfort* or provide *free movement* by eliminating the use of earphones which were thought as uncomfortable, especially when the device was used for a long time.

f. Maintenance

Three of the consequences were related with maintenance of the device. *Material* was thought to provide *maintaining the device clean*, and *protect user from damaging the device*. *Form* was also mentioned that rounded or though corners were better since they would not break easily, and prevent *damaging the device*. Size was thought by some of the respondents as a factor related with maintenance; they mentioned that small sizes could easily be lost. *Direct USB connection* was mentioned as leading the user to *forget the device connected to a computer,* or *lose its parts*. It was also mentioned that the USB dock easily broke, so they would *damage the device* with that property.

g. Keeping the device/functions available

Since it is needed to connect the device to a computer for data upload, *direct USB connection* was preferred by some respondents. One of them stated that:

> *You do not plan that you will exchange song today, it is a spontaneous thing. So you do not take the USB cable with you all the time. Thus, by direct USB connection you are always able to upload songs from friends, or share them your own songs.*

So direct USB connection can allow user connect the device to a computer whenever s/he wants. It also allows *spontaneous charge*; the user could connect the device to a USB dock available, and charge the battery.

Easy carriage is also important for keeping the device available. *Form* and *size* provides *compatibility with the containers the device is kept in*. Weight was thought to be important for comfortable carriage. One of the respondents told that:

> *I have so many items in my bag, and it is already heavy all the time. So any small item I put is important.*

The device can *remind itself* by its *size*. Since only 1 respondent mentioned this relation, it was not represented in the value maps. Since he feels it in his pocket when he carries the device due to its big size, he realizes when it is absent, and remembers to take the device with him.

h. Preparing to use

Design can contribute to the preparation of the device to usage. In this case, the preparation was provided by *easy upload/charge which was led by* direct *USB connection*. It eliminated the need for the cable, and the user was able to connect it to the computer more quickly and effortlessly.

i. Safe use

The respondents mentioned that rounded sides and corners were safer, otherwise they could injure themselves or hurt. So, *form* can lead to *safe use*.

j. Excellence of the device

For some respondents, the device gave the impression of a *high-quality* item regarding *general appearance, form, color/contrast* and *size.* The elegant look of the product made some of the users think that it was more technological. The rounded sides and slim forms were preferred with the expectation of high quality. While one respondent preferred small sizes, another told that she expected more quality or functions from bigger sized products. From the product specific design

attributes, display size and number of buttons were mentioned for the expectations of high quality. The devices with bigger display size and more number of buttons were preferred.

4.4.2. Experiential Consequences

8 out of 46 consequences were experiential. The experiential consequences were examined below under subcategories of aesthetic pleasure, epistemic benefits, fun/enjoyment, relational benefits, and emotional stability.

4.4.2.1. Types of Experiential Consequences

Aesthetic pleasure, epistemic benefits, fun/enjoyment, relational benefits and emotional stability were the identified types of experiential benefits.

a. Aesthetic Pleasure

Two items provided aesthetic pleasure which were stated below:

c39. Visual beauty

c40. Providing tactile pleasure

b. Epistemic Benefits

Two consequences were about epistemic benefits which were as follows:

c35. Suitability for the discovery of new things

c42. Intrigue to the user

c. Fun/Enjoyment

The consequences that were related with fun/enjoyment were as follows:

c38. Allowing the user to have fun/Making activities enjoyable

c41. Playful interaction

d. Relational Benefits

The only consequence that was related with relational benefits was the following:

c33. Allowance for communing/socializing

e. Emotional Stability

Data collected from the interviews reflected that, users avoid from unpleasant emotions, and want to stay in a neutral mode or keep their current mood. This is called in this research as "**emotional stability**", and coded as **c46**. Emotional stability as a consequence did not fit any of the subgroups of experiential value that were identified in the literature review. Thus, it is taken as another subgroup of experiential value.

4.4.2.2. Comparison of Experiential Consequences Identified from the Data with the Experiential Value Types in the Literature Review

In the literature review, four types of experiential consequences were stated, which were supported by the data: aesthetic pleasure, fun/enjoyment, relational benefits and epistemic benefits. However, the data showed that, one category should be added to these subgroups, which is **emotional stability**.

As it is briefly explained above, emotional stability is related with keeping the current mood or staying neutral. The user avoids from getting angry or being frustrated. The respondents mentioned that when they had difficulties ergonomically or in operation of the device, these negative emotions might occur. It is also identified that loss of the device may result in negative emotions. Users also want to relax and reduce stress. In this case, listening songs before sleeping was mentioned as a relaxing activity.

4.4.2.3. Design and Experiential Consequences

The experiential consequences that were directly linked to design attributes were related with aesthetic pleasure, epistemic benefits or fun/enjoyment. The relations are examined below.

a. Aesthetic pleasure

Visual and tactile aesthetics were mentioned by the respondents as consequences. Some of the respondents did not identify specific attributes, but mentioned that *general appearance* provided *visual beauty*. The ratio of the attributes to each other was also stated as important by some of them, and they did not like the spare areas on the device. Respondents did not like the devices when they look like a mobile phone, a flash disk, a clock, or a radio; they either wanted to be able to categorize the device as a "digital audio player", but not anything else, and some of them sought for novelty. However, when they found the device similar to a daily object rather than technological, like a sugar box or rouge, they thought that devices were unique, and liked the appearance.

Some of the respondents specified the attributes that contributed to visual beauty as *form, color/contrast*, and *material.* Generally slim forms were preferred. Both tough lines and rounded lines were mentioned as leading to beauty. Color preference changed according to personal tastes, but some of the respondents also told that the color should be appropriate for a technologic device, and should not be orange for instance.

Number of the buttons also affected visual beauty; respondents preferred the ones with less buttons. Some stated that lots of elements led to a complicated appearance.

Tactile pleasure was provided by the *material*; some of the respondents told that certain materials like aluminum were pleasing them in terms of touching.

b. Epistemic benefits

The products' ability to arise curiosity is an epistemic benefit. In the case, the direct consequence "i*ntriguing*" was provided by keeping the *texts* less, and also by the *button type*. The novel forms of the buttons and touch button was stated to be intriguing.

c. Fun/enjoyment

The attributes that directly provided fun/enjoyment was those providing *playful interaction*. Button type led to playful interaction. Touch button was thought to be similar to playing a game. Also, buttons that were embedded in the screen provided playfulness.

4.4.3. Symbolic Consequences

4 out of 46 of the consequences were symbolic consequences.

