

# The effect of user manual quality on customer satisfaction: the mediating effect of perceived product quality

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## Abstract

**Purpose** – The purpose of this paper is to investigate the elements of user manual quality and its influences on perceived product quality and customer satisfaction in an integrated model structure.

**Design/methodology/approach** – Survey method was used to evaluate user manual quality and its influences on perceived product quality and customer satisfaction. Electrical appliances consumers were chosen in our sample. Factor analysis and structural equation modeling were performed to introduce, test and validate the user manual quality dimensions and also test the hypotheses.

**Findings** – The findings show a positive significant relation between user manual quality and perceived product quality, and this result demonstrates that consumers perceive user manual quality as a part of their quality evaluation related to the product. The results point out that user manual quality is essential for both low- and high-value products regarding customer satisfaction. The findings also reveal that perceived product quality mediates the influence of user manual quality on customer satisfaction.

**Practical implications** – This study reveals that providing a high-quality user manual should be an essential element of product management and development strategies. The findings also highlight the need for companies that particularly sell complex products with long product life cycles must invest in providing high-quality user manuals. This will enhance perceived product quality and in turn customer satisfaction.

**Originality/value** – Although some prior studies address user manuals in the relevant literature, these studies did not examine the elements of user manual quality and their impact on consumers' perceptions of the product quality and their satisfaction evaluations in a research model. This paper attempts to fill this gap in the literature. In addition, the authors found two major dimensions of user manual quality as content-related elements and representational/format-related elements of the user manual.

**Keywords** Customer satisfaction, Product quality, Product management, perceived product quality, Product manuals, User manual quality

**Paper type** Research paper

## 1. Introduction

A product manual is an interface between the user and the product. Users often form an opinion about a product and its supplier based on their experience of learning how to use and maintain the product (Pham *et al.*, 2002). High-quality user manuals can provide tangible benefits to both the consumer and the company. Such manuals help users become more productive, reducing the cost of customer support and the cost of field maintenance and increasing the sales and repeat purchase of the brand (Hackos, 1994; Smart *et al.*, 2001). Despite these significant paybacks, a limited number of studies has addressed user manuals in the relevant literature, and those studies have mostly focused on whether consumers consult the

manuals (Wright *et al.*, 1982; Peterson, 1984; Mehlenbacher *et al.*, 2002; Tsai *et al.*, 2012), manual usage behavior of consumers (Wright *et al.*, 1982; Jansen and Balijon, 2002) and the ideal design of the manuals (Schriver, 1993; Reinert *et al.*, 2007; Pedraz-Delhaes *et al.*, 2010). Some studies have examined technical documents and documentation issues for specific products, such as software or automobiles (Mitchell, 1993; Wiese *et al.*, 2004; Novick *et al.*, 2008; Van Loggem, 2014) or industrial products (You *et al.*, 2001; Pham *et al.*, 2002; Setchi *et al.*, 2006). Another stream of research addresses user manuals as a technical documentation issue in technical communication literature (Smudde, 1993; Smart *et al.*, 1995; Spencer and Yates, 1995; Smart *et al.*, 2001; Setchi *et al.*, 2006).

General belief suggests that consumers rarely consult manuals; rather, they tend to use less effective methods and

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trial-and-error practices, but the extant research points out conflicting results. Studies have generally concluded that the user manual is necessary and consulted particularly for complex, high-value and unfamiliar products (Wright *et al.*, 1982; Petersen, 1984; Jansen and Balijon, 2002; Mehlenbacher *et al.*, 2002; Tsai *et al.*, 2012; Van Loggem, 2014). However, these studies did not examine the issue of user manual quality and its impact on consumers' perceptions of the product quality or their evaluation of satisfaction in a research model. As consumers interact with a user manual in post-purchase occasions and the user manual is an intrinsic communicative dimension of a product, it has the potential to influence the consumer's quality perceptions related to the product and to affect the user's satisfaction judgments for the specific purchase. Thus, users' quality perceptions about manuals can influence how they view an organization's products, its customer service and even the company itself (Schrivver, 1993). Prior findings have also indicated that the documentation accompanying a product is a vital extrinsic cue that consumers use to evaluate both the product and the manufacturer, which implies that these documents are secondary products that add value to the primary product (Pedraz-Delhaes *et al.*, 2010). High-quality documentation can reduce inadvertent customer-caused product failures and can increase customer satisfaction (Smart *et al.*, 1996). Extant research also asserts that effective documentation helps users, which in turn helps firms enjoy a better reputation for the product that can lead to increased sales and a greater likelihood of repeat sales (Smart *et al.*, 2001).

