MEASURING SERVICE QUALITY IN ONLINE LUXURY GOODS RETAILING

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ABSTRACT

Service quality has been identified as a crucial factor to successfully and sustainably manage online shops. In this paper, we introduce an adaptation of the E-S-Qual instrument to measure service quality in online luxury goods retailing. Based on a literature review, we identify efficiency, design, fulfillment, information, contact and responsiveness as factors of service quality in online luxury goods retailing. We found empirical evidence that these factors should be considered as dimensions rather than antecedents. A survey conducted in cooperation with the HUGO BOSS AG indicates that our proposed instrument is valid and reliable. Implications for research and practice as well as limitations of our study are discussed.

Keywords: Service Quality, Luxury Goods, E-S-Qual, Customer Service

1. Introduction

Many luxury goods retailers fear that online retailing will diminish their brand's appeal by corroding their reputation for exclusivity. Think of expensively furnished shops on the high streets of fashionable cities not everybody dares enter, and exquisitely designed advertisements in high-fashion, high-price glossy magazines.

Contrast this with a website accessible to everyone anytime, and blinking banner ads on Google Search. Could opening a web shop ultimately force a luxury good retailer to alter its business model and reposition its entire brand?

On the other hand, online retailing will facilitate impulse buying for loyal customers and attract new customers. High-end customer groups are typically broadly distributed geographically, but align their tastes with international peer groups. They suffer from severe time constraints and happily use online shops [Dubois & Laurent 1995]. Some of the biggest luxury good retailers, Dolce & Gabbana, HUGO BOSS and Dior, have already identified online retailing as a chance, not a threat, and recently launched their online shops. Can their competitors afford to keep away from the internet now – or will they be marginalized, scrambling to regain market share and customers?

We think that the key question here is whether the features that make luxury goods attractive to customers and that made retailers a success on the high street in the first place can be replicated online. Luxury goods buyers are typically looking for outstanding quality and image in the brands they favor, and are willing to pay the high price which signals the good's exclusivity [Vigneron & Johnson 2004]. Another feature eminently important to them is a high standard of service quality. Product quality and prices can be determined, to a great extent, independently of the sales channel. Services customers need in online shops, for example safe shipment, secure payment and fast response to customer emails or telephone calls differ from those they expect in high-street shops. This is why we decided to look into the key feature of service quality in luxury brands online shops first.

There exists a multitude of instruments for measuring online service quality. [Parasuraman et al. 2005] proposed an adaptation of their ServQual instrument which has been widely applied for measuring offline service quality. Another instrument which is based on the original DeLone and McLean IS-success model has been

developed by [Mc Kinney et al. 2002]. DeLone and McLean themselves recommended their updated IS-success model for measuring the satisfaction of customers with e-commerce web sites [DeLone & McLean 2004].

However, none of them have been specifically developed or tested for luxury goods retailing which is distinctly different from mainstream goods retailing. Luxury goods offer their buyers more than just functional value [Arghavan & Zaichkowsky 2000]. Compared to purchasing mainstream goods, consumers exhibit different attitudes towards [Dubois & Laurent 1994; Wong & Ahuvia 1998] and motivation for buying luxury goods [Kapferer 1998]. It seems likely that luxury goods consumers will consider other aspects when evaluating the service quality of a luxury retailer's online shop. Our research attempts to answer the questions:
- What factors influence the perceived service quality in online luxury goods retailing?
- Are these factors dimensions or antecedents?

We adapt the E-S-Qual instrument developed by Parasuraman et al. in order to measure service quality specifically for online luxury good retailers. In cooperation with HUGO BOSS AG, we empirically examined our instrument to test the reliability and validity of the factors we suggest influence luxury goods consumers' satisfaction with online retailing. Our findings show that our instrument is both reliable and valid and very well suited to measuring service quality in online luxury goods retailing.

The work presented here makes three major contributions to researchers and practitioners:
1. We empirically test a set of factors and indicators, derived from theories and research relevant to luxury goods retailing, that may be appropriate for explaining service quality in online luxury goods retailing.
2. We identify a set of indicators which developers and managers of online shops for luxury goods need to take into account to ensure their shop's success.
3. Finally, our research will help researchers as well as practitioners to understand the attitudes of consumers of luxury goods better.

The remainder of this paper is organized as follows. In the next section, we construct the measurement instrument based on previous empirical findings about service quality and attitudes of luxury goods consumers. The design and the result of the survey conducted to evaluate the proposed measurement instrument are presented afterwards. We conclude the article with a discussion of our findings, their limitations, and their implications both for research and practice and point out some interesting avenues for further research.

2. Theoretical Foundations
2.1. State of the Art of Research
Service quality is mostly depicted as a latent variable that can only be measured indirectly. Most researchers believe that service quality is a perception and might be different for different customers [Homburg et al. 2002]. In order to measure a latent variable reliably, a measurement model consisting of one or more indicators is constructed. Similar indicators are grouped in distinct dimensions (components) or antecedents. We use the term "factor" for a construct which is either modeled as dimension or antecedent.

A large variety of factors affecting service quality, such as convenience, site design, privacy, and trust, are discussed in the literature [Schaupp & Bélanger 2005; Szymanski & Hise 2000]. Table 1 summarizes factors used for measuring the service quality of online shops.

[Schaupp & Bélanger 2005] for example identified three main factor classes: technology-related (e.g. searching capabilities, site security), shopping-related (e.g. price comparison service, post purchase service), and product-related (e.g. perceived product quality, cost of the products). Based on a conjoint analysis, they assessed each sub-factor's relative importance and found that privacy to be most important for their test group.

2.2. Definition of Luxury Goods
[Dubois et al. 2001] identified six attributes which distinguish luxury goods from other products: 1) excellent quality, 2) very high price, 3) scarcity and uniqueness, 4) aesthetics and polysensuality, 5) ancestral heritage and personal history, and 6) superfluousness. Bourne underscores the exclusiveness of luxury goods and defines such goods as not commonly owned or used goods [Bourne 1957]. [Vigneron & Johnson 1999] define luxury goods as conspicuous, unique, social, emotional, and of high quality, which is similar to the definition given by Dubois et al. The motivation to buy a specific luxury good depends on the degree to which the good displays the attributes defined by Dubois et al. Consumers which evaluate product quality very critically tend to evaluate service quality equally critically. Intending to purchase high-quality products, they are likely to mind deficiencies very much, and expect problems to be dealt with immediately.