4.4.3.1. Types of Symbolic Consequences

Symbolic consequences were related with self worth and personal meaning, which are stated below.

a. Self worth

The consequences that were related with self worth were identified as follows:

c34. Suitability for the recommendation of songs to friends
c43. Establishing harmony with clothes
c44. Making the user feel unique
c45. Ability to communicate taste/group/status to others

b. Personal Meaning

The only consequence that was related with personal meaning was the following:

c31. Accessibility to photos of loved ones

4.4.3.2. Comparison of Symbolic Consequences Identified from the Data with the Experiential Value Types in the Literature Review

The identified types, self worth and personal meaning, were also stated in the literature. The data did not support the type “conditional meaning” which was examined in the literature review. This was as expected, since the conditional meaning is related with the important events such as new year celebrations or seasonal products.

4.4.3.3. Design and Symbolic Consequences

General appearance was thought to be important; since it communicated taste to others. **Color/contrast** was mentioned especially by male respondents as a reason for anti-consumption. They told that they would not buy feminine colors like pink (sometimes also red). Aesthetic compatibility was thought to be important by one of the respondents. She stated that she wanted the device to be aesthetically compatible with her clothes, to communicate taste and image.

Personal meaning was about looking at photos, and thus the display size. Also, though it is not a design attribute, it should be noted that one of the respondents told since they used Sony Walkman when they were young, she would pick Sony Walkman again. She stated it would evoke memories of the past.

4.4.4. Indirect Consequences and End-states

The indirect consequences and end-states that were provided by direct consequences were examined below. The identified end-states were belonged to either experiential or symbolic value types.

4.4.4.1. Indirect Consequences

Among the stated consequences, the ones that were indirectly related with the attributes were as follows:

Being appropriate to use context
Substitution for another device
Accessibility to photos of loved ones
Saving time
Allowance for communing/socializing
Suitability for the recommendation of songs to friends
Suitability for the discovery of new things
Easing tasks
Saving money
Allowing the user to have fun/Making activities enjoyable

4.4.4.2. Indirect Consequences, End-States and Design

a. Being appropriate to use context

This could be provided by comfort/free movement which was led by built in speaker. The users who wanted to play music while cooking in the kitchen or doing housework stated that, they would not use a digital audio player with the earphone cables in these use contexts. Built-in speaker provided the movement capability by eliminating the need for earphones.

Not making noise which was related with built-in speaker was also important for the respondents who thought to use the device in the dormitory or in public places.

Compatibility with the containers the device is put in while using the device, which was provided by form and size, was also made the device appropriate for the use context. Moreover, the location of the buttons, for controlling in pocket or with one hand, and size and form which led comfortable carriage was also important for the ones who used the device while walking.

Easy sight that was led by display size was important for using the device while driving.

b. Substitution for another device, economy and decreasing the carried weight

Keeping the device always available and using it for data transfer whenever wanted eliminates the need for a flash disk for some of the users. Thus direct USB connection was valuable since it provided connection to computer always accessible, and the user could transfer data. So, the users did not buy a flash disk, and save money.

For some respondents, built in speaker was appropriate for playing in the social environments. Since otherwise, they used laptops, which were harder to carry, the digital audio player substituted laptops, and decreased the weight carried.

c. Having access to personally important items

One of the respondents thought that she would use the device for looking at photos. Thus, she thought that the display size provided appropriateness for looking at photos. So, she had always access to the photos of her family, look at them whenever she missed them, and remembered the memories.

d. Time management

One of the respondents who used the device for teaching musing stated that playing part of the song, instead of listening the whole song, was important for her for saving time in the practices. Thus, shortcut buttons and display size which led to playing a part of the song was thought to be important.

e. Communing/socializing

Built in speaker provided playing music aloud, which made the device appropriate for using in social environments. So they can talk about music (socialize), and have fun together (commune).

f. Self expression

Other than the device attributes that were directly linked to self expression, **advising songs** was an indirect consequence which was thought also as a way of self expression. **Built in speaker** was valued for advising songs to friends.

g. Discovery

By **direct USB connection**, users could **transfer data whenever they wanted**. This data transfer could be songs, videos, photos, computer programs and games by which users satify their epistemic needs and discover new things.

h. Easing tasks

By the **direct USB connection** that led spontaneous data transfer, users thought that they could transfer files that are related with their school works or job. By this way the device eased their tasks and helped them.

Also, **built-in speaker** was important for the respondent who used the device for teaching music; she could play the device aloud and teach to students. So the device helped the user in her tasks and responsibilities.

j. Having fun/Making activities enjoyable

Since the device is an entertainment product, keeping it always available for using led to having fun or making activities enjoyable. **Keeping the device and its functions always available** was a consequence led by form, size, weight, and direct USB connection.

Also, **making the product appropriate for different use contexts** was also important; the user expected the product to be appropriate for the activities' contexts because of built-in speaker (for listening in social environments), display size (for using while driving), button type (for using while walking), form and size (for fitting to containers in the context). By using the device in intended places, users have fun and make the activities enjoyable.

4.4.4.3. Experiential end-states

The experiential end-states identified are:

e.1 Happiness/joy/leisure
e7. Connectedness/friendship
e8. Well-being

Happiness/joy/leisure is related with the fun/enjoyment value type. Connectedness/friendship belongs to relational benefits, and lastly well-being is thought to be related with an experiential value type that is called as emotional stability.

4.4.4.4. Symbolic end-states

The symbolic end-states identified are:

e2. Personal meaning

e3. Social recognition

e4. Self-esteem

e5. Success/fulfill responsibilities

e6. Caring for/Sharing with/Helping others

Remembering and feeling personal ties is related with the symbolic value type “personal meaning”. All other symbolic end-states belong to “self worth”.

4.4.5. The Salient Relations between Attributes, Consequences and End-States

The value maps provided in Figure 4.5 and Figure 4.6 shows the relation between attributes, consequences and end-states of all data, based on the implication matrix.

In the implication matrix, the cells filled with red indicate the biggest number of relations. Thus, it can be inferred from the matrix that, the most mentioned attribute-consequence relations (regarding the direct relations) were between general appearance and visual beauty (27 direct relations), overall size of the device and compatibility with the containers for keeping the device (21 direct relations), and button type and comfortable hold and deal with the device (25 direct relations). The number of relations between form and visual beauty (18 direct relations), and color/contrast and self expression (17 direct relations) followed them.

Visual beauty is strongly related with the ultimate goal of happiness/joy/leisure (28 direct relations), while compatibility with containers for keeping the device is the end of the ladder for most of the respondents who mentioned about this relation. Comfortable hold and deal with the device is strongly related with easy access to content (20 direct relations), which is the end of the ladders of most of the respondents who found this relation important. For a less number of

respondents, easy access is related with emotional stability (8 direct relations), since otherwise they would be frustrated with their interaction with the device. All of the emotional stability responses are linked with the well-being end-state.

