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**WHAT MAKES A BEAUTIFUL WEBSITE? FACTORS  
INFLUENCING PERCEIVED WEBSITE AESTHETICS**



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## ABSTRACT

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Website aesthetics is a significant part of a website user experience. A website observed as beautiful positively influences the resultant overall experience from the website use. Aesthetics is a well-researched concept in the research field of human-computer interaction (HCI), and importance of aesthetics to website design is well-accepted in the information systems (IS) research. Nonetheless, there is a lack of generally accepted principles for web designers on how to design aesthetically pleasing websites. Hence, this study examined which are the essential factors that influence perceived website aesthetics. Aesthetic factors are worth identifying, so that designers can provide their customers more aesthetical, enjoyable and pleasant websites in future, and ultimately better user experience. In addition to customers, better user experience is also beneficial for the companies, as they are more likely to gain loyal customers. Present thesis was carried out as a literature review, and as a result, nine different factors influencing website aesthetics were identified. Focusing on these nine factors – simplicity, diversity, colorfulness, craftsmanship, unity, complexity, intensity, novelty and interactivity – a designer can improve the appearance of a website. The factors are abstract and large entities. Therefore, this study does not offer specific nor practical step-to-step instructions on how to design beautiful constructs, instead it informs which aspects a web designer should consider if the aim is to create aesthetic website.

Keywords: aesthetics, design, user experience, website

## TIIVISTELMÄ

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Mikä tekee verkkosivustosta kauniin? Verkkosivun koettuun esteettisyyteen vaikuttavat tekijät

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Verkkosivujen estetiikka on merkittävä osa sivustojen käyttäjäkokemusta. Kauniiksi mielletty sivusto vaikuttaa positiivisesti verkkosivun käytöstä johtuneeseen kokonaisvaltaiseen kokemukseen. Estetiikkaa on paljon tutkittu ihmisen ja tietokoneen välisessä vuorovaikutuksessa, sekä hieman myös tietojärjestelmätieteen saralla. Tästä huolimatta ei ole olemassa yleisesti hyväksytyjä periaatteita, miten suunnitella kauniita verkkosivustoja. Täten tässä tutkimuksessa selvitettiin mitkä tekijät vaikuttavat verkkosivuston koettuun esteettisyyteen. Nämä tekijät ovat tarpeellista tunnistaa, jotta web-suunnittelijat pystyvät tuottamaan jatkossa esteettisempiä, miellyttävämpiä ja nautinnollisempia sivustoja, sekä lopulta tarjoamaan asiakkailleen parempaa käyttäjäkokemusta. Paremmasta käyttäjäkokemuksesta on asiakkaan lisäksi hyötyä myös palvelun tarjoajalle, jonka todennäköisyydet saada lojaaleja asiakkaita kasvavat. Tutkimus suoritettiin kirjallisuuskatsauksena ja tutkimuksen tulokseksi löydettiin yhdeksän erilaista määrittävää tekijää, jotka vaikuttavat koettuun verkkosivun esteettisyyteen. Tekijät ovat yksinkertaisuus, moninaisuus, värikkyys, ammattitaito, yhtenäisyys, kompleksisuus, intensiteetti, uutuudenviehätys ja vuorovaikutteisuus. Kiinnittämällä huomiota näihin yhdeksään tekijään suunnittelija voi parantaa sivuston ulkoista ilmettä. Tekijät ovat melko abstrakteja ja sisältävät laajoja kokonaisuuksia. Tämä tutkimus ei tarjoa tarkkoja ohjeita kauniiden sivujen luomiseksi, vaan pikemminkin informoi mihin asioihin web-suunnittelijoiden kannattaa keskittyä.

Asiasanat: estetiikka, käyttäjäkokemus, suunnittelu, verkkosivusto

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# 1 INTRODUCTION

Traditionally research in human-computer interaction (HCI) and information systems (IS) has focused on usability issues, such as efficiency and effectiveness of interactions (Moshagen & Thielsch, 2010; Hassenzahl & Tractinsky, 2006; Lavie & Tractinsky, 2004; Jiang, Wang, Tan & Yu, 2016). Researchers in these specific fields neglected the aesthetic dimension of website (Lavie & Tractinsky, 2004). In ten years, UK adults have doubled the number of hours spent online from ten to over 20 hours per week (Ofcom, 2015). Hallnäs and Redström (2002) stated that as computer systems become more and more ubiquitous in people's lives, and as systems are not just tools of specific uses anymore, the shift should occur from designing for efficient use to designing for meaningful presence. Change of focus has already taken place, and in the context of HCI and user experience (UX) aesthetics of user interfaces has become a major topic of research (Tuch, Roth, Hornbæk, Opwis, & Bargas-Avila, 2012; Jiang et al., 2016).

Emerging research has exhibited evidence that perceived quality of website aesthetics affects users' attitudes toward website (Jiang et al., 2016), and aesthetically pleasing website can achieve high user satisfaction even with low perceived usability (Lindgaard & Dudek, 2003). Website aesthetics affects perceived quality of website usability (Tractinsky, Katz, & Ikar, 2000; Li & Yeh, 2010; Lee & Koubek, 2010; Lindgaard, Dudek, Sen, Sumegi & Noonan, 2011), and ultimately the perceived user experience (Schenkman & Jönsson, 2000; Bargas-Avila & Hornbæk, 2011). Cyr, Head and Ivanov's (2006) study indicates that perceived aesthetics of a product influences users' loyalty towards the product.

However, why exactly does aesthetics matter? Tractinsky (2004) argues that studying aesthetics in the context of information technology (IT) can be reasoned with three arguments. Firstly, aesthetics satisfies basic human needs. Psychologist Abraham Maslow (1970, 51) suggests that aesthetics truly is a basic need for some people: "They get sick (in special ways) from ugliness, and are cured by beautiful surroundings; they crave actively, and their cravings can be satisfied only by beauty". Secondly, due to advances in technology, systems performance has exceeded users' needs. Good performance or usability does not translate to strategic advantage anymore. Instead, IT companies can differentiate their products and gain competitive advantage by designing products to look

aesthetically pleasing. For example, Apple has put great amount of effort in making their products look and feel beautiful and desirable, which is presumably notable reason why Apple has grown to be one of the biggest companies in the world (Edson & Beck, 2013). Thirdly, aesthetic evaluations stemming from interactions are immediate (Lindgaard, Fernandes, Dudek & Brown, 2006), and they are hard to overcome. Users make first impressions rapidly, and quality of aesthetics might set tone for the rest of the interaction (Tractinsky, 2004).