Although limited numbers of studies scrutinize the relations between product documentation and user quality perceptions and customer satisfaction (Schriver, 1993; Smart *et al.*, 1996), to the best of our knowledge, no study in the literature specifically investigates the elements of user manual quality (UMQ) and its influences on perceived product quality (PPQ) and customer satisfaction (CS) in an integrated model structure. Therefore, our contribution to the research area is twofold. First, our study investigates the potential elements and dimensions of user manual quality. Second, our study tries to elucidate the links among user manual quality, perceived product quality and customer satisfaction with a moderated mediation model that has not been previously tested. Our proposed moderated mediation model allows for revealing the interconnections among those

variables and several moderators concurrently. If user manual quality serves as a significant factor in consumers' quality perceptions and satisfaction judgments, user manual quality becomes an important element of the product development process and strategies. Thus, this study is pioneering work that empirically examines the relations between these constructs.

The remainder of the paper is organized as follows. Section 2, we present the conceptual background of our study. Then, we explain the data collection and methodology of the fieldwork and Section 3 and present the findings in Section 4. Finally, we discuss the findings and touch upon theoretical and management implications and potential avenues for further research in Section 5.

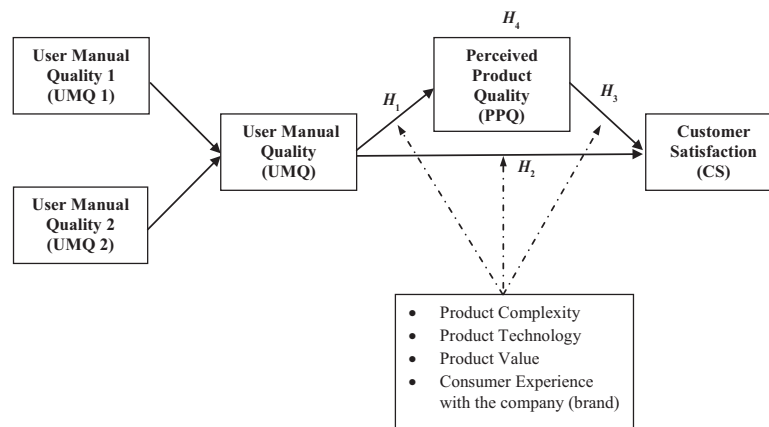
## 2. Conceptual background and hypothesis development

Consistent with the evidence in prior studies, we postulate a model proposing that user manual quality is associated with consumers' product quality perceptions and their satisfaction. Thus, we examine the effect of user manual quality on perceived product quality and customer satisfaction as configured in the following model structure (Figure 1).

### 2.1 User manual quality

User (product) manual is a generic term for any document that explains how to use, maintain or handle a product from its delivery to its disposal; in addition, it provides any technical information that a user is likely to need during the life of the product (Pham *et al.*, 2002). As a communicative dimension of a product, the user manual can be considered part of a firm's product management strategy and it has the potential to improve the performance of a product by decreasing losses and damage related to misuse of the product. As an extension of the "core product," document quality can influence the customer's perceptions of the product and the manufacturer. High-quality documentation can ease installation, evaluation, operation, use and maintenance, as well as increase efficiency and decrease total customer support costs. At best, to our knowledge, no prior study has directly and comprehensively examined the elements of UMQ in the relevant literature. Thus, we depart from technical documentation literature, consumer studies and information quality research to trace the relevant elements of