Consequently, for this case study which researches digital audio players as the product group, general appearance, button type, size and form were identified as the most important reasons of choice. The desired consequences that were provided or expected to be provided at pre-purchase by these attributes were about aesthetics, ergonomics, comfortable carriage, easy access to content, emotional stability, and self expression. So, the consequences belonged to convenience, aesthetic, emotional stability, and self worth categories. These consequences served to the ultimate goals of happiness, social recognition, and well-being.

CHAPTER 5

CONCLUSIONS

5.1. OVERVIEW OF THE STUDY

Following the Introduction, **Chapter 2** started with the examination of the objective and subjective value theories, the former suggesting that value resides in the object, while the latter suggesting it is evaluated by the users. Recent studies, on the other hand, adopts an intermediate position between two views; value is thought to be in the object as a potential, it becomes real when but the user realizes and appreciates it. Following this view, it may be suggested that designer can manipulate the product and create the potential value.

Chapter 2 has also discussed the different value definitions, regarding *three different perspectives*: Benefits and sacrifices, value chain and axiology. Having discussed the positive and problematic sides of the three perspectives in detail, this study has adopted the following: Value is the perceived evaluation of and preference for product attributes, attribute performances and consequences arising from using or possessing the product, that facilitate (or block) achieving user's goals in use situations or desired end-states.

Then, users' value assignment to products has been elaborated in this chapter. The literature review has suggested that the important elements of value assessment are as follows:

- *Consumer value hierarchy:* The hierarchy suggests that users assign value regarding the product attributes, the consequences these attributes lead to, and following end-states which are the personal values or the ultimate goals of the users.
- *Desires and expectations*: Former being what the user prefers for each level of the consumer value hierarchy, and latter being beliefs and predictions about a particular product's ability to satisfy the levels of the hierarchy, they both affect the value assignment process.

In this study, the value hierarchy which shows the linkages between desired attributes, desired consequences and desired end-states are called as desired value hierarchy, while the hierarchy that is formed for a certain product, and that includes the linkages between product attributes, expected consequences and expected end-states are called as expected value hierarchy. At pre-purchase value is assigned regarding the match between desired value hierarchy and expected value hierarchy. At post purchase, value is assigned regarding what is expected, what is desired and what is received.

Having analyzed the descriptions and perspectives related to value and value assignment, **Chapter 3** has elaborated the "*value types" (which means the possible types of consequences and end-states) and their relation with design*. After briefly describing different approaches to the value types (Hartman, Mattson, Sheth et al., Sweeny and Soutar, Wang et al., Holbrook, Boztepe, Smith and Colgate), this study has attempted to make a new categorization regarding all these studies. Value types are first grouped into two as pragmatic value and hedonic value. Pragmatic value has subcategories of convenience, excellence and economic benefits. Hedonic value is divided into two categories as experiential value and symbolic value. The former includes aesthetic pleasure, fun/enjoyment, epistemic benefits,

and relational benefits. The latter includes self worth, personal meaning and conditional meaning.

Then, to understand the linkage between these value types and design, Chapter 3 has reviewed the design literature in relation to pragmatic value, hedonic value and experiential value.

Chapter 4 has included a study on pre-purchase value assignment to portable digital audio players. This thesis has aimed at analyzing the value assignment with a design focus, and constituting a resource for the field of design. Considering this aim, the pre-purchase value assignment process is chosen to be investigated. The research technique adopted was the *laddering technique*. Based on Means-End Theory, laddering technique is developed for eliciting the attribute-consequence-end state linkages.

Regarding the symbolic value type, a product that users could use while they are with other people would be appropriate for the field study. Since they are portable, widely used, seen by other people, *portable digital audio players* were found appropriate for this study. The products samples were selected regarding the different designed attributes such as size, form, buttons, display size, and direct USB connection.

The case study has been concerned with the top part of the pre-purchase value assignment process; the expected value hierarchy. After laddering interviews, the digital audio players have been examined in terms of designed attributes, the following consequences and end-states that were expected by the respondents.

5.2. CONCLUSIONS

This study has aimed at exploring the role of design in value assignment. It has suggested that, identification of the outcomes that users desire, and the leasing attributes will lead to better product design, and thus focusing value can increase user satisfaction. With this aim, the main research question has been defined as below:

- How do design attributes contribute to users' value assignment?

The main question is answered by searching for answers for the sub-questions through literature review. The sub-questions and findings are discussed below.

- **Which outcomes do users value? Can they be categorized?**
- **Which designed attributes are expected to provide these outcomes?**

Outcomes that the designed attributes provides were first investigated in the literature. There are different approaches and categorizations for these outcome types. Based on all the reviewed literature, a new categorization was made, that was intended to be a comprehensive grouping. The possible outcomes, which correspond to consequences or end-states in the value hierarchy, were named as "Value Types" (figure 5.1.)

In the new categorization, there are two main types of outcomes, **pragmatic** and **hedonic**.

Pragmatic outcomes are related with the practical and more concrete benefits of the product. The instrumentality of the products in doing tasks, and its degree of ability in this instrumentality provide pragmatic outcomes. Being instrumental and efficient is called as **convenience**, which can include various subgroups, such as

appropriateness, compatibility, accessibility, and avoiding unpleasantness, as Boztepe (2007) identifies. The ability of the products in being convenient is called **excellence**. It includes appreciation of the device in terms of this ability. Thus, the perception of quality is mainly what excellence constitutes.