To utilize websites' potential and provide rich user experience, it is important to understand fundamental drivers of user's perception (Singh, Dalal & Spears, 2005). Aesthetics has been accepted as an important factor of website design, and it is a popular research topic (Jiang et al., 2016). Yet there are not many papers among existing literature that have managed to clearly compile the essential elements of website aesthetics. Therefore, there is a lack of generally accepted design principles for web designers (Jiang et al., 2016.). This gap in the literature should be further addressed.

Correspondingly to these considerations, present study intends to answer the following research questions:

- What is meant by aesthetics in IS and HCI literature?
- What are the essential factors that influence perceived visual aesthetics of a website?

Aim of this study is to identify and acknowledge those aspects and elements of a website that essentially influence perceived website aesthetics. In other words, objective is to find which qualities of a website contribute in making the website perceived as beautiful in the eyes of a user. Furthermore, since the object of our aesthetical examination is a website, it is necessary to study how the concept of aesthetics is understood in the fields of IS and HCI, and what kind of research has been done.

Today, internet is increasingly present in different aspects of our daily lives (Ofcom, 2015). The majority of people from the developed world need to use web-based applications or services to some extent to get through their daily lives (International Telecommunication Union, 2016). Information acquired from these aesthetic factors could help businesses and web designers in producing better user experience. Ultimately, increased quality in user experience would lead to increased number of joyful and pleasant moments in people's lives.

Each of the human senses can participate in forming aesthetic perceptions (Jiang et al., 2016). However, perceptions of a website atmosphere lie almost solely in its visual aspect as 80% of the information processed by user's brain comes from sight (Pelet & Papadopoulou, 2012). Hence, this study will mainly investigate factors that affect visual side of aesthetics.

This study is carried out through a literature review. Most of the sources are found from the top and leading level HCI and IS journals. In addition, few academic books and conference articles are utilized as sources. Source material is principally found with the help of internet service Google Scholar. Because some articles could not be opened with Google Scholar, University of Jyväskylä's JYKDOK archive was utilized to get access to these documents. On top of the

credibility of publisher, sources of this study were accepted for example based on the following criteria: article is relevant to the topic, article is recently published in the 2010s, article is widely accepted among the research community and research methods are soundly explicated in articles.

In the beginning, relevant papers concerning aesthetics were searched from the Google Scholar by typing 'visual appeal' and 'aesthetics' as an entry. Sources were searched from the eight journals, which are according to the Association for Information Systems (2011) the top journals of IS research field. By using advanced search options, it was possible to examine articles one journal at a time. Later, same entries were used for finding articles from outside the realm of general IS research. HCI articles concerning user experience were searched using 'user experience' as a search input. Sources for the second research question were searched with words 'factors of website aesthetics'. Even though the entry yielded more than 80 000 results, not many among them were simultaneously from the qualified journals and relevant to this specific topic. Throughout the study, great number of articles were also found by examining sources cited in the source articles.

The results of this literature review are mainly based on two studies (Jiang et al, 2016; Moshagen & Thielsch, 2010), since they are the only studies found that systematically and comprehensively came up with holistic frameworks for explaining website aesthetics. Many researchers have studied how specific factors influence website aesthetics, but few have compiled all factors to one construct. It is more secure and reasonable approach to base the thesis on existing frameworks than to merely combine separate factors from separate studies.

As a result, nine factors of website aesthetics were identified for the purposes of present study. Proposed factors are simplicity, diversity, colorfulness, craftsmanship, unity, complexity, intensity, novelty and interactivity. As an implication, designers can increase visual appearance of website by focusing on these nine factors in a design process. This study differs from the prior research as its proposed framework is more thorough and takes into consideration more aspects than other similar studies regarding aesthetical factors.

Present study consists of four chapters. In next chapter, concepts of user experience and aesthetics are explained. Also, supplementary research question is answered by examining the nature of aesthetics according to HCI and IS research. In third chapter, as an answer to main research question, nine factors of website aesthetics, originating from the extant literature, are proposed and described. Last chapter includes conclusion of the study and further discussions.



## 2 USER EXPERIENCE AND AESTHETICS

In present chapter, relating to first research question, the core concepts of the thesis are explained and defined. This study concentrates on the non-instrumental aspects of the user experience in the website context. More specifically, focus is on the aesthetic side of the experience. Firstly, to give proper background on the topic, the concept of user experience is explained. Secondly, the term aesthetics is explained, and reviews are offered regarding studies on aesthetics in the fields of HCI and IS in general. In last subchapter, aesthetics' role in user experience is examined in more detail.

### 2.1 User experience

In the 21st century user experience, often abbreviated as UX, has been a phenomenon that has captured the interest of both HCI researchers and practitioners (Hassenzahl & Tractinsky, 2006; Law, Roto, Hassenzahl, Vermeeren, & Kort, 2009). UX is an obscure term, and there are many different definitions for it (Law et al., 2009). Because of their prominent role in the research of UX, this paper adapts Hassenzahl and Tractinsky's (2006) definition for UX, which is as follows:

*“UX is a consequence of a user's internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g. complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organisational/social setting, meaningfulness of the activity, voluntariness of use, etc).”*

It can be seen from this definition that UX includes three aspects: a user who interacts with the system, the system itself, and the environment where the interaction happens. Furthermore, Hassenzahl and Tractinsky (2006) explain the phenomenon with three approaches. Firstly, UX goes beyond the instrumental. The term non-instrumental refers to qualities which are not related to tasks, but in the fulfillment of human needs (Bargas-Avila & Hornbæk, 2011). Objects have

intrinsic value in itself. Secondly, UX is concerned with the users' emotions and affective consequences. As the UX is about designing for the pleasure, its researchers are interested in producing positive emotions instead of preventing negative emotions. Interacting with the products should be fun and joyful. Thirdly, UX is experiential. The emphasis is on the actual experience that stems from the interaction between user and the system. What kind of impression does the system give to user when she uses it? Experience is the combination of product, user's internal state, and the time period when the use occurs. Experience has a beginning and end, and it kindles emotional and behavioral change (Hassenzahl & Tractinsky, 2016.).

Thüring and Mahlke (2007) state that UX is a compound of three components, which are quite compatible to Hassenzahl and Tractinsky's (2006) three approaches to UX. In the end, what matters in UX is the appraisal of the system. As illustrated below in the components of user experience model (FIGURE 1), appraisal of the system is a consequence of three elements (Thüring & Mahlke, 2007.). First element is perception of instrumental qualities. As mentioned before, instrumental qualities, such as usability, are a part of UX. They are of extrinsic nature, and means to achieve something. Non-instrumental qualities are the second element of UX. As both Hassenzahl and Tractinsky (2006), and Thüring and Mahlke (2007) place aesthetics to the non-instrumental qualities, present study is particularly interested in this component of the model. Both instrumental and non-instrumental qualities have an influence on the last element of model which is user's emotional responses or reactions to system behavior. Emotions are characterized as "episodes of subjective feelings accompanied by specific physiological reactions and expressive behaviour" (Thüring & Mahlke, 2007.).