We define luxury goods as goods that serve as a symbol for the characteristics defined by [Dubois et al. 2001], and help consumers to strengthen the membership to a certain social group [Tsai 2005]. The purchase process of luxury good consumers is different especially in regard to the purchase objective which is not purely functional. Consumers of luxury goods choose goods which reflect their internal self, and match their individual preferences

and quality requirements [Wong & Ahuvia 1998]. These findings about the behavior of consumers of luxury goods are used to reduce the set of possible factors (see Table 1).

Table 1: Online Shopping Service Quality Factors

Author(s)	Factors
[Aladwani & Palvia 2002]	Specific content, content quality, appearance, technical adequacy
[Anand 2007]	Convenience, merchandising, site design, security, serviceability
[Balasubramanian et al. 2003]	Satisfaction, perceived trustworthiness, perceived environmental security, perceived operational competence, trust disposition, price perceptions
[Bauer et al. 2006]	Functionality/design, enjoyment, process, reliability, responsiveness
[Boshoff 2007]	Efficiency, delivery, privacy, speed, system availability, reliability
[Chang & Chen 2009]	Convenience, interactivity, customization, character, perceived security
[Cheung & Lee 2005]	Information quality (accuracy, content, format, timeliness), system quality (navigation, ease of use, response time, security), service quality (responsiveness, assurance, empathy)
[Cho & Park 2002]	Product information, consumer service, purchase result and delivery, site design, purchasing process, product merchandising, delivery time and charge, payment methods, ease of use, additional information services
[Collier & Bienstock 2009]	Process quality (ease of use, privacy, design, information access, functionality), outcome quality (order accuracy, order timeliness, order condition), recovery (interactive fairness, procedural fairness, outcome fairness)
[Dabholkar et al. 2000]	Reliability, personal attention, comfort, features
[Fassnacht & Koese 2006]	Environment quality (graphic quality, clarity of layout), delivery quality (attractiveness of selection, information quality, ease of use, technical quality), outcome quality (reliability, functional benefit, emotional benefit)
[Gummerus et al. 2004]	User interface, responsiveness, need fulfillment, security
[Janda et al. 2002]	Performance, access, security, sensation, information quality
[Kettinger & Lee 2005]	Reliability, responsiveness, rapport, tangibles
[Kim & Stoel 2004]	Web appearance, entertainment, informational fit-to-task, transaction capability, response time, trust
[Kim et al. 2006]	Efficiency, fulfillment, system availability, privacy, responsiveness, compensation, contact, information and graphic style
[Li et al. 2009]	Ease of use, reliability, system availability, responsiveness, trust
[Liu & Arnett 2000]	Quality of information and service, system use, playfulness, system design quality
[Madu & Madu 2002]	Performance, features, structure, aesthetics, reliability, storage capability, serviceability, security and system integrity, trust, responsiveness, product/service differentiation and customization, web store policies, reputation, assurance, empathy
[Mc Kinney et al. 2002]	Understandability, reliability, usefulness, access, usability, navigation
[Parasuraman et al. 2005]	Efficiency, fulfillment, system availability, privacy, responsiveness, compensation, contact
[Santos 2003]	Reliability, efficiency, support, communication, security, incentive
[Schaupp & Bélanger 2005]	Technology factors (security, usability and site design, privacy), shopping factors (convenience, trust and trustworthiness, delivery), product factors (merchandising, product value, product customization)
[Srinivasan et al. 2004]	Customization, contact interactivity, cultivation, care, community, choice, convenience, character, e-loyalty, search, word-of-mouth, willingness to pay more
[Surjadaja et al. 2003]	Service marketing, service design, service delivery
[Szymanski & Hise 2000]	Convenience, merchandising (product offerings and product information), site design, security
[Torkzadeh & Dhillon 2002]	Product choice, online payment, vendor trust, shopping travel, shipping errors, shopping convenience, internet ecology, customer relation, product value
[Wolfinbarger & Gilly 2003]	Site design, fulfillment and reliability, privacy and security, customer service
[Yang et al. 2003]	Responsiveness, credibility, ease of use, reliability, convenience, communication, access, competence, courtesy, personalization, continuous improvement, collaboration, security/privacy, aesthetics
[Yoo & Donthu 2001]	Ease of use, aesthetic design, processing speed, security

2.3.   Factors of Service Quality in Online Luxury Goods Retailing

We chose E-S-Qual for our study. It has been shown to be well-suited for evaluating online shops' service quality (see for example [Akinci et al. 2010; Boshoff 2007; Connolly et al. 2010; Jun et al. 2009; Marimom et al. 2010]). Some changes were made to reflect previous empirical studies' findings and the results of interviews with

two marketing manager and two online shop managers from HUGO BOSS AG. We introduce both scales of the E-S-Qual instrument and discuss both the dimensions and the proposed changes.

Based on the famous ServQual instrument [Parasuraman et al. 2005] developed an instrument for evaluating online services. They conceptualized and refined two multiple-item scales for measuring service quality in online shops. The base scale consists of the four factors efficiency, fulfillment, system availability and privacy. The second scale, which is only relevant for consumers who have actually used recovery services, encompasses three factors: responsiveness, compensation and contact.

Luxury goods consumers' willingness-to-pay deviates from that of consumers of non-luxury goods. We now consider the question whether these consumer groups also differ in regard to the factors they use to judge the service quality of an online retailer. Most instruments summarized in Table 1 have been developed for online shops in general, implying that they may also be used to evaluate luxury goods shops. A recent study about the consumer behavior of luxury goods consumers, however, showed the vital factors for service quality to be the following [Springer Media Impact 2009]: ease of use, site organization, site design, product information, and convenience.