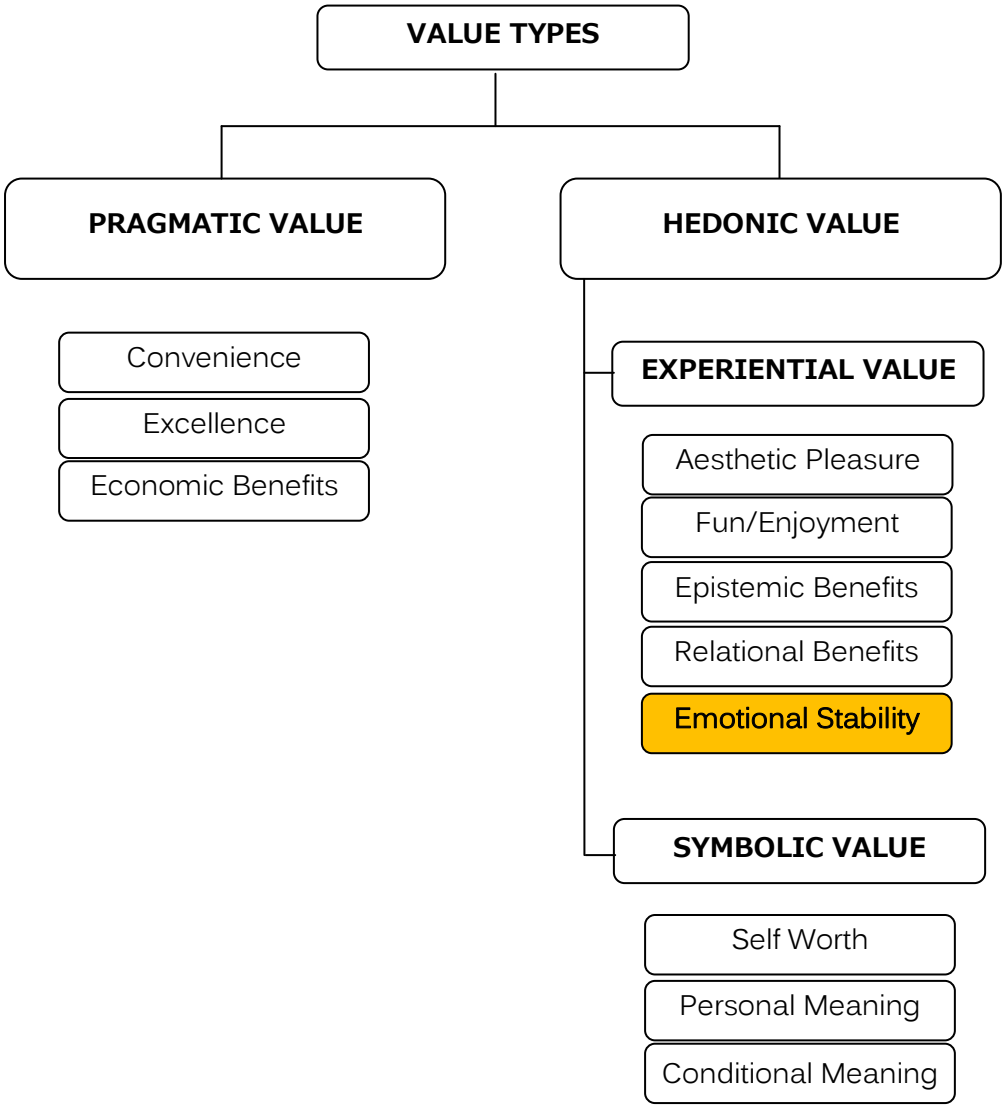

Figure 5.1 Final Categorization of Value Types

Other than instrumentality, the **economic benefits** provided are also practical and concrete; so they are included in the pragmatic value type. Literature suggests that economic benefits can be related with the *price* as well as with *long time usage*.

The findings of the case study also supported the identified types of pragmatic value. Most of the consequences were related with the convenience, while the other two types, economy and excellence, were also mentioned. Convenience could be provided by **form, size, material, weight** and **texts**, in terms of general design attributes. When the product-specific design attributes are reviewed, all of them (**built-in speaker, number of buttons, button location, button type, and USB connection type**) can be seen as providing convenience related consequences.

The price was excluded in the case study, and the samples were told to be at similar prices. Thus, the value of the perception of price and its relation with design was not examined. However, economic benefits were still mentioned by some respondents. Design attributes could make the device **substitute another device**, and the users did not have to spend money for the substituted device. Also, by **protecting user from damaging or losing the device**, the design attributes could make the users save their money.

Hedonic outcomes are related with more abstract benefits and the affective states of the users. They are categorized into two as experiential and symbolic outcomes. **Experiential outcomes** are related with the positive emotions such as fun and pleasure. **Symbolic outcomes** are related with the products' associated meanings, independent from what products actually do in terms of functions or experiences. While pragmatic value and experiential value are almost totally dependent on the product, symbolic outcomes need other people and culture, as well as products, since products gain different meanings by the contributions of media, advertising

and ideology that affect the culture, and when these meanings are accepted and shared by other people.

Based on the literature review, experiential outcomes are categorized into four as aesthetic pleasure, fun/enjoyment, relational benefits and epistemic benefits. **Aesthetic pleasure** depends on our senses; it may be related with the appearance, tactile pleasure, or the sound. **Fun/enjoyment** is related with the exciting, funny, enjoyable, experiences the product delivers. **Relational benefits** are related with our social relations; the products can be used to build social relations or develop the bonds. Lastly, **epistemic benefits** means the product can arise curiosity or satisfy the desire for knowledge.

All of these four experiential value types were identified in the case study. However, the case study revealed that, one more experiential value type, as emotional stability, can be added to the categorization. **Emotional stability** is product's ability to keep the user in a neutral or positive mood, and protect them from negative emotions such as anger or frustration.

In the case study, **color/contrast, general appearance, form** and **material** were identified as affecting the aesthetic pleasure. Also, when **number of the buttons** increased, the aesthetic pleasure decreased for some of the respondents. Fun/enjoyment was the main goal of using a digital audio player, so as expected; having fun and being happy were mentioned by a significant number of the respondents. It is inferred from the study that playful interaction can make the user enjoy the experience. Playfulness was provided by the button type, in the case. Moreover, for the entertainment products such as the digital audio player, it can be stated that making the products appropriate for different use contexts can increase fun. **Form, size, weight, built-in speaker, button type,** and **display size** affected the appropriateness to use context in the case. When there were less

texts and less number of **buttons**, the products arose curiosity, and thus had epistemic value. Also, **USB connection type**, by providing data transfer, could create epistemic value. Lastly, in the case, **built-in speaker** was thought to be important for socializing with friends and having fun with them. By this attribute, digital audio players can bring relational value.

From the literature review, it is inferred that **symbolic value** can be related with **self worth, personal meaning** or **conditional meaning**. Self worth is related with feeling good about the self. Products can make the user feel special or beautiful, and increase self esteem. Since products have associated meanings by the society, people can communicate their status, tastes, and identities with other people, and gain social recognition. Being appreciated by the social environment increases the self worth. Satisfying ethical values, such as taking care for the environment, can also make the user feel better about himself/herself. Personal meaning is related with, not the society's, but the users' special associations for a product. Though, gifts especially have personal meaning, products can create value by reminding memories, events and people. Lastly, conditional meaning is about seasonal or cultural events, like Christmas trees' being important for a couple of weeks.

In the case self worth and personal meaning related consequences were identified, though only one of them was personal meaning. It is as expected that no results was found about design's contribution to conditional meaning, since digital audio player is not a seasonal product. **General appearance** and **color/contrast** was stated as expressing the self and thus important for **self worth**. **Built-in speaker** could be useful for advising songs to friends which is another way of self expression. **Display size** by being appropriate for displaying photos of the family members could lead to **personal meaning**.

The attributes, the direct and indirect consequences, and the end-states the attributes lead to, which can be viewed in detail in the ladder maps in Figure 4.2 and Figure 4.3, is also summarized in Table 5.1 and Table 5.2 below.

Table 5.1. is prepared according to the direct consequences design attributes led to. These direct consequences may be regarded as design goals, and one can explore what the design goals can further provide for the user in terms of value looking at this table.