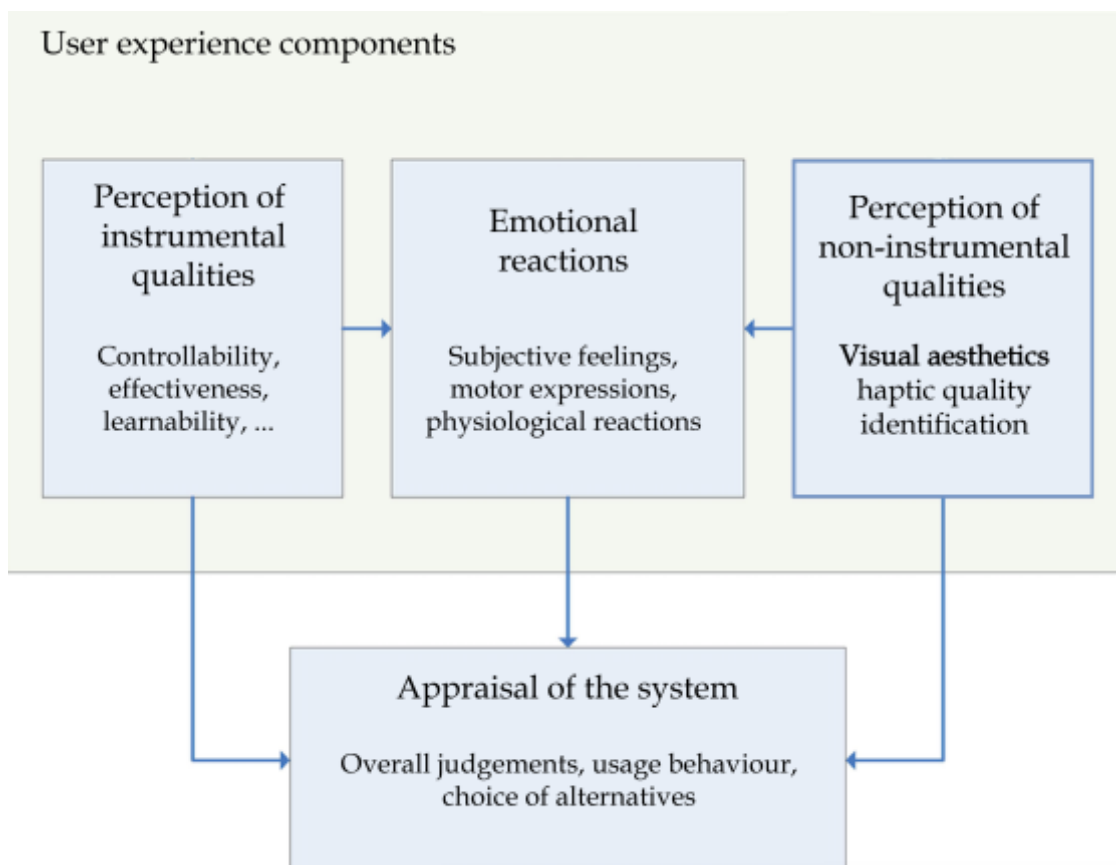


FIGURE 1 Aesthetics in user experience. Adapted from the Components of User Experience model (Thüring & Mahlke, 2007, 262)

The two models presented above (Hassenzahl & Tractinsky, 2016; Thüring & Mahlke, 2007) do not contradict with each other. They both share the view of two fundamental aspects of UX. It includes non-instrumental qualities and is concerned with users' emotions. Additionally, Thüring and Mahlke (2007) note that UX includes also the instrumental qualities, and Hassenzahl and Tractinsky (2006) attach the experiential approach to the concept.

Hassenzahl (2004) argues that characteristics of a product consist of two distinct groups of attributes, pragmatic and hedonic attributes. Sometimes users visit website for finding information and other times for entertaining themselves (Huang, 2003). Pragmatic attributes are concerning users' needs to achieve goals, and hedonic attributes associates to enjoyment that the system use arouses in user (Hassenzahl, 2004).

UX is a countermovement to traditional usability framework, in which the focus has been targeted on the pragmatic side of the interaction, and on ensuring the instrumental value of the product (Hassenzahl & Tractinsky, 2006). Rather than centering on usability, UX is more concerned with the hedonic attributes of a product. Hedonic attributes concern the user itself. Instead of focusing on the functionality of a product, aim is to increase pleasure that use of product generates for user. Term hedonic derives from the word hedonism, which stands for the idea that pleasure and happiness are the most desirable things in life (Van

der Heijden, 2004). For instance, UX research community is interested in aesthetics, as beauty is primarily a hedonic attribute (Hassenzahl, 2004).

The idea behind UX is to improve quality of life by “designing for pleasure rather than absence of pain”. Focus is on users’ emotions and affects, more than in the technology. (Hassenzahl & Tractinsky, 2006.) Also, research on the topic supports the view that perceived enjoyment is stronger determinant of intention to use than perceived usefulness (Van der Heijden, 2004).

To conclude, traditionally HCI’s objective has been preventing frustration and discontentment. As researchers have learned, traditional model of HCI does not sufficiently cover all the important aspects of interaction between users and systems, concept of UX has emerged to fill those gaps. Effectiveness and efficiency are important aspects of systems use, but so are the system design and emotional experiences as well (Thüring & Mahlke, 2007). UX acknowledges the fact that products contain instrumental and non-instrumental qualities, and emphasizes user’s affects and emotions. UX focuses on the hedonic and positive aspects of the interaction, and research on the visual aesthetics of computer interfaces suggests that during the interactions aesthetics is a strong determinant of pleasure experienced by the user (Lavie & Tractinsky, 2004.).