E-S-Qual covers only ease of use (efficiency), site organization (efficiency) and convenience (effiency and fulfillment). Site design and product information are not included in the instrument. The study conducted by Springer Media Impact suggests that compensation is unimportant. It requires a rather great effort from the consumer, which is precisely what consumers of luxury goods typically try to avoid. Our first change to the survey is adding the two factors site design and product information and deleting the factor compensation. The adaptation of the E-S-Qual instrument is continued with a more thorough discussion of each possible factor. We incorporate theoretical findings from our literature review and practical findings from our interviews with two marketing managers and two shop managers from HUGO BOSS.

Some studies show the efficiency of the online shop to be paramount [Hsu 2008; Parasuraman et al. 2005]. Efficiency describes the ease and speed of interacting with the shop. Efficiency is important for luxury goods consumers because they frequently work long hours. They have the money to buy luxury goods [Dubois & Laurent 1995], but not the time or patience to handle inefficient online shops.

Factors such as fulfillment, reliability, or delivery process are also often discussed and have been identified as very important in some studies [Parasuraman et al. 2005; Schaupp & Bélanger 2005]. Indicators of these factors are, for example, the speed and accuracy of product delivery and the retailer's reliability. Consumers are dissatisfied if these factors are implemented badly in an online shop. Luxury goods consumers do not only consider the quality of the good, but also the quality of the entire purchasing process [Fionda & Moore 2009]. We believe that these indicators, which we summarize in the construct fulfillment, are also relevant to explaining perceived service quality in online luxury goods retailing.

The third factor, system availability, has been found to affect service quality only mildly [Akinci et al. 2010; Parasuraman et al. 2005]. It is questionable whether the items used previously to measure system availability are still appropriate today - most e-shops have a system availability of nearly 100%. Our interviewees corroborated our supposition: they told us that receiving complaints based on system unavailability is very unusual. We decided to omit this factor from our measurement instrument.

Most studies quote privacy and security as factors of online shopping service quality. [Schaupp & Bélanger 2005], for example, reported that privacy was crucial to service quality, but that security was inconsequential [Parasuraman et al. 2005], on the other hand, found privacy to be inadequate for explaining online shopping service quality. This was the result of their conducting a factor analysis with an oblique rotation method. Re-analyzing their data with an orthogonal rotation method led [Parasuraman et al. 2005] to conclude that privacy was important after all. But orthogonal rotation methods being invalid for second order constructs (such as service quality), their second and final interpretation about the importance of privacy is misleading. Other researchers have confirmed that privacy cannot be used for explaining the perception of online shopping service quality [Li et al. 2009; Wolfinbarger & Gily 2003]. We decided to omit this factor from our measurement instrument.

Another factor proposed as a factor of online shopping quality is site design. The design of an online shop is comparable to the internal design and arrangement of offline stores. Since consumers are not able to taste, smell or feel products in an online shop, the visual impression of online shops becomes more important [Abbott et al. 2000]. In e-commerce, site design is a very important criterion for online shop differentiation. According to [Dubois et al. 2001], aesthetics and polysensuality are important aspects both of a luxury good and the store selling the luxury good. The design of a website is used to symbolize characteristics, emotions and the image of a brand. Brand recognition has been found as very important for luxury goods [Han et al. 2010]. Since luxury goods have been defined as goods that serve as a symbol for several characteristics, we believe that site design will be an important factor for demonstrating characters like quality, aesthetics and polysensuality.

Consumers' inability to taste, smell, feel, and test products in online environments also increases the importance of the amount and quality of product information provided [Abbott et al. 2000]. Consumers of luxury goods often have very high expectations of product quality [Vigneron & Johnson 2004]. Quality has already been shown to be an attribute well-suited for distinguishing between luxury and non-luxury goods [Dubois et al. 2001]. Evaluating product quality before purchasing the product online is only possible based on product information such as texts, pictures and videos. We believe that the amount and quality of product information are crucial for evaluating product quality and avoiding bad purchases. Our interviewees agreed with our hypothesis that product information is especially important for online service quality when buying luxury goods.

The factors we have discussed so far are valid both for consumers who have used recovery services and for those who have not. For consumers having already used recovery services, [Parasuraman et al. 2005] constructed a measurement instrument called E-RecS-Qual. This instrument consists of three factors: responsiveness, compensation and contact, and has been validated in several studies [Akinci et al. 2010; Yang & Tsai 2007; Parasuraman et al. 2005].

The first customer requirement in the recovery services process is contacting the seller. The possibility to contact service employees and the latter's communication behavior might increase perceived recovery service quality [Parasuraman et al. 2005]. Consumers of luxury goods are characterized by high product involvement and high expectations about product quality [Vigneron & Johnson 2004]. These customers are likely to want to contact the online shops even in case of minor problems with the product or the purchasing process. Contact is therefore an important factor to explain recovery service quality in online luxury goods retailing.

The ability and motivation of employees to solve post-purchase problems are subsumed in the factor responsiveness. Responsiveness has a direct impact on recovery service quality, customer loyalty and willingness to recommend the online shop [Parasuraman et al. 2005]. Since one of the characteristics of a luxury good is their high-class image, it is obvious that problems in the after-sales stage should be solved as fast and competently as possible in order to preserve this image.

Compensation describes the degree to which the online retailer is willing to compensate customers for problems. A main indicator of this factor is whether pick-up services are offered for returning products. Although we, and also our interviewees, believe this factor to be relevant for explaining service quality in online luxury goods retailing, we excluded this factor. This is due to the fact that some compensation services, for example revocation of buying contracts and product return services, are strictly regulated by law in Germany where we conducted the empirical study. Some compensation indicators will not contain any variance, rendering compensation useless for explaining variance of service quality. In future research, we will extend the proposed measurement instrument and evaluate it with an online luxury retailer located elsewhere.

The initial measurement instrument is well-founded on the original E-S-Qual instrument, on theoretical findings about luxury goods consumers, and on the opinion of four luxury good experts. The items we found in the relevant literature display high reliability and validity, rendering an additional preliminary study for generating and reducing a large set of possible initial items unnecessary. Both scales were checked for face validity before conducting the survey. The items we used to measure the proposed factors are introduced in the next subsection.