The ordering of Table 5.2 is made according to the ends of the ladders which are either an end-state or the last consequence with which an attribute had a relation. In this table, one can focus on the ultimate goals of the users and the ultimate consequences desired, and examine how these goals and consequences can be satisfied by another consequences and design attributes. For instance, in the first row, the end-state "social recognition" was provided by the consequence "self expression". Self expression was led by another consequence, "properly functioning", which was provided by display size or built-in speaker. Self expression was also directly provided by some of the attributes which were general appearance, color and built-in speaker.

- **Which design attributes are more salient?**
- **Which outcomes are more salient?**
- **Which relations between attributes and other outcomes are more salient?**

The most mentioned attributes of digital audio players were general appearance, form, color, button types, overall size and built-in speaker. Among consequences, compatibility with the containers, ergonomic hold and deal with the device, visual beauty, easy access to content, spontaneous computer connection,

appropriateness to the use context, having fun/making activities enjoyable, and expressing taste/status/group to others were the most mentioned ones. Lastly, happiness/joy/leisure and social recognition were the end-states that were mentioned the most.

General appearance and form has a strong relation with aesthetic pleasure. Color is also related with aesthetic pleasure, but it is more related with self expression, especially for male respondents, since they think some colors like pink and red, or bright colors can establish a girly image which is an unwanted expression of the self.

Aesthetic pleasure satisfies the ultimate goal of happiness in life, while self expression in a desired way is thought to bring social recognition which is counted as self worth in the outcome types.

Button types are thought to be important because they provide ergonomic hold and deal with the devices. Ergonomy and comfort have no relations with any of the end-states, they are the ends themselves.

Lastly overall size is related with compatibility with the pocket and bag, so the users can keep the device available in a comfortable way.

Table 5.1 Summary of the Findings Ordered According to Direct Consequences

DESIGN ATTRIBUTES	DIRECT CONSEQUENCES (DESIGN GOALS)	INDIRECT CONSEQUENCES	END-STATES
Display size, built-in speaker	PROPERLY FUNCTIONING	Have fun/make activities enjoyable, discover data, self expression (by advising), appropriateness to use context, commune/socialize	Happiness/joy/leisure, social recognition
Button type, number of buttons, button location, size, text	EASE OF USE	Easy access to content, easy to learn, emotional stability	Well being
Display size, number of the buttons	EXTENSIVE CONTROL OVER CONTENT	Select the desired song/play the desired part of the song, have knowledge of the experience	
Size, form, weight, built-in speaker, button type	USE CONTEXT CONSIDERATIONS	Appropriateness to use context, commune/socialize, have fun/make activity enjoyable	Connectedness/friendship, happiness/joy/leisure
Size, form, weight, button type, button location, number of buttons	HUMAN FACTORS IN USE (Comfortable hold and deal with the device, comfort/free movement, comfortable carriage)	Appropriateness to use context, easy access to content, emotional stability, have fun/make the activity enjoyable	Happiness/joy/leisure, well-being
Material, form, USB connection type	MAINTENANCE	Aesthetics, economy	Happiness/joy/leisure, emotional stability
Form, size, USB connection	KEEPING THE DEVICE AVAILABLE (carriage, extra equipment, needed, remind itself)	Appropriate for spontaneous usage (data transfer and play), substitute another device, economy, discover new things, ease/finish tasks	Happiness/joy/leisure, sharing with/helping people, self-esteem/fulfill responsibilities
USB connection type	EASY PREPARATION OF THE DEVICE TO USE		
Form	SAFE USE		
General appearance, color/contrast, size, form	EXCELLENCE OF THE DEVICE		
General appearance, form, color/contrast, material number of the buttons	VISUAL BEAUTY, TACTILE PLEASURE		Happiness/joy/leisure
USB connection type, general appearance, text	INTRIGUE TO THE USER		Happiness/joy/leisure
Button type	PLAYFUL INTERACTION		Happiness/joy/leisure
General appearance, color, built-in speaker,	SELF EXPRESSION		Social recognition

Table 5.2 Summary of the Findings Ordered According to the Ends of the Ladders

END-STATE	CONSEQUENCE	LEADING CONSEQUENCE(S)/ATTRIBUTES	LEADING ATTRIBUTES
Social recognition	SELF EXPRESSION	Properly functioning	Display size, built-in speaker
		General appearance, color, built-in speaker	
Self-esteem/fulfilling responsibilities	EASING TASKS	Availability for spontaneous use	Form, size, USB connection
Connectedness/friendship	ALLOWANCE FOR COMMUNING / SOCIALIZING	Properly functioning	Display size, built-in speaker
		Being appropriate for the use context	Built-in speaker
Happiness/joy/leisure	SUTABILITY FOR THE DISCOVERY OF NEW THINGS	Properly functioning	Display size, built-in speaker
		Availability for spontaneous data transfer	Form, size, USB connection
	INTRIGUE TO THE USER	USB connection type, general appearance, texts	
	ALLOWING USER TO HAVE FUN/MAKING ACTIVITIES ENJOYABLE	Properly functioning	Display size, built-in speaker
		Being appropriate for the use context	Built-in speaker
		Playful interaction	Button type
	VISUAL/TACTILE PLEASURE	General appearance, form, color/contrast, material number of the buttons	
		Maintenance	Material, form, USB connection type
	EXCELLENCE	General appearance, color/contrast, size, form	
Well-being	EMOTIONAL STABILITY	Ease of use	Button type, number of buttons, button location, size, texts
	EASE OF USE	Button type, number of buttons, button location, size, texts	
	EASE OF PREPARATION	USB connection type	
	PHYSICAL COMFORT	Size, form, weight, button type, button location, number of buttons	
	SAFE USE	Form	
	ECONOMY	Substitution for another device, led by availability for song play as desired and spontaneous data transfer	Form, size, USB connection
		Maintenance	Material, form, USB connection type

5.3. LIMITATIONS OF THE STUDY

This study was conducted with 30 respondents. Although this number is suitable for this study which used laddering technique as the research method; it does not allow to make generalizations for the conclusions. Furthermore, the respondents were similar in terms of some of the demographic information; all of the respondents were either a university graduate or a student, and were living in the same city. The similarities in their backgrounds, and the culture which has been influencing them might have kept the results in a limited range. Also, income level was not a criterion while forming the sample, and age was restricted between 18 and 41. As a result, the data collected may not reflect the same results with a study which has a broader scope, in terms of age, education, geographical location, socio economic status, etc.

In this thesis, the research was limited to a single product group, the digital audio players, which does not allow the provision of generalizible results. Moreover, the respondents compared two pairs of digital audio players. As it is explained in the literature review, user value is relativistic; which means the value of a product is decided by comparing it to the other alternatives. If different pairs were used, different results might have been obtained.