## 2.2 Aesthetics

In 1735 Philosopher Alexander Gottlieb Baumgarten defined the concept of aesthetics as “the science of how things are known via the senses” (Jiang et al., 2016; Lavie & Tractinsky, 2004). The meaning of this old term has evolved during the passing of the time and it means different things to different areas of study (Lavie & Tractinsky, 2004; Udsen & Jørgensen, 2005). However, aesthetics, which has been studied in various disciplines, such as philosophy, psychology and architecture (Jiang et al., 2016), is generally meant to refer beauty (Lavie & Tractinsky, 2004; Jiang et al., 2016). More specifically, aesthetics is about the beauty of people, nature or object (Lavie & Tractinsky, 2004). According to Lavie and Tractinsky (2004) “the word beauty is commonly applied to things that are pleasing, either to the senses, to the imagination, or to our understanding”. Consistently to prior literature (Lavie & Tractinsky, 2004; Tractinsky, 2004; Moshagen & Thielsch, 2010), present thesis is primarily interested in aesthetics’ common meaning as well. This means that aesthetics, in its essence, is understood as beautiful or pleasing appearance of an object (Tractinsky, 2004).

When delving a bit deeper into the matter, it becomes evident that aesthetics is a complex term consisting of many different aspects. People view the nature of aesthetics differently from each other. (Udsen & Jørgensen, 2005.) There can be differentiated three different views for beauty: objectivist, subjectivist and interactionist view (Moshagen & Thielsch, 2010). Proponents of objectivist view state that beauty is a property of an object which produces enjoyable experience for every perceiver. Subjectivist view proposes that as long as senses are being pleased, any object can be beautiful (Moshagen & Thielsch, 2010.) Objectivist and subjectivist views are contradictory to each other, and there has been a debate

whether the beauty is in the eyes of a beholder, or not (Lavie & Tractinsky, 2004). Regardless, Moshagen and Thielsch (2010) state that neither subjectivist or objectivist views about beauty are not generally accepted anymore. Instead, interactionist perspective is thought to be most accurate view about beauty because it considers both objectivist and subjectivist views. Aesthetics, or beauty, is seen as combination of qualities of the object and characteristics of the perceiver (Moshagen & Thielsch, 2010).

Aesthetics has been studied by using two different approaches or methods, the philosophical approach and the empirical approach. In both approaches theories of aesthetics have been made with studies of work of arts, such as paintings and sculptures (Lavie & Tractinsky, 2004.). Regarding the philosophical approach, philosophers have been interested in how the aesthetic attitudes are formed. Does the aesthetic attitude towards an object develop as the viewer of the object has certain purpose in mind, or because of characteristics of the object? Other main topic for the philosophical approach is the aforementioned objective versus subjective debate regarding the nature of aesthetics (Lavie & Tractinsky, 2004.). Leading authority in the philosophical aesthetics, Monroe Beardsley proposes that beauty is a regional quality of perceptual objects, and is intrinsically valuable (Beardsley, 1981; Jiang et al., 2016). Empirical research on aesthetics can be divided to experimental and exploratory aesthetics. In experimental aesthetics, the aim is to test hypotheses and “identify general laws of aesthetic qualities that can be found in the evaluated object” (Lavie & Tractinsky, 2004.). Exploratory research on aesthetics tries to describe higher order factors that delineates evaluated objects. The focus is on the subjective perceptions of people rather than on the objective qualities of object (Lavie & Tractinsky, 2004.).

### **2.2.1 Aesthetics in HCI literature**

Aesthetics is a prominent topic in the HCI and UX research (Tuch et al., 2012). But it has not always been so (Lavie & Tractinsky, 2004). Traditionally HCI research focused on effectiveness and efficiency of interactions between users and technology (Moshagen & Thielsch, 2010). After Tractinsky et al. (2000) concluded that there is association between perceived interface aesthetics and perceived usability, aesthetics started to grow more popular topic in the HCI research (Moshagen & Thielsch, 2010).

Aesthetics, visual appeal, beauty or attractiveness - there are many different terms used in HCI literature to describe the same thing (Tuch, Presslauer, Stöcklin, Opwis, & Vargas-Avila, 2012). As meanings of words ‘beauty’ and ‘aesthetics’ are very close to each other, in the HCI literature these terms are used interchangeably and synonymously (Moshagen & Thielsch, 2010). On account of simplicity, present thesis primarily uses terms aesthetics and beauty for the rest of the paper.

Because beauty and aesthetics are often used synonymously, it is reasonable to define further the nature of beauty. Moshagen and Thielsch (2010) have adopted Santayana’s (1955) view that beauty has three defining attributes. Firstly, beauty is of positive value because it produces pleasurable experience for

the perceiver. Secondly, beauty is intrinsic. Objects are not perceived by rationalization. The first sight determines the degree of how visually appealing the appearance of objects are evaluated. In fact, people make judgements of website only in 50 milliseconds (Lindgaard et al., 2006). Therefore, many HCI researchers study first impressions regarding the website aesthetics (Tuch et al., 2012). Thirdly, beauty is objectified. This means that beauty is always directed to some object. A positive value cannot arise to the perceiver if there is nothing to perceive. (Santayana, 1955; Moshagen & Thielsch, 2010.)

Many a time in HCI literature the object of aesthetic analysis is a website (Lavie & Tractinsky, 2004; Lindgaard et al., 2011; Moshagen & Thielsch, 2010; Tuch et al., 2012). Lavie and Tractinsky (2004) developed and validated measurement instrument of perceived web site aesthetics to understand the aesthetic attitudes of web users better. The study resulted in conclusion that subjective perceptions of website aesthetics consist of two dimensions, classical aesthetics and expressive aesthetics. Classical aesthetics “emphasize orderly and clear design of aesthetics” and it can be derived from the times of ancient Greece until the 18th century. Classical dimension refers to website design attributes, such as aesthetic, pleasant, clear and symmetrical. Expressive aesthetics, which is more modern dimension of these two, is about designers’ creative abilities to design original websites. Expressive dimension includes attributes such as creative, using special effects, original, sophisticated and fascinating (Lavie & Tractinsky, 2004.).

Hallnäs and Redström (2002) have taken an existential approach to aesthetics. They state that objects can be defined in terms of its function or its presence. Because computers have become ubiquitous in our daily lives, technology should be designed for meaningful presence instead of efficiency of use. Furthermore, artefacts are “bearers of expressions rather than functions” (Hallnäs & Redström, 2002). This leads us to Hallnäs and Redström’s (2002) descriptive statement that aesthetics is related to how material builds expressive artifacts.

Aesthetics in the field of HCI is understood as “non-quantifiable, subjective, and affect-based experience of system use” (Tractinsky et al., 2000). This view has resemblance to the concept of UX, which includes subjective and affect-based dimensions as well (Law et al., 2009). Even though aesthetic is a complex term which can be seen from many different perspectives, in HCI research, aesthetics is mainly referred as beauty. Studies that have investigated aesthetic aspects of interfaces have principally studied how to design objects which are interpreted as beautiful, or which causes aesthetic pleasure for the user (e.g., Lavie & Tractinsky, 2004; Moshagen & Thielsch, 2010; Seckler, Opwis & Tuch, 2015).