2.4.   Indicators of Service Quality in Online Luxury Goods Retailing

Based on the factors deduced in the previous section we constructed a measurement instrument with indicators mainly based on the E-S-Qual and the E-RecS-Qual scale proposed by [Parasuraman et al. 2005]. We also followed their recommendation to construct two scales, one for all consumers and one for those who have already used recovery services. The first scale which we also call E-S-Qual consists of the factors efficiency, site design, product information and fulfillment and thus measures service quality as a second order construct. Recovery service quality is measured with the second scale (E-RecS-Qual).

Indicators for both scales are summarized in Table 2 and 3. We use multiple items to measure our constructs as recommended by [Churchill 1979; Sarstedt & Wilczynski 2009] for ensuring a thorough measuring of constructs.

All items presented in Table 2 and 3 have been used before to evaluate online service quality. Their face validity was investigated in at least one study. All items have been used to measure the factor we assigned to the item, relieving us of the need to start with a larger set of items and reducing it step by step. We conducted a pretest and checked both scales for reliability and validity (see section 3).

In order to assess the scales' validity, [Parasuraman et al. 2005] suggest measuring the loyalty intentions of the customers and their perceived value. We defined a scale for loyalty intentions and a single-item to measure perceived value. These items are shown in Table 4.

Table 2: Indicators of E-S-Qual

Factor	Item	Indicator	Reference
Efficiency	EFF1	The site makes it easy to find what I need.	[Boshoff 2007; Parasuraman et al. 2005]
	EFF2	The site makes it easy to get anywhere on the site.	[Boshoff 2007; Parasuraman et al. 2005]
	EFF3	The site enables me to complete a transaction quickly.	[Boshoff 2007; Parasuraman et al. 2005]
	EFF4	Information at the site is well organized.	[Boshoff 2007; Parasuraman et al. 2005]
	EFF5	The site loads its pages fast.	[Parasuraman et al. 2005]
	EFF6	The site enables me to get on to it quickly.	[Parasuraman et al. 2005]
Design	DES1	Using the site gives me a lot of fun.	[Liu & Arnett 2000; McKinney et al. 2002]
	DES2	The graphical design of the site is appropriate.	[Cho & Park 2002]
	DES3	The layout of the site meets my expectations.	[Zhou et al. 2009]
Information	INF1	The site offers an adequate number of alternative items.	[Szymanski & Hise 2000]
	INF2	Amount and quality of product information are sufficient to make a buying decision.	[Cho & Park 2002; Szymanski & Hise 2000]
	INF3	Product pictures help to make a buying decision.	[Yoo & Donthu 2001]
Fulfillment	FUL1	It delivers orders when promised.	[Parasuraman et al. 2005]
	FUL2	It informs me about the order status.	[Akinci et al. 2010; Cho and Park 2002]
	FUL3	It quickly delivers what I order.	[Parasuraman et al. 2005]
	FUL4	It sends out the items ordered.	[Parasuraman et al. 2005]
	FUL5	It has in stock the items the company claims to have.	[Parasuraman et al. 2005]
	FUL6	It delivers the products as described on their site.	[Parasuraman et al. 2005]

Table 3: Indicators of E-RecS-Qual

Dimension	Item	Indicator	Reference
Contact	CON1	The customer service is always available during opening times.	Re-constructed
	CON2	The customer service representatives are very friendly.	[Li & Suomi 2009; Santos 2003]
	CON3	In case of problems I can talk to a customer service representative.	[Parasuraman et al. 2005]
	CON4	The customer service representatives are very helpful.	[Santos 2003]
	CON5	The advice of the customer service representatives is competent.	Re-constructed
Responsiveness	RES1	This site handles product returns well.	[Parasuraman et al. 2005]
	RES2	This site handles reclamations well.	[Parasuraman et al. 2005]
	RES3	This site returns my money fast when I return an item.	Re-constructed
	RES4	It takes care of problems promptly.	[Parasuraman et al. 2005]

Table 4: Indicators to prove the validity

Dimension	Item	Indicator	Reference
Loyalty Intention	LOY1	Say positive things about this site to other people?	[Parasuraman et al. 2005]
	LOY2	Recommend this site to someone who seeks your advice?	[Parasuraman et al. 2005]
	LOY3	Encourage friends and others to do business with this site?	[Parasuraman et al. 2005]
	LOY4	Consider this site to be your first choice for future transactions?	[Parasuraman et al. 2005]
	LOY5	Do more business with this site in the coming month?	[Parasuraman et al. 2005]
Perceived Value	PV1	The overall satisfaction with the site	Re-constructed

2.5.   Dimensions versus Antecedents

Some recent studies used, instead of dimensions models, antecedents models of service quality. As [Dabholkar et al. 2000] objected, there are several research streams in which factors were first defined as dimensions and later as antecedents. It seems natural to expect antecedent models to be superior to dimension models. Empirical evidence for the antecedent model has been presented in [Dabholkar et al. 2000] and in various other studies such as [Gounaris et al. 2005; Shamdasani et al. 2008].

We tested two alternative measurement models (Figure 1), one of which contained the factors derived in section 2.3 as dimensions, and the other as antecedents. The first model suggests that the factors (efficiency, design, information fulfillment, contact and responsiveness) operate as dimensions of service quality, which is a reflective second order construct. The antecedent model suggests that service quality is formatively influenced by the factors presented in section 2.3.