Some of the respondents hesitated to talk about the consequences and end-states that were related with their “self-worth”, which was defined as one of the value categories in Chapter 2. This may be because self-worth is an extremely personal issue. Also, it may stem from the belief that self promotion is not welcome in Turkey. Because of this cultural aspect, studies in different countries can reveal different and more detailed results.

5.4. FURTHER RESEARCH

This study is an attempt to find out the linkages between design attributes and user value. In the field study, the pre-purchase value assignment is investigated. However, post-purchase value assignment should also be explored, and the differences between pre-purchase and post purchase value assignment should be identified by further research. Then, the user experience with the product can be refined, so the post-purchase value can be increased, as well as cues to this experience can be truly communicated through design attributes at pre-purchase, which increases the pre-purchase value.

Although this study has implied useful results both for academic studies and designers, similar studies on different product types or groups can give different results and increase in number of studies in this area would add value to collective wisdom on creating value for the user through design. By this way, the recommendations in this study can be further developed, and a guideline for designers can be built.

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APPENDIX A

INTERVIEW SCRIPT

1. Getting the Demographic Information

The demographic information asked included age, sex and occupation.

2. Comparisons

For product comparisons, the respondent is given the samples of products, but also shown the pictures of them (see Appendix C) to inform the respondent about further functions which exist in the real product and about other color alternatives.

Comparison 1: iPod Nano 4th Generation and Sony NVZ

“Assume that you will buy a new digital audio player and assume that these two devices are similar in these technical terms:

Capacity: 8 GB

Battery life: 26 hours

Extra Functions: Radio, playlist, photo/video display

However, they are different in terms of buttons; iPod has a touch wheel, while Sony has push-buttons. Also, Sony has a built in speaker.

Assuming that their prices are the same, and with the knowledge of these product information, which one would you prefer and why?"

Comparison 2: Sony B Series and Philips Spark

"Assume that you will buy a new digital audio player and assume that these two devices are similar in these technical terms:

Capacity: 2 GB

Battery life: 32 hours

However, they are different in terms of buttons; both have push-buttons, but the forms of the buttons are different. Also, Philips can display album covers and Sony has direct USB connection.

Assuming that their prices are the same, and with the knowledge of these product information, which one would you prefer and why?"

In both of the comparisons, the interview continued as such:

If the reasons of choice is designed attributes, they are further probed by asking "Why is that important for you?" until the end-states are stated.

If the stated reason is not a designed attribute, but an attribute that designed attributes provide (such as looking modern) or a consequence, the respondent is also asked "Do you think which attribute provide this?, and then the first stated reason is probed again by asking "Why is that important to you?" until the end-states are stated.

When the respondent is not able to state further consequences or end-states, one of these questions are asked:

“What would happen if the product could not provide this attribute/consequence?”

“Think about a person using this device. What would happen when the consequence occur? How would s/he feel? Why do you think s/he wants/does not want that situation?”

For some of the answers the respondent is asked extra questions.

For the answers about the look of the product such as visual beauty, modernity, looking high-tech, the respondent is asked:

“Do you mind if other people do not like the device you choose?”

For the answers about music exchange, the respondent is asked:

“Do you mind if your friends do not like the music you shared with them?”

For the answers about playing music publicly to listen with friends, the respondent is asked:

“Do you mind if your friends do not like the music you played?

If their answer is “yes” to these questions, then they are asked about the reasons.

In the end of the comparisons, the respondent is shown an attribute list (Appendix B), and asked if there are any attributes in the list that s/he did not mention but think as important while choosing a digital audio player. The attributes stated are further probed again by asking “Why is that important to you?” to gather the consequences and end-states.

APPENDIX B

ATTRIBUTE LIST

Size

Form

Color

Material

General appearance

Weight

Texts

Built-in speaker

Direct USB connection

Display size

Button type (touch wheel/push-button)

Button location

Button form

APPENDIX C

PRODUCT MODELS USED IN THE STUDY

The visuals of the product models are provided below in Figure C.1, Figure C.2, Figure C.3, and Figure C.4.

Figure C.1 Sony NWZ-B143

Figure C.2 Sony NVZ-S545

Figure C.3 iPod Nano 4th Generation

Figure C.4 Philips Go Gear Spark

APPENDIX D

INDIVIDUAL LADDERS OF RESPONDENTS

Table D.1 Individual Ladders

R. No.	Ladders				
1	a1	c39	e1		
1	a1	c45	e3		
1	a1	c28			
1	a2	c3	c29	c38	e1
1	a3	c45	e3		
1	a6	c3	c29	c38	e1
1	a8	c7			
1	a12	c8			
2	a1	c39	e1		
2	a2	c39	e1		
2	a1	c45	e3		
2	a2	c1			
2	a2	c3	c29	c38	e1
2	a3	c45	e3		
2	a5	c2			
2	a5	c7			
2	a6	c1			
2	a6	c3	c29	c38	e1
2	a6	c7			
2	a7	c10			
2	a8	c11	c46	e8	
2	a8	c41	e1		
2	a10	c10	c46	e8	

Table D.1 (Continued)

2	a10	c39	e1		
2	a11	c10			
2	a12	c8	c29	c38	e1
2	a12	c39	e1		
2	a13	c12			
3	a1	c39	e1		
3	a2	c7			
3	a3	c28			
3	a6	c7			
3	a7	c42	e1		
3	a8	c7			
3	a8	c39	e1		
3	a11	c5	c38	e1	
3	a12	c8			
4	a2	c39	e1		
4	a3	c43	c45	e3	
4	a3	c45	e3		
4	a3	c28			
4	a6	c28			
4	a6	c39	e1		
4	a8	c7	c46	e8	
4	a10	c28			
4	a11	c18	c38	e1	

Table D.1 (Continued)

4	a12	c22	c29	c30	c47
4	a12	c22	c29	c38	e1
4	a12	c22	c29	c33	e7
4	a12	c22	c34	e3	
4	a13	c27	c37		
5	a1	c39	e1		
5	a2	c1	c19	c38	e1
5	a2	c3	c29	c38	e1
5	a2	c7			
5	a2	c39	e1		
5	a3	c39	e1		
5	a3	c45	e3		
5	a6	c1	c19	c38	e1
5	a6	c3	c29	c38	e1
5	a7	c10			
5	a8	c3	c29	c38	e1
5	a8	c7			
5	a12	c22	c29	c38	e1
5	a12	c22	c29	c33	e7
5	a13	c12	c19	c38	e1
5	a13	c14	c20	c36	e5
6	a1	c28			
6	a1	c39	e1		
6	a1	c42	e1		
6	a1	c45	e3		
6	a2	c1			
6	a2	c3	c29	c38	e1
6	a3	c39	e1		
6	a4	c40	c46	e8	
6	a6	c1			
6	a6	c3	c29	c38	e1
6	a6	c7			
6	a8	c41	e1		
6	a10	c18	c32	c36	e5