## 2.2.2 Aesthetics in IS literature

IS researchers have not conducted very much research about aesthetic aspects of information systems, even though aesthetics’ important role in website design is acknowledged in the research field of IS (Jiang et al., 2016). Those researchers that

have done so, have mainly adapted the HCI researchers view on aesthetics. For example, both Jiang et al. (2016) and Deng and Poole (2010) have covered Lavie and Tractinsky's (2004) two-dimensional definition of aesthetics in their articles. Even though Jiang et al. (2016) have used findings from HCI studies in their paper, they conclude that prior HCI literature has not been able to successfully explain essential elements to website aesthetics, and Lavie and Tractinsky's (2004) dimensions are too obscure to be utilized in designing more appealing websites. As a side note, Jiang et al. (2016) does not separate HCI literature from IS literature.

Van der Heijden (2003) has studied factors influencing usage of websites, and similarly to HCI studies, he concluded that perceived visual aesthetics influence usefulness, enjoyment and ease-of-use. In addition to HCI, in IS research the first impressions of a website has been studied as well. Jiang et al. (2016) state that perceived website aesthetics will directly influence user attitudes more than perceived utility. However, if users interact with a website many times, the situation is likely to be the opposite, and then utility will matter more than aesthetics.

IS researchers have categorized visual appeal as a 'mood-relevant' and 'low-task-relevant' characteristic of a website. By modifying visual elements designer can determine the ambiance of the website, as aesthetical qualities of a website influence the perceived atmosphere of the website (Deng & Poole, 2010.). According to the same study, visual appeal affects the user enjoyment of a website. But at least in a context of e-commerce, it does not directly affect the completion of a shopping task (Deng & Poole, 2010).

In other IS studies, commercial impacts have been studied as well. In Jiang et al. (2016) study, one of the objectives is to understand how "firms can leverage the functional mechanism of website aesthetics to better promote their businesses". Results of the study suggests that website's aesthetics impacts the corporate image. Pelet and Papadopoulou (2012) examined in their study how colors affect e-commerce websites on consumer mood, memorization and buying intention. The study provides evidence that color attributes hue and brightness affect the two variables, memorization and consumer mood, which are antecedents to buying intention.

Based on literature review of top IS journals, conclusion is that there are few papers conducted which regard aesthetics and website aesthetics. Many of those few articles have been interested in investigating profound and commercial effects of aesthetics, such as effect of aesthetics in corporate image and buying intention. Instead, HCI researchers have mainly studied the effects on the aesthetic objects itself (Jiang et al., 2016). It is reasonable to study how the appearance of a website influences other aspects of the website. However, for many people and companies it could be more beneficial to see the impacts of aesthetics on a larger scale.

### 2.3 Role of Aesthetics in user experience

Traditionally aesthetics has not been regarded as important aspect of HCI. As emphasis has been on objective performance of products, aesthetics has been neglected (Lavie & Tractinsky, 2004). In fact, there were opinions that aesthetics considerations in designing products is hurtful for perceived usability (Tractinsky et al., 2000).

However, this view is not present in research community anymore. The current view accepts aesthetics' role as an influencing factor to the perceived quality of interaction (Tractinsky, 2004). In addition to usability, designers should consider also aesthetics when designing products for the users (Lindgaard & Dudek, 2003). HCI researchers include the aesthetics in models which explain UX. Both models, facets of UX model (Hassenzahl & Tractinsky, 2006), and components of user experience model (Thüring & Mahlke, 2007) state that aesthetics is a non-instrumental part of UX.

When we look at the numerous studies on aesthetics, it is evident that aesthetics has a notable role to play in user experience. In their influential study Tractinsky et al. (2000) studied website aesthetics resulting in the statement that "what is beautiful is usable". Although the results have been later questioned (Tuch, Roth, Hornbæk, Opwis, & Vargas-Avila, 2012), after the statement there has been a significant increase in interest towards aesthetics in UX research. Vargas-Avila and Hornbæk (2011) reviewed 66 empirical studies from 2005–2009, and concluded that aesthetics is one of the most assessed UX research dimension among the dimensions of emotions and enjoyment.

Schenkman and Jönsson's (2000) study shows that beauty of a web page is an important factor in webpage judgement and user experience. In his influential book, renowned usability and design expert Don Norman (2005) claims that aesthetic design influences more on user preferences than usability (Hartmann, Sutcliffe, & Angeli, 2008; Norman, 2005). Another study showed, that even with low perceived usability, a beautiful website can still achieve high user satisfaction. This evidence suggests that a website does not necessarily need to be usable to produce a good user experience (Lindgaard & Dudek, 2003). In any case, a conclusion can be made that aesthetics is crucial and an internal part of UX.



### **3 FACTORS OF PERCEIVED WEBSITE AESTHETICS**

This chapter aims to answer to the second, and primary research question, which is as following: which factors influence perceived visual aesthetics of a website? It is important to study these factors as knowledge gained from them can help designers to design better user interfaces and provide better user experiences. The answer is mainly formed from the combination of two studies.

This chapter consists of four parts. Firstly, background of emerged factors of website aesthetics is shortly illuminated. In the second and the third part, nine factors from two studies are presented and described. Lastly, factors are synthesized and composed to a new holistic framework. Contributions of the study are also discussed.

#### **3.1 Factors as a synthesis from two studies**

There are two measurement approaches for investigating perceived website aesthetics (Seckler et al., 2015). Firstly, there is objective approach, which is based on screen design factors and layout elements which relates to user perception. The measurement is done by using numerical counts of visual images or by more complex mathematical formulas. For instance, Ngo and Byrne (2001) developed 14 measures of screen aesthetics by using objective methods. Secondly, there is subjective method for measuring user perceptions, which is based on questionnaire instruments, such as surveys. Proponents of this method think that screen design elements can be so complicatedly interrelated that aesthetics should view beauty within the subject instead of the object (Seckler et al., 2015.). Underlying factors which are proposed in this study have been found primarily by using subjective measurement methods. As Moshagen and Thielsch (2010) state, it means the following:

For example, a high rating on the Diversity facet does not necessarily imply that the design of the website is exceedingly dynamic or creative, but merely that the realized degree of Diversity is positively valued by a given perceiver.

As this study concentrates on the users' perceptions of websites, it is appropriate use factors based on subjective measurement methods.