In the next section, we describe our survey design and sample before both scales are purified based on the results of exploratory factor analysis and internal consistency. We compare the models shown in Figure 1 based on a SEM.
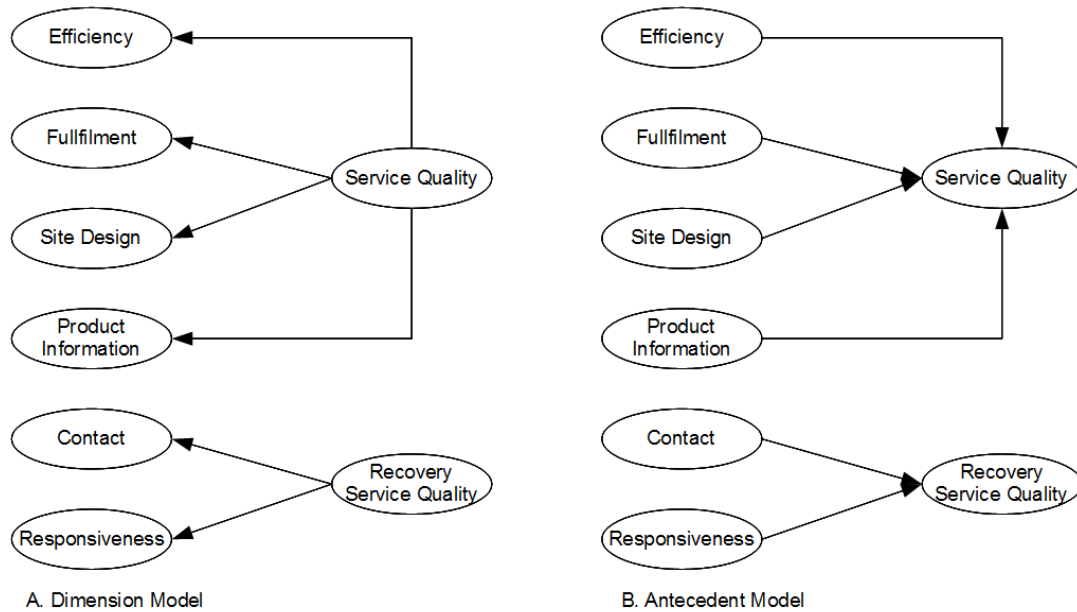

Figure 1: Measurement Models

3.   Empirical Evaluation

3.1.   Design and Pretest

We evaluated the scales developed in the previous section in a survey in cooperation with the HUGO BOSS AG. The questionnaire was implemented by Globalpark, a service company of HUGO BOSS. The population for this survey is defined by the customers of the German online shop of HUGO BOSS. The questionnaire is divided in five parts: an introduction, the E-S-Qual scale (see Table 2), the E-RecS-Qual scale (see Table 3), validity indicators (see Table 4), and some personal questions.

The questionnaire was checked for clarity and face validity in a pre-test. The questionnaire was filled in by 5 experts in the domain of e-commerce – none of which were connected to HUGO BOSS – to ensure face validity. The experts were interviewed regarding the questions' answerability and comprehensibility as well as the consistency of the used terms. Based on these interviews, some small linguistic changes were made.

3.2.   Sample

All customers of the German HUGO BOSS shop who bought an article between 30th July and 13th November 2009 were invited to participate in the survey one week after their purchase. Invitations were sent out via e-mail. E-mail addresses of the customers were gathered during the purchasing process. Approximately 8700 customer addresses were collected in the specified period. 2117 of these customers participated on the survey. Although we did not send a second invitation e-mail to non-respondents, we reached a response rate of 24.2%. We used no incentives to encourage participation in the survey. All respondents had an intrinsic motivation to participate. This is

very surprising but underlines the deep relationship consumers have with luxury brands. Reasons why customers did not participate were not examined.

We excluded questionnaires which were not completely filled in and which contained outlier observations. No systematic relationships between missing and outlier values and the content of the questionnaire were identified. After pre-processing the data, 1066 questionnaires were deemed suitable for the evaluation of the measurement instrument. The E-RecS-Qual scale was completely and consistently filled in by 166 customers.

3.3.   Scale Purification

Indicators are appropriate measures for a construct if they propose to measure one and the same construct and no other constructs. This can be determined by analyzing their internal consistency and the results of exploratory factor analysis (EFA). Internal consistency measures whether different indicators measure the same construct. In addition, EFA tells us which constructs are explained by an indicator, and permits testing for uniqueness. We regard indicators as appropriate measures for a construct only if both internal consistency and EFA results are good. After presenting the results of internal consistency, we will turn to interpreting the EFA results.

Internal consistency was determined using Cronbach's α and corrected item-to-total correlations. Cronbach's α indicates the degree to which a set of items measures a latent construct. According to [Nunally & Bernstein 1994], a reliable construct will produce alpha-values greater than or equal to 0.7. In Table 5 the results for Cronbach's α are presented. While all factors of the E-RecS-Qual scale have a high reliability, the factors fulfillment and information fail to pass the suggested threshold.

Table 5: Cronbach's alpha of the two scales

E-S-Qual		E-RecS-Qual	
Factor	Cronbach's α	Factor	Cronbach's α
Efficiency	0.779	Responsiveness	0.794
Design	0.728	Contact	0.900
Information	0.620	Loyalty Intentions	0.912
Fulfillment	0.674		
Loyalty Intention	0.807		

We assessed the corrected item-to-total correlations (CITC) to identify the indicators which are the cause for the low internal consistency in the factors fulfillment and information. According to [Zaichkowsky 1985], indicators having a CITC of less than 0.5 should be removed from the scale. The CITC, the standard deviation, and the squared multiple correlations (SMC) are presented for each indicator in Tables 6 and 7.

Table 6: Exploratory factor analysis and internal consistency of the E-S-Qual scale

Indicator	Factor Loading	SD	CITC	SMC	MSA	KMO
EFF1	0.791	0.841	0.678	0.497	0.803	0.824
EFF2	0.774	0.841	0.659	0.496	0.792	
EFF3	0.396	0.646	0.363	0.138	0.883	
EFF4	0.766	0.819	0.657	0.475	0.812	
EFF5	0.496	0.784	0.450	0.208	0.889	
EFF6	0.389	0.496	0.355	0.131	0.893	
DES1	0.636	0.759	0.573	0.332	0.803	0.675
DES2	0.806	0.761	0.675	0.511	0.666	
DES3	0.819	0.813	0.657	0.515	0.653	
INF1	0.520	0.908	0.353	0.240	0.665	0.619
INF2	0.865	0.894	0.470	0.374	0.604	
INF3	0.522	0.850	0.348	0.244	0.658	
FUL1	0.913	0.532	0.603	0.577	0.649	0.697
FUL2	0.560	0.662	0.454	0.302	0.789	
FUL3	0.679	0.602	0.478	0.479	0.672	
FUL4	0.503	0.425	0.455	0.253	0.718	
FUL5	0.443	0.838	0.366	0.224	0.701	
FUL6	0.236	0.744	0.224	0.064	0.808	
LOY1	0.799	0.631	0.657	0.637	0.714	0.753
LOY2	0.836	0.685	0.680	0.664	0.703	
LOY3	0.675	1.004	0.587	0.389	0.875	
LOY4	0.549	0.945	0.524	0.350	0.764	
LOY5	0.628	0.909	0.610	0.415	0.768	