Table D.1 (Continued)

6	a10	c18	c32	c36	e6
6	a10	c39	e1		
6	a12	c22	c29	c33	e7
6	a12	c22	c29	c36	e5
6	a12	c22	c29	c36	e6
6	a12	c22	c29	c38	e1
6	a13	c14	c20	c36	e5
7	a5	c2	c19	c38	e1
7	a5	c7			
7	a6	c1	c19	c38	e1
7	a6	c7			
7	a10	c28			
7	a11	c5	c31	e2	
7	a11	c5	c33	e7	
7	a12	c22	c29	c33	e7
7	a12	c22	c29	c38	e1
7	a12	c22	c34	e3	
7	a13	c2			
7	a13	c12	c21	c36	e5
8	a1	c39	e1		
8	a2	c1			
8	a2	c3	c29	c38	e1
8	a2	c16	e8		
8	a2	c26	c37		
8	a3	c39	e1		
8	a4	c26	c37		
8	a6	c1			
8	a6	c3	c29	c38	e1
8	a6	c15	c19	c38	e1
8	a6	c15	c20	c35	e1
8	a6	c15	c20	c36	e5
8	a6	c15	c20	c38	e1
8	a6	c15	c20	e6	
8	a6	c27	c37		

Table D.1 (Continued)

8	a8	c39	e1		
8	a8	c7	c10	c46	e8
8	a8	c7	c46	e8	
8	a9	c7	c46	e8	
8	a12	c22	c29	c33	e7
8	a12	c22	c29	c38	e1
8	a13	c13	c19	c38	e1
8	a13	c14	c20	c30	C47
8	a13	c14	c20	c30	c37
8	a13	c14	c20	c35	e1
8	a13	c14	c20	c36	e5
8	a13	c14	c20	e6	
8	a16	c3	c26	c37	
8	a16	c3	c26	c46	e8
9	a1	c39	e1		
9	a2	c39	e1		
9	a3	c39	e1		
9	a3	c45	e3		
9	a5	c2			
9	a6	c1			
9	a8	c7	c10	c46	e8
9	a13	c12	c46	e8	
9	a13	c27	c37		
9	a13	c27	c46	e8	
10	a2	c28			
10	a6	c1			
10	a6	c28			
10	a8	c7	c10	c46	e8
10	a10	c10	c46	e8	
10	a11	c9	c29	c46	e8
10	a14	c9	c29	c46	e8
11	a1	c28			
11	a1	c39	e1		

Table D.1 (Continued)

11	a2	c28			
11	a2	c39	e1		
11	a3	c39	e1		
11	a5	c2	c29	c38	e1
11	a6	c1			
11	a6	c3	c29	c38	e1
11	a10	c28			
11	a13	c12			
12	a1	c39	e1		
12	a2	c39	e1		
12	a3	c25	c39	e1	
12	a3	c39	e1		
12	a6	c1	c19	c38	e1
12	a6	c1	c20	c36	e5
12	a8	c7			
12	a8	c39	e1		
12	a10	c10			
12	a10	c11	c46	e8	
12	a12	c8			
12	a12	c22	c29	c38	e1
12	a13	c12	c21	c36	e5
12	a13	c14	c20	c30	c47
12	a13	c14	c20	c30	c37
12	a13	c14	c20	c35	e1
12	a13	c14	c20	c36	e5
12	a13	c14	c20	e6	
13	a1	c39	e1		
13	a1	c45	e3		
13	a2	c7			
13	a3	c39	e1		
13	a3	c45	e3		
13	a5	c7			
13	a6	c7			
13	a8	c7	c10		

Table D.1 (Continued)

13	a8	c11			
13	a10	c10			
13	a10	c28			
13	a11	c9	c29	c38	e1
13	a11	c18	c38	e1	
13	a11	c28			
13	a12	c8			
13	a13	c2			
13	a13	c12			
13	a13	c14	c20	c35	e1
13	a13	c27	c37		
14	a1	c39	e1		
14	a1	c44	e4		
14	a1	c45	e3		
14	a2	c3	c29	c38	e1
14	a2	c23	c29	c38	e1
14	a2	c39	e1		
14	a3	c39	e1		
14	a3	c45	e3		
14	a5	c2	c19	c38	e1
14	a5	c2	c20	c35	e1
14	a6	c1	c19	c38	e1
14	a6	c1	c20	c35	e1
14	a6	c3	c29	c38	e1
14	a7	c39	e1		
14	a8	c7	c10		
14	a8	c23	c29	c38	e1
14	a8	c26	c37		
14	a8	c26	c46	e8	
14	a8	c18	c38	e1	
14	a9	c39	e1		
14	a10	c10			
14	a10	c28			
14	a11	c5	c38	e1	
14	a11	c9			

Table D.1 (Continued)

14	a12	c22	c34	e3	
14	a12	c28			
14	a13	c12	c21	c36	e5
14	a13	c14	c20	c35	e1
14	a13	c14	c20	c36	e5
14	a15	c45	e3		
15	a1	c39	e1		
15	a2	c7			
15	a2	c16	e8		
15	a2	c26	c37		
15	a6	c7			
15	a6	c27	c37		
15	a8	c7	c10		
15	a10	c10			
15	a10	c28			
15	a11	c18	c38	e1	
15	a12	c22	c29	c30	c47
15	a12	c22	c29	c33	e7
15	a12	c22	c29	c38	e1
15	a13	c14	c20	c36	e5
16	a1	c39	e1		
16	a2	c1			
16	a2	c7	c46	e8	
16	a3	c45	e3		
16	a4	c39	e1		
16	a6	c1			
16	a8	c7	c10	c46	e8
16	a8	c41	e1		
16	a10	c10	c46	e8	
16	a11	c5	c38	e1	
16	a11	c10	c46	e8	
16	a12	c22	c29	c38	e1
16	a13	c14	c20	c36	e5

Table D.1 (Continued)

17	a1	c39	e1		
17	a2	c1	c27	c37	
17	a2	c1	c27	c46	e8
17	a2	c3	c29	c38	e1
17	a2	c39	e1		
17	a3	c39	e1		
17	a5	c2			
17	a6	c1	c27	c37	
17	a6	c1	c27	c46	e8
17	a6	c3	c29	c38	e1
17	a6	c39	e1		
17	a8	c7	c10		
17	a13	c27	c37		
17	a13	c27	c46	e8	
18	a1	c39	e1		
18	a2	c3	c29	c38	e1
18	a2	c7			
18	a2	c39	e1		
18	a3	c45	e3		
18	a5	c2	c19	c38	e1
18	a5	c2	c20	c35	e1
18	a5	c2	c20	c36	e5
18	a5	c7			
18	a6	c1	c19	c38	e1
18	a6	c1	c20	c35	e1
18	a6	c1	c20	c36	e5
18	a6	c3	c29	c38	e1
18	a6	c7			
18	a8	c28			
18	a9	c7	c10		
18	a10	c11			
18	a10	c39	e1		
18	a11	c4	c35	e1	
18	a11	c4	c38	e1	
18	a11	c5	c38	e1	