Present literature review combines mainly results from two relevant and comprehensive articles from the research fields of HCI and IS for proposing essential factors that critically influence perceived website aesthetics. Resulting factors are also supplemented with findings from many other studies. The article from the field of HCI covers four distinct aspects or factors affecting visual aesthetics of a website (Moshagen & Thielsch, 2010). IS article concludes that website aesthetics is affected by five different determinants (Jiang et al., 2016). Combined, these nine essential factors create a multidimensional and profound framework for website aesthetics.

## **3.2 Four factors from visual aesthetics of website inventory**

Moshagen and Thielsch's (2010) article from the field of HCI includes the objective measure construct called visual aesthetics of websites inventory (VisAWI) for covering aspects of perceived visual aesthetics. The study resulted in validating and identifying four facets: Simplicity, Diversity, Colorfulness, and Craftsmanship. These factors are selected and adopted in this review because of the wide acceptance that the paper in question enjoys (Seckler et al., 2015). Furthermore, previously mentioned four factors are results of extensive identification and validation process which consist of seven studies.

From the inclusive literature review Moshagen and Thielsch (2010) identified 34 factors which described visual aesthetics of a website. In the first study, these factors were evaluated by questioning 256 web users and experts. They came up with 12 broad domains describing visual aesthetics of websites and 84 separate items that reflected these 12 domains. In second study, with the help of 300 volunteers and 100 Finnish websites the structure of item pool was determined, and initial scales constructed. In third study, the scales were further refined and resulted in final model which includes four factors representing visual aesthetics. In fourth study the factor structure was replicated with confirmatory factor analysis. In last three studies the scale of visual aesthetics of websites inventory was validated. Studies show that the construct contains convergent, divergent, concurrent, and discriminative validity. Underneath, the emerged four facets resulted from the study are explained in detail.

### **3.2.1 Simplicity**

Simplicity is an influencing factor of perceived website aesthetics, which includes and combines aspects such as unity, homogeneity, clarity, orderliness and balance (Moshagen & Thielsch, 2010). Simplicity is "a combination of elements that

results in ease in comprehending the meaning of a pattern" (Ngo & Byrne, 2001). In the first interaction with the website, simplicity plays a critical role when user forms the perception of aesthetics value for the first time. Simplicity is found to

correlate highly with classical aesthetics (Moshagen & Thielsch, 2010). Further research has been carried out regarding the four factors of VisAWI measurement method, and results show that low complexity of website affects positively to the perceived website aesthetics (Seckler et al. 2015). Seckler et al. (2015) argue that visual complexity, a well-established design factor and important factor for aesthetic perception (Jiang et al., 2016; Tuch et al., 2012), is arguably the same concept as simplicity. Simplicity is also related to perceived usability of interactions (Karvonen, 2000). In fact, among the four factors simplicity displays the strongest relationship to perceived usability (Moshagen & Thielsch, 2010). In the context of websites, simplicity can be realized by optimizing or reducing the number of elements on screen and alignment points (Ngo & Byrne, 2001). Moreover, to achieve higher ratings to simplicity, complexity, symmetry and color factors hue and brightness should be considered and manipulated (Seckler et al., 2015).

### **3.2.2 Diversity**

Diversity is not a new idea. Already in the 19<sup>th</sup> century, Fechner (1876, 39) stated that the central principle of aesthetics is “the right combination of diversity in unity” (Moshagen & Thielsch, 2010). Diversity is a factor that is related to visual complexity and visual richness. Additionally, it comprises aspects dynamics, novelty, and creativity. Thus, it is no wonder that diversity showed highest correlations to the expressive aesthetics. Diversity can be applied into websites by creating interesting, novel and creative elements which positively arouse the user and creates aesthetic experiences. Creating more diverse website is the solution for low arousal, which is a consequence of boring and simple layout (Moshagen & Thielsch, 2010.). Furthermore, to evoke more diversity, Seckler et al. (2015) suggest that web designer should address the complexity and symmetry of a website, but considering color factors, such as hue, brightness and saturation, would not help.

### **3.2.3 Colorfulness**

Third factor, colorfulness is related to perception or evaluation of websites' individual colors and their composition, selection, placement and combination. Colorfulness includes all color-related aspects of aesthetic perception (Moshagen & Thielsch, 2010.). There is a wide agreement that colors affect the aesthetic perception of website (Kim, Lee & Cho, 2003; Moshagen, Musch & Göritz, 2009; Moshagen & Thielsch, 2010; Cyr, Head & Larios, 2010). People tend to perceive information based on three entities of website: objects, background and relationship between objects and background (Kim et al., 2003). Kim et al. (2003) state that color with its properties hue, saturation and brightness, is a main design factor for each of the three entities. Colors can arouse physiological, cognitive, and emotional reactions (Elliot & Maier, 2007; Kim et al., 2003). Those reactions can be positively affected by choosing the colors appropriately. For example, cool color (blue-white) combinations are perceived as significantly

more appealing than warm color (red-orange) combinations (Coursaris, Swierenga & Watrall, 2008).

### **3.2.4 Craftsmanship**

Last influencing factor emerged from the Moshagen and Thielsch's (2010) study, craftsmanship, can be described as "the skillful and coherent integration of all relevant design dimensions". Craftsmanship reflects whether the website is designed harmoniously with modern technologies. Website design trends constantly change and internet technologies has advanced in past, and will advance in future in a rapid pace. If website is not designed with modern methods and technologies, there is a great probability that its appearance seems outdated to user (Moshagen & Thielsch, 2010.). Regarding the nature of aesthetics, this indicates that aesthetic perceptions are affected by passing of the time. What was observed as beautiful in the past might not be beautiful anymore. At any rate, a website is hardly evaluated as aesthetically pleasing if it does not appear to be professionally designed.

## **3.3 Five factors from IS study**

Even though some of the factors from two different frameworks overlap, present study takes into account other perspective as well to depict more comprehensive model about the essential factors of perceived website aesthetics. Other perspective comes from Jiang et al. (2016) article which represents more the field of IS research than HCI research, which is at the intersection of many different fields of study. Researchers intention was to find essential design elements that affects user perceptions of website aesthetics. Unlike the Moshagen and Thielsch (2010), Jiang et al. (2016) studied the effects of aesthetics in the context of first interactions with websites. Therefore, the angle of view is slightly different. The comprehensive and extensive research process, which was conducted by using subjective measures, resulted in the model of five distinct and sufficient determinants, or factors which significantly affect the user perceptions. Factors are unity, complexity, intensity, novelty and interactivity.