Table 7: Exploratory factor analysis and internal consistency of the E-RecS-Qual scale

Indicator	Factor Loading	SD	CITC	SMC	MSA	KMO
CON1	0.617	0.821	0.589	0.387	0.896	0.864
CON2	0.854	0.792	0.798	0.700	0.848	
CON3	0.843	0.834	0.799	0.641	0.883	
CON4	0.915	0.897	0.850	0.763	0.817	
CON5	0.811	1.043	0.762	0.614	0.901	
RES1	0.730	0.842	0.646	0.499	0.767	0.725
RES2	0.976	0.957	0.790	0.690	0.653	
RES3	0.710	1.065	0.605	0.517	0.723	
RES4	0.507	1.280	0.466	0.242	0.871	
LOY1	0.893	0.930	0.831	0.799	0.785	0.832
LOY2	0.884	0.956	0.822	0.799	0.772	
LOY3	0.802	1.113	0.761	0.597	0.905	
LOY4	0.744	1.032	0.713	0.536	0.894	
LOY5	0.803	1.035	0.770	0.620	0.849	

Some indicators obviously perform badly on internal consistency measures. Indicators which are neither part of their proposed factor (factor loading < 0.5) nor display good internal consistency will be excluded from further analyses. We computed the measure of sampling adequacy (MSA) and the Kaiser-Meyer-Olkin (KMO) criterion to find out whether EFA is applicable. The results of EFA as well as the MSA and the KMO criterion are summarized in Tables 6 and 7. Since all MSA and KMO values are greater than 0.5, computing a factor analysis is possible. Factor loadings greater than or equal to 0.5 indicate that an indicator is adequate for measuring a construct. We did not find cross-loadings greater than 0.5.

As the results in Tables 6 and 7 show, all indicators load on the proposed factors. Based on their performance on EFA and internal consistency, indicators EFF3, EFF5, EFF6, FUL5 and FUL6 are removed from the E-S-Qual scale. The indicator FUL4 was excluded because its factor loading had diminished greatly after removing the previously listed indicators (0.346). Since the squared multiple correlation and the internal consistency of CON1 and RES4 are rather low, these indicators were also removed. The final scales are presented in table 10 and 11.

3.4.   Dimensions versus Antecedents

The purified scales were used to estimate the dimension as well as the antecedent model. We computed a SEM for both models and obtained reasonably good results for the root-mean-square-error of approximation (RMSEA) and the standardized root mean square residual (SRMR) as well as quite good values for the goodness of fit (GFI, the comparative fit index (CFI), and the incremental fit index (IFI) in the dimension model (Table 8). The antecedent model produced worse results for all fit statistics (Table 9). We assume that our proposed factors are dimensions rather than antecedents of service quality. All statistics presented in the next sections pertain to the dimension model.

Table 8: Goodness of fit statistics for the dimension model

Measure	E-S-Qual	E-RecS-Qual	Recommended Value
χ^2	1061.42	125.41	
df	147	62	
RMSEA	0.08	0.08	≤ 0.08
SRMR	0.06	0.04	≤ 0.10
GFI	0.90	0.90	≥ 0.90
AGFI	0.87	0.86	≥ 0.90
CFI	0.90	0.96	≥ 0.90
IFI	0.90	0.96	≥ 0.90

Table 9: Goodness of fit statistics for the antecedent model

Measure	E-S-Qual	E-RecS-Qual	Recommended Value
$\chi 2$	1760.50	159.47	
df	147	62	
RMSEA	0.12	0.11	≤ 0.08
SRMR	0.20	0.15	≤ 0.10
GFI	0.83	0.87	≥ 0.90
AGFI	0.77	0.81	≥ 0.90
CFI	0.79	0.93	≥ 0.90
IFI	0.78	0.89	≥ 0.90

3.5.   Reliability and Validity

Since the defined scales consist of reflexive measurement models (dimensions), we conducted a confirmatory factor analysis (CFA) to assess their validity. We used the maximum-likelihood-method to compute the CFA, since it allows us to make statements about the whole population. The CFA was carried out with a Bollen-Stine-bootstrapping correction to deal with the lack of multivariate normality.

Squared multiple correlation (indicator reliability), factor reliability, and mean variance per factor are used as assessment criteria for reliability. Squared multiple correlation is the proportion of an indicator's variance which can be explained by the factor [Bagozzi & Yi 1988]. Its value should be larger than 0.2 if the sample size is greater than 1000, and larger than 0.4 otherwise. Factor reliability is equivalent to indicator reliability except that it measures the proportion of a factor's variance which can be explained by the second order construct (here: service quality). [Bagozzi & Yi 1988] suggest that factor reliability should exceed 0.6. Mean variance per factor indicates the average percentage of a construct's variance explained by its indicators. According to [Fornell & Larcker 1981] mean variance per factor should be at least 0.5 for a good reliability.