Table D.1 (Continued)

18	a11	c10			
18	a12	c39	e1		
18	a13	c2			
18	a13	c14	c20	c35	e1
18	a13	c14	c20	c36	e5
19	a1	c28			
19	a1	c39	e1		
19	a2	c7	c46	e8	
19	a3	c39	e1		
19	a8	c7	c10	c46	e8
19	a8	c39	e1		
19	a11	c4	c38	e1	
19	a11	c9			
19	a13	c12			
20	a1	c39	e1		
20	a1	c45	e3		
20	a2	c39	e1		
20	a3	c45	e3		
20	a6	c1			
20	a7	c42	e1		
20	a8	c7	c10		
20	a10	c39	e1		
21	a1	c39	e1		
21	a2	c1			
21	a2	c7			
21	a2	c39	e1		
21	a3	c39	e1		
21	a3	c45	e3		
21	a5	c2			
21	a5	c7			
21	a8	c7	c10		
21	a9	c23	e1		
21	a12	c24	e6		

Table D.1 (Continued)

21	a13	c12			
21	a13	c14	c20	c35	e1
21	a13	c27	c37		
22	a1	c39	e1		
22	a2	c23	c29	c38	e1
22	a2	c39	e1		
22	a2	c42	e1		
22	a3	c44	e4		
22	a5	c2			
22	a5	c7			
22	a6	c1			
22	a6	c7			
22	a8	c7	c10		
22	a8	c42	e1		
22	a10	c10			
22	a10	c39	e1		
22	a11	c4	c35	e1	
22	a11	c4	c38	e1	
22	a11	c9			
22	a12	c8			
22	a12	c22	c29	c38	e1
22	a12	c39	e1		
22	a13	c12	c21	c36	e5
22	a13	c14	c20	c35	e1
22	a13	c14	c20	c36	e5
23	a1	c39	e1		
23	a1	c45	e3		
23	a2	c39	e1		
23	a3	c39	e1		
23	a8	c7	c10	c46	e8
23	a8	c26	c37		
23	a8	c26	c46	e8	
23	a10	c10	c46	e8	
23	a10	c11	c46	e8	

Table D.1 (Continued)

23	a11	c6	c18	c38	e1
23	a13	c14	c20	c35	e1
23	a13	c27	c37		
23	a13	c27	c46	e8	
24	a1	c11			
24	a1	c39	e1		
24	a2	c7			
24	a2	c39	e1		
24	a2	c44	e4		
24	a2	c45	e3		
24	a3	c39	e1		
24	a3	c45	e3		
24	a8	c7	c10		
24	a8	c39	e1		
24	a11	c4	c35	e1	
24	a11	c9			
24	a12	c22	c29	c33	e7
24	a12	c22	c29	c34	e3
24	a12	c22	c29	c38	e1
24	a13	c12	c19	c38	e1
24	a13	c14	c20	c35	e1
25	a1	c39	e1		
25	a1	c45	e3		
25	a2	c7			
25	a2	c28			
25	a2	c39	e1		
25	a3	c45	e3		
25	a4	c25			
25	a4	c26	c37		
25	a4	c40	e1		
25	a5	c2			
25	a6	c1			
25	a8	c7	c10		
25	a8	c25			

Table D.1 (Continued)

25	a9	c7	c10		
25	a10	c10			
25	a12	c22	c29	c33	e7
25	a12	c22	c29	c38	e1
25	a12	c22	c34	e3	
25	a13	c2			
25	a13	c12			
25	a13	c14	c20	c35	e1
26	a1	c39	e1		
26	a2	c1			
26	a2	c7	c46	e8	
26	a2	c26	c37		
26	a2	c26	c46	e8	
26	a2	c39	e1		
26	a3	c45	e3		
26	a4	c26	c37		
26	a4	c26	c46	e8	
26	a6	c1			
26	a6	c7	c46	e8	
26	a8	c7	c10	c46	e8
26	a8	c7	c46	e8	
26	a8	c23	e1		
26	a8	c39	e1		
26	a8	c41	e1		
26	a11	c10	c46	e8	
26	a15	c2			
27	a1	c39	e1		
27	a1	c45	e3		
27	a2	c7			
27	a2	c39	e1		
27	a3	c45	e3		
27	a5	c2			
27	a5	c7			
27	a6	c1			

Table D.1 (Continued)

27	a6	c7			
27	a8	c7			
27	a11	c6	c17		
27	a11	c28			
27	a13	c2			
27	a13	c12	c19	c38	e1
27	a13	c14	c20	c35	e1
27	a13	c14	c20	c36	e5
27	a13	c14	c29	c38	e1
27	a13	c27	c37		
28	a1	c39	e1		
28	a2	c23			
28	a4	c25			
28	a4	c39	e1		
28	a5	c2			
28	a6	c1			
28	a8	c7	c10		
28	a8	c41	e1		
28	a11	c4	c35	e1	
28	a11	c4	c38	e1	
28	a11	c5	c38	e1	
28	a11	c10			
28	a12	c8	c29	c38	e1
28	a12	c22	c29	c38	e1
28	a13	c13	c19	c38	e1
28	a13	c14	c20	c35	e1
29	a1	c39	e1		
29	a2	c1			
29	a2	c3	c29	c38	e1
29	a2	c7			
29	a3	c39	e1		
29	a3	c44	e4		
29	a3	c45	e3		
29	a4	c26	c37		

Table D.1 (Continued)

29	a4	c26	c46	e8	
29	a6	c1			
29	a6	c3	c29	c38	e1
29	a8	c7	c10		
29	a8	c28			
29	a8	c39	e1		
29	a10	c39	e1		
29	a11	c5	c38	e1	
29	a11	c26	c39	e1	
29	a11	c26	c46	e8	
29	a13	c27	c37		
29	a13	c27	c46	e8	
30	a1	c39	e1		
30	a1	c45	e3		
30	a2	c39	e1		
30	a3	c45	e3		
30	a4	c28			
30	a4	c39	e1		
30	a6	c1			
30	a6	c7			
30	a8	c7	c10		
30	a8	c26	c37		
30	a8	c26	c46	e8	
30	a8	c39	e1		
30	a9	c10			
30	a10	c39	e1		
30	a11	c4	c35	e1	
30	a11	c6	c17		
30	a11	c6	c35	e1	
30	a15	c23	c29	c38	e1