Jiang et al. (2016) conducted their research quite similarly as Moshagen and Thielsch (2010). Based on literature review, aforementioned five determinants were hypothesized into research model as influencing factors. Three of them, unity, complexity and intensity, were adapted from the Beardsley's (1981) three general canons for aesthetic design. Because canons were proposed before the era of internet, Jiang et al. (2016) included two additional determinants, novelty and interactivity from the previous literature to their research model (Djajadiningrat, Gaver & Fres, 2000; Lim, Lee & Kim, 2011; Reimann, Zaichkowsky, Neuhaus, Bender, & Weber, 2010). The model was successfully tested with two coherent studies.

In the first study, Jiang et al. (2016) found substantial qualitative evidence for the proposed five determinants. Evidence was found with item sorting

method and with the help of web designers and professionals. Study included two stages. In the first stage items describing design elements of the website were generated and refined, and in the second stage items were sorted into different categories by professional judges. They were not told what the underlying construct was expected to be to eliminate the possibility for interpretational confounding. In the second study, proposed elements were tested by surveying 300 participants. Participants were randomly assigned to ten corporate portal websites. Additional tests were carried out to check the validity of the findings. Below, the confirmed resulting five factors which form holistic framework for website aesthetics are discussed.

### **3.3.1 Unity**

Unity, somewhat overlapping factor with the simplicity facet, refers to conformity and uniformity among the elements of website design in a way that they seem to belong together (Jiang et al., 2016; Veryzer & Hutchinson, 1998). Unity pertains to intended and meaningful visual connection among design elements. Unity is also linked to the colorfulness factor because it is related to the consistency of visual schemes (Jiang et al. 2016.). Recently, concept of unity has not been very popular topic in HCI research. Nevertheless, also Veryzer and Hutchinson (1998) demonstrate with four experiments that unity affects positively aesthetic responses, and this effect is not confounded with other factors. Objects under examination were physical products, but the results can be extended to websites as well. Moshagen and Thielsch (2010) found out that unity highly correlates with the clarity of website. Regarding salient visual elements of website, Silvennoinen and Jokinen (2016) demonstrate that users' emotional emphasis is placed on symmetrical and balanced composition, which further indicates the importance of unity in website design. To conclude, based on Jiang et al. (2016) study it can be stated that perceived quality of unity positively affects the user's perceived quality of website aesthetics. On top of color schemes, unity can be achieved in website design by paying attention to visual balance of website structure and layout of texts and images (Jiang et al., 2016).

### **3.3.2 Complexity**

Complexity of a website is determined by the number of elements on the interface, variety of presentation formats and different layers of navigation structure (Jiang et al., 2016). Complexity also refers to perceived amount of information in website (Huang, 2003). If users perceive the website complexity as of low quality, it might indicate that website is too complex or simple (Jiang et al., 2016). Thus, complexity is closely related to the facets of simplicity and diversity. When website is observed as too simple, it is a signal the website is tedious and boring. When interaction with the website requires too much cognitive resources from the user, the website is too complex and results in high uncertainty. Boredom and uncertainty negatively influences perceived quality of website aesthetics (Jiang et al., 2016.). Seckler et al. (2015) have discovered that complexity affects all four subjective facets from the VisAWI construct. Additionally, Tuch's et al. (2012)

study reinforces the notion that visual complexity is important factor for aesthetic perception of websites in the context of first impression. In order to avoid negative first impressions, website designer should not design constructs leading to high visual complexity (Tuch et al., 2012).

### **3.3.3 Intensity**

Intensity refers to vigor of qualities which are characterized as presence of expressiveness. Intensity is means to escape the visual dullness and therefore increase aesthetic value of website (Jiang et al., 2016.). Intensity of website regards elements and components such as color schemes, brightness, contrasts and quality of images. Proper design of intensity attracts user attention and facilitates aesthetic appeal. (Jiang et al., 2016.) Saturation, which refers to intensity of color (Reinecke, Yeh, Miratrix, Mardiko, Zhao, Liu & Gajos, 2013), is a visual factor of website homepages and it affects the emotions in users (Kim et al., 2003). As intensity in design can be manifested with the use of color schemes, intensity is as well closely related to the facet of colorfulness. Regarding intensity, designer should also find the golden mean, likewise in complexity.

### **3.3.4 Novelty**

The term novelty is considered as “the quality or state of being new and unusual, different from anything in prior existence” (Jiang et al., 2016). Novelty addresses unexpected, surprising, new and unfamiliar aspects of website (Huang, 2003). New designs can provide chance for people to experience new things. Novelty can be achieved in website by creating new designs in web elements, such as navigation, interface and layout of the site (Jiang et al., 2016.). Designer can create pleasantly surprising aesthetic experiences by seizing and utilizing innovations in IT (Huang, 2003). When looking at the factor of novelty and dimension of visual aesthetics, expressive aesthetics, assumptions can be made that these two are interrelated. Novelty also overlaps with the facet of diversity.

### **3.3.5 Interactivity**

Last factor of the framework, interactivity, cannot be clearly connected to any facet of VisAWI construct. Therefore, it is most prominent factor in separating these two frameworks from each other. Interactivity can be described as the ability of an object to allow users’ participation in modifying its form and content (Lim et al., 2011; Jiang et al., 2016). It is a dynamic aspect and invisible part of interaction (Lim et al., 2011). Additionally, it points out the extent of information exchange between website and user (Huang, 2003). Interactivity is distinctive characteristic of a website, which differentiates it from the other media, such as newspapers and magazines (Jiang et al., 2016). Djajadiningrat et al. (2000) argue that aesthetics and interaction are tightly intertwined, and interactions must be judged by their aesthetic qualities. To improve these aesthetic judgements of interactions, websites should be designed in a way that interplay between user and system has an interesting and changing flow (Djajadiningrat et al., 2000).

This suggests that aesthetical pleasure could be increased by implementing smooth and colorful animations in layout changes or page transitions as a response for user inputs.

### **3.4 Nine factors of website aesthetics**

As result of this study nine essential factors influencing website aesthetics are identified and proposed. Factors are simplicity, diversity, colorfulness, craftsmanship, unity, complexity, intensity, novelty and interactivity. Results are presented and summarized in the table below (TABLE 1 Factors influencing perceived website aesthetics). Qualities of these factors determine the evaluated and judged quality of website aesthetics. They determine the beauty of a website.

How does one create a beautiful website? It is not an easy task to successfully create functional and beautiful web designs that please users. Results of this bachelor thesis give insight on which aspects should be considered if the aim is to increase aesthetic appeal of the website. Addressing the simplicity, designers should combine elements of the web pages in a balanced way that the message of the site is easily understood. In a same time, designers should seize their creativity and create novel and interesting elements which arouse the users and dispose their boredom. This requires the diversity aspect. Resultant construct should be enriched with successful combination of colors which arouses positive emotions in user. Cool color choices are recommended. On top of everything, website should be produced by using modern technologies. This harmonious and coherent design requires craftsmanship from the designer.