Table 10: Confirmatory factor analysis of the E-S-Qual scale

Indicator	Factor Loading	Error Variance	SMC	Factor Reliability	Mean Variance
EFF1	0.783	0.387	0.613	0.807	0.519
EFF2	0.773	0.402	0.598		
EFF4	0.795	0.368	0.632		
DES1	0.669	0.552	0.448	0.811	0.590
DES2	0.764	0.416	0.584		
DES3	0.860	0.260	0.740		
INF1	0.638	0.593	0.407	0.695	0.435
INF2	0.744	0.446	0.554		
INF3	0.586	0.657	0.343		
FUL1	0.912	0.168	0.832	0.800	0.579
FUL2	0.589	0.653	0.347		
FUL3	0.747	0.442	0.558		
LOY1	0.868	0.247	0.753	0.821	0.492
LOY2	0.882	0.222	0.778		
LOY3	0.645	0.584	0.416		
LOY4	0.475	0.774	0.226		
LOY5	0.538	0.771	0.289		

The scales presented in Tables 10 and 11 are the final scales representing the measurement instrument we suggest for evaluating service quality in online luxury goods retailing. Both final scales display outstanding overall reliability in terms of Cronbach's α (E-S-Qual scale: 0.88 and E-RecS-Qual scale: 0.90), glb (E-S-Qual scale: 0.91 and E-RecS-Qual scale: 0.95) and ω_t (E-S-Qual scale: 0.92 and E-RecS-Qual scale: 0.95). We computed glb and ω_t values due to the fact that both are better predictors for reliability than Cronbach's α [Revelle and Zinbarg 2009]. Although some factor loadings are very low, we can assume reliability for all indicator measurements due to high reliability values for the overall scale and high reliability scores for all factors (see Tables 10 and 11). Low factor loadings indicate that the indicator is not representative for the factor behind that indicator. We did not exclude any other indicators since, in most cases, the existence of one "bad item" does not affect the reliability and validity of the whole construct [Sarstedt & Wilczynski 2009].

Table 11: Confirmatory factor analysis of the E-RecS-Qual scale

Indicator	Factor Loading	Error Variance	SMC	Factor Reliability	Mean Variance
CON2	0.868	0.247	0.753	0.917	0.734
CON3	0.799	0.362	0.638		
CON4	0.933	0.130	0.870		
CON5	0.820	0.328	0.672		
RES1	0.717	0.486	0.514	0.856	0.669
RES2	0.976	0.047	0.953		
RES3	0.736	0.458	0.542		
LOY1	0.935	0.126	0.874	0.911	0.676
LOY2	0.915	0.163	0.837		
LOY3	0.775	0.399	0.601		
LOY4	0.706	0.502	0.498		
LOY5	0.754	0.431	0.569		

Construct validity is demonstrated by validating the theory behind the scales. We use assessments of convergent validity, discriminant validity and goodness of fit statistics to demonstrate construct validity. All dimensions display a factor reliability greater than 0.5 which, according to [Fornell & Larcker 1981] suggests that a scale has convergent validity. We conducted χ^2-difference tests in order to assess both scales' discriminant validity [Fornell & Larcker 1981]. These tests may be used to find out whether there is a significant difference between an unrestricted model M_u (factor correlations are not preset) and a restricted model M_r (factor correlations are set to 1). If the χ^2-difference is equal or greater than 3.84, we can assume discriminant validity with an alpha error of 0.05. As shown in Tables 12 and 13, all χ^2-differences are greater than 3.84. The computation of the restricted model for the dimensions fulfillment and overall value was not possible, so discriminant validity cannot be tested for these dimensions.

Table 12: χ^2-difference test of the E-S-Qual scale

Dimensions	χ^2-M_u	χ^2-M_r	χ^2-difference
LOY ↔ Overall Value	1210.68	1306.48	95.80
EFF ↔ FUL	1210.68	1722.99	512.31
EFF ↔ DES	1210.68	1304.534	93.85
FUL ↔ INF	1210.68	1681.48	470.80
EFF ↔ INF	1210.68	1352.16	141.48
FUL ↔ DES	1210.68	1505.93	295.24
DES ↔ INF	1210.68	1327.01	116.33
EFF ↔ Overall Value	1210.68	1388.71	178.03
DES ↔ Overall Value	1210.68	1361.11	150.43
INF ↔ Overall Value	1210.68	1365.95	155.27
FUL ↔ Overall Value	1210.68	-	-
DES ↔ LOY	1210.68	1350.00	139.32
INF ↔ LOY	1210.68	1373.69	163.01
FUL ↔ LOY	1210.68	1642.83	432.15
EFF ↔ LOY	1210.68	1376.79	166.11

Table 13: χ^2-difference test of the E-RecS-Qual scale

Dimensions	χ^2-M_u	χ^2-M_r	χ^2-difference
LOY ↔ Overall Value	134.54	146.75	12.21
RES ↔ LOY	134.54	156.25	21.71
CON ↔ LOY	134.54	152.97	18.43
CON ↔ RES	134.54	163.57	29.03
CON ↔ Overall Value	134.54	167.50	32.96
RES ↔ Overall Value	134.54	168.08	33.54

Another aspect of validity is the criterion validity, which indicates how good a measurement instrument's predictions are when juxtaposed to information gained from external variables. We used the overall satisfaction with service quality and loyalty intentions as external variables. We computed a correlation of 0.718 between the E-S-Qual scale (efficiency, design, information and fulfillment) and loyalty intentions and a correlation of 0.775 between

this scale and the overall value. For the E-RecS-Qual scale (contact, responsiveness), we obtained a correlation of 0.857 with loyalty intentions and a correlation of 0.864 with the overall value. We can assume criterion validity for both scales.

3.6.   Structural Equation Model Results

As shown in Table 8 the fit statistics of the overall scales are quite good for the dimension model. The standardized estimates of the proposed structural models (see Figure 1) are presented in Table 14. We tested the relationships with a t-test comparing our model to the default model. Service quality as second order construct is highly and significantly correlated with all the dimensions of the E-S-Qual scale. This is also true for the construct recovery service quality. We estimated the importance of each dimension explaining the second order constructs. Efficiency is most important, followed by design, fulfillment and information. The construct contact is more important for explaining recovery service quality than responsiveness. Effect sizes showed that the first scale is more important for explaining loyalty intentions.