Furthermore, design elements should be connected together to achieve all-encompassing unity among elements. Designer should strive for visual balance. In a design process, focus should be placed on finding correct level of complexity. Too simple design leads to boredom and too complex design to high uncertainty. Regarding intensity, by utilizing stark contrasts, bright colors, and vibrant images one can attract attention and highlight important aspects of website. Resultant appearance of a website should differ in some way from other existing websites. Novelty factor can arouse curiosity towards the aesthetic object, and create new experiences for users (Jiang et al., 2016). Lastly, interactions should be designed in a way that system responses to user inputs have interesting and changing flow.

Present paper with its nine factors has focused on the visual aspects of website's user experience. It is worth acknowledging that mere beautiful appearance does not automatically translate to good system performance or user experience. Therefore, designers should not forget to take into account usability when designing websites and other products (Moshagen et al., 2009.). A good designer strives for creating websites which are both usable and aesthetic.

TABLE 1 Factors influencing perceived website aesthetics

<b>Factor</b>	<b>Description</b>	<b>From Study</b>
Simplicity	Combination of visual elements which results in ease of comprehension.	Moshagen & Thielsch (2010)
Diversity	Implementing visual richness in unity.	Ibid.
Colorfulness	Evaluations relating to individual colors and their composition.	Ibid.
Craftsmanship	Skillful and coherent way of integrating design elements.	Ibid.
Unity	Conforming of website elements in a way that they belong together.	Jiang et al. (2016)
Complexity	Number of elements and presentation formats in website.	Ibid.
Intensity	Vigor of presence of expressiveness.	Ibid.
Novelty	Being different from anything prior existence.	Ibid.
Interactivity	Ability of object in allowing user to modify its contents and form.	Ibid.



## 4 CONCLUSION AND DISCUSSIONS

Purpose of this study was to examine role of aesthetics in user experience, and particularly to identify which essential factors of website influence perceived website aesthetics. Visual appearance and beauty of a website significantly affect how the website will be experienced and judged (Schenkman & Jönsson, 2000). More beautiful and joyful website is, more likely users will return to use it in future as well (Cyr et al., 2006). Hence, it is reasonable and important to know the factors of aesthetics. Increased knowledge on aesthetics will help web designers in creating more appealing and enjoyable websites in future. In overall, this knowledge will help to accomplish better user experience.

First research question was the following: What is meant by aesthetics in IS and HCI literature? It can be summarized that aesthetics is a complex and multidimensional concept which is understood differently among research community (Lavie & Tractinsky, 2004). Research focusing on website aesthetics has understood the term aesthetics as beautiful or pleasing appearance of object. Thus, aesthetics refers to beauty (Tractinsky, 2004). We can claim that scientists representing general research field of IS do not study aesthetics nearly as much as HCI researchers, who especially are interested in the interactions between humans and computers. Moreover, IS field has quite congruent view on aesthetics with the HCI field. Despite the low number of studies, one study from the top class IS journal was found out to be highly relevant to this thesis (Jiang et al., 2016). Among the articles, Jiang et al. (2016) study was the only one that specifically pursued for identifying aesthetic factors of a website. It is evident that aesthetics is a fundamental part of user experience. It belongs to hedonic and non-instrumental side of user experience, and it greatly influences especially the first impressions of website.

Second, and primary research question was the following: what are the essential factors that influence perceived visual aesthetics of a website? As a result to main question, this study chose findings from two separate studies to represent factors that affect perceived quality of website aesthetics. These two studies were chosen because their proposed frameworks are results of thorough research processes. When factors from both studies are combined, resulting

construct gives more accurate and inclusive picture about website aesthetics than either studies can offer alone. Nine extensive factors were chosen altogether. Four factors, simplicity, diversity, colorfulness and craftsmanship, were from the HCI research's VisAWI construct (Moshagen & Thielsch, 2010), and five factors, unity, complexity, intensity, novelty and interactivity, were adapted from the IS paper (Jiang et al., 2016).

Some of the factors from two frameworks collide with each other. For instance, complexity factor includes aspects from simplicity and diversity factors, and novelty is related to diversity. Nonetheless, no single factor can be left out of proposed new framework as each factor contains unique characteristics. Certainly, diversity is related to complexity, yet they are not equivalents to each other. While complexity is about how many elements a website contains (Jiang et al., 2016), diversity is more about how different those elements are from each other (Moshagen & Thielsch, 2010).

Beautiful appearance of a website positively affects companies' businesses. As an implication of this study, designers can increase visual appearance of website by focusing on these nine factors in design process. People spend a great deal of their lives using internet. When the sites they encounter while browsing the web are aesthetically pleasing and visually joyful, it does not only positively impact the experience of interaction, but also the life of the user. Beauty is beneficial for both sides of the interaction, the company and customer.

Findings of present study rest on scientific information that is found from the reliable sources. Nonetheless, there is one issue that might affect the trustworthiness of the results. Only two frameworks that cover factors of website aesthetics was found, which indicates that there are not enough studies conducted regarding the topic. It is possible that there exist some aspects of website aesthetics that none of the nine factors take into account. In theory, all factors are important, but maybe some factor does not matter as much as it seems. More research should be conducted to test these factors.

It is important to note that this thesis does merely offer broad suggestions on how to design beautiful websites since proposed factors are quite abstract and general. Results highlight the aspects where the focus should be targeted, but this study does not provide clear and specific instructions on how one should design website elements in practice. Finding more practical design guidelines for each factor could be interesting topic for further research. Design guidelines would address website elements, such as background colors, pictures, font choices, animations and layout (Jiang et al., 2016).

Other limitation lies in the notion that this paper and its sources have simplified the nature of aesthetics to mean beauty. Some aspects and dimensions of aesthetics might have been ignored. For example, some could say that website can be visually pleasing or interesting even though they would not perceive it as a beautiful. Paper has investigated mainly visual aspects of website, which relate to sense of sight. Thus, it ignores how much other senses impacts to aesthetic perceptions. Accessibility issues have also been neglected. Would design, which has considered nine factors of visual aesthetics, also positively affect perceived accessibility of website?

Present study does not consider how cultural differences affect the aesthetic perceptions. Hence, further studies could be conducted on how the cultural differences affect the identified factors of website aesthetics. It would be revealing to see the degree of how universally people from different cultures and nations perceive the beautiful objects, and are the proposed nine factors equally relevant in every culture.

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