Table 14: Results of the structural equation model

Relationship	Estimate	t-value	Effect size
Efficiency ← Service Quality	0.814	25.00***	0.900
Fulfillment ← Service Quality	0.376	9.10***	0.600
Design ← Service Quality	0.858	19.02***	0.843
Information ← Service Quality	0.733	15.49***	0.787
Contact ← Recovery Service Quality	0.683	6.67***	0.646
Responsiveness ← Recovery Service Quality	0.543	5.94***	0.602
Service Quality → Loyalty Intentions	0.553	13.99***	0.606
Recovery Service Quality → Loyalty Intentions	0.823	4.68***	0.514

*** $p < 0.001$

4. Discussion

Following a discussion of the state of the art of research into evaluating online shopping service quality, we built a set of dimensions for measuring service quality in online luxury goods retailing. We then conducted an empirical study in cooperation with HUGO BOSS. The result was a reduced set of indicators appropriate for defining a reliable and valid instrument which consists of one scale for service quality and one for recovery service quality.

4.1.   Implications for Research

The main contribution of this paper is the identification of the factors that explain how service quality is perceived in online luxury goods retailing. Although previous research indicates that buying behavior and attitudes of luxury goods consumers differ significantly from mainstream goods consumers', no research into the effects on service quality in online luxury stores had been undertaken so far. Based on previous research on consumer behavior and online service quality, we developed a theoretical model explaining luxury goods consumers' perception of service quality in online luxury stores.

We then built a survey instrument based on E-S-QUAL to test the proposed factors. We found that efficiency, fulfillment, design, information, contact and responsiveness have a positive effect on service quality in online luxury goods retailing. By comparing the dimension with an antecedent model, we show that these factors ought to be modeled as dimensions rather than antecedents of service quality. This means that 1) the direction of causality is from service quality to the proposed factors, 2) changes of the factors must not necessarily cause changes of service quality, but changes of service quality cause changes of the factors, and 3) the indicators of each factor are correlated inter-correlated and share a common theme.

Design is the second most important factor for explaining perceived service quality. Here our results differ from previous studies on online stores selling mainstream goods which found it to be virtually inconsequential in influencing service quality [Schaupp & Bélanger 2005; Li et al. 2009]. This finding underscores the differences in the behavior and perceptions of luxury goods consumers compared to mainstream goods consumers. This particular case demonstrates luxury goods consumers' tendency to evaluate product and shop design very critically, a behavior noted in previous studies on this consumer group. This supports our suggestion that instruments for measuring service quality of online mainstream goods retailing are inappropriate for luxury goods.

Our research confirms the suggestion of [Parasuraman et al. 2005] that two separate scales for measuring general service quality and recovery service quality ought to be constructed. We can now measure the factors at every stage in the buying process [Kotler & Keller 2008], starting at the information stage and ending with the after-

sales stage. Integrating the E-RecS-Qual scale's constructs into the E-S-Qual scale, however, is likely to reduce overall reliability because only a fraction of the users will be able to answer questions about recovery service.

4.2. Implications for Practice

This study is of particular interest to luxury goods retailers because it provides in-depth understanding of consumers' perception of service quality in online luxury stores, and an instrument with which to capture it. Our instrument serves to improve the number of purchases by regular customers which are positively affected by service quality.

For luxury goods retailers planning to open online stores, our research contains valuable information as to which factors need to be taken into account for designing a successful shop. Efficiency and design are the most influenced dimensions of service quality. We therefore suggest that speed, navigation structure and layout of the online shop need to be tested thoroughly before launching it, for instance by conducting load and usability tests.

We provide existing online stores with the means to identify service quality flaws which will likely, if they are not fixed, have a negative impact on customer satisfaction and online sales, possibly creating negative spill-over effects on sales in the "real" world. Let us consider an example where an online retailer has a very low conversion rate which means that only few site visitors complete a transaction. This may be due to a number of reasons – possibly the visitors are unable to find what they are looking for (EFF4), product information quality and quantity are inadequate (INF2), product offers are inadequate (INF1) or the store design does not appeal to the customers (DES1-DES3). Our instrument pinpoints the exact reason for the low conversion rate, giving the retailer a very precise idea how to improve the shop, and saving him from going through a potentially expensive process of trial and error in finding and fixing the problem. For instance, if visitors are shown to be unhappy with product details provided, the retailer could add product photos from different perspectives or describe the material in more detail.

However, changes in all of the factors must not necessarily cause changes in service quality, because the direction of causality is from service quality to the proposed factors. A re-test using the adapted E-S-Qual instrument is thus imperative to ensure that changes of one or more factors also cause changes of the service quality. The direction of causality also implies that service quality can be measured without knowing all factors influencing the construct service quality.

4.3. Limitations

The evaluation of the measurement instrument is subject to some limitations. There might be a response bias due to non-response. Although nearly one-fourth of the invited customers participated in our survey, it is possible that some unknown consumer attitude influencing service quality also influenced the willingness to participate in the survey.

We conducted the evaluation in only one online shop. Further investigations are required to support our suggestion that our instrument is valid for online luxury goods retailers in general. The dimension compensation, which was omitted from the measurement instrument, might be also important to explain service quality in online luxury goods retailing. Future studies will be conducted testing this dimension with retailers in countries where the compensation is not as strictly regulated as in Germany.

Table 14: Information criteria for instrument comparison

Measure	E-S-Qual	E-RecS-Qual
AIC	1447.42	183.41
BCC	1149.06	188.79
BIC	1361.20	273.66
CAIC	1404.20	302.66
ECVI	1.077	1.112

Although fit indices imply that the structure of the measurement instrument is quite good, it is possible that instruments with different structures exist which produce even better fit indices. Examining instruments for measuring service quality in online luxury goods retailing may very yield interesting results. We present some information criteria in Table 14 that can be used to compare our instrument with others.

5. Conclusion

This study presents a reliable and valid adaptation of the E-S-Qual instrument for measuring service quality in online luxury goods retailing. We extracted a set of dimensions and indicators from previous theoretical and empirical research in this area. Their adequacy for measuring service quality is demonstrated by their internal consistency and the results of exploratory factor analysis and confirmatory factor analysis. The purified instrument can be used by luxury goods retailers to help them do business online successfully.

Our findings underline the differences between luxury goods consumers and mainstream goods consumers. While other studies have shown design and product information to have only a minor or even no significant effect on service quality, our results show a significant positive effect for both factors. These finding support our suggestion that separate instruments need to be used for evaluating service quality in online mainstream and luxury stores.

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