**Figure 1** Research model



UMQ. [Schrivver \(1993\)](#) argues that the concept of UMQ involves several dimensions and suggests readability, clarity and user friendliness as major quality indicators of user manuals. [Pham et al. \(2002\)](#) point out three major dimensions of product manuals; content, presentation and form related, and suggest that product manuals should contain accurate information and present information in the most appropriate format. Good presentation complements the content and makes the manual more effective and easier to use. The quality of illustrations also plays an important role in influencing user assessment of documentation ([Gudknecht, 1982](#)). [Gemoets and Mahmood \(1990\)](#) suggest that documentation has to comprise written and visual explanations to help consumers understand how the product works, what it does and how to use it. [Chen and Dibb \(2010\)](#) also propose that information should be sufficient, easy to understand, up to date, accurate and consistent. As a result of their comprehensive review, [Pedraz-Delhaes et al. \(2010\)](#) point out that high-quality documentation should be well written, understandable, accurate, readable and functional and should have a usable structure, clear content, consistent terminology, images and diagrams. Studies on information quality and the technical documentation literature also provide evidence about potential elements of UMQ. From an information quality perspective, [Wand and Wang \(1996\)](#) suggest four information quality dimensions: correctness, unambiguousness, completeness and meaningfulness. [Guillemette \(1990\)](#) describes good product documentation as comprehensible, task relevant, credible, demonstrative and systematically arranged.

## 2.2 User manual quality – perceived product quality link

Perceived quality can be defined as the consumer's judgment about a product's overall excellence or superiority. This perception-based approach views quality as a form of overall evaluation of a product, suggesting that quality is a relatively global value ([Zeithaml, 1988](#)). Consumers use pre-purchase informational cues to develop beliefs about products ([Olson, 1978](#)), and departing from this approach, consumers similarly use post-purchase informational cues for quality appraisals. Whenever there is an uncertainty about quality of the product, customers may benefit from getting information about the performance and characteristics of the product ([Kihlstrom, 1974](#)). The user manual is a significant, integral aspect of a product that potentially affects the product's perceived value, usability and usefulness, as well as users' actual productivity and success in using the product ([Smart et al., 2001](#)). Shortly after product purchase and before final consumption, consumers tend to depend heavily on informational cues, such as user manuals, and researchers have mainly verified the impact of these documents on a product's perceived usability ([Mead, 1998](#); [Pedraz-Delhaes et al., 2010](#)). Purchases are based on the perceptions of quality aspects which can be verifiable only by post-purchase experience that needs additional information to compare the realized and expected utility ([Kotowitz and Mathewson, 1979](#)). Customers are expected to examine not only how a product performs but also how it is supported, and product manuals can influence the customer's quality perceptions of a product. Thus, user manuals can be considered post-purchase product information signaling product quality. Although the user manual supports

the core product, it is seldom examined as an antecedent of consumers' product quality perceptions. [Smart et al. \(1996\)](#) find that customer perceptions of the manuals influence perceived product quality, suggesting that the user manual plays a key role in the total product experience. [Pedraz-Delhaes et al. \(2010\)](#) state that the language quality of the document affects document appraisal and evaluation of both the product and the manufacturer. Through document evaluation, consumers make inferences regarding the product quality, and perceptions of poor quality can negatively affect consumers' behavioral intentions toward the product and the manufacturer. As a post-purchase informational cue, user manuals, thus, can be considered an important element that affects the total product experience. Considering prior findings and rationales, we hypothesize the following:

*H1. UMQ is positively related to PPQ.*

## 2.3 User manual quality – customer satisfaction link

As customers encounter user manuals in a post-purchase situation, the encounter is expected to be highly interacted and integrated with customers' post-decisional product evaluations. Prior studies have suggested two commonly used theories to explain post-decisional product evaluations: cognitive dissonance and contrast theories. [Festinger \(1957\)](#) described cognitive dissonance as a psychologically uncomfortable state that motivates a person to reduce the dissonance ([Sweeney et al., 2000](#)). Dissonance theory posits that any discrepancy between expectations and product performance is minimized or assimilated by the consumer's adjusting his or her perception of the product to be consistent (less dissonant) with expectations ([Anderson, 1973](#)). Dissonance is at a maximum right after the purchase decision but before experiencing the product and this stage is the base of satisfaction formation ([Oliver, 1997](#)). The customer attempts to reduce this psychological state of discomfort, uncertainty, and doubt, and if a customer stays at a high level of dissonance, he or she is less likely to perceive value and less likely to experience satisfaction; the customer also would have experienced more difficulty in assessing the quality of the product ([Sweeney et al., 2000](#)). In particular, when the consumer invests a substantial amount of money or psychological effort in purchase decisions, including those with long-term consequences, a relatively higher level of dissonance is aroused. Under this condition, consumers try to reduce the dissonance by searching for confirmatory and consonant information to justify the choice. [Korgaonkar and Moschis \(1982\)](#) point out that cognitive dissonance plays an important role in influencing post-decisional evaluations of highly involving products. Thus, provision of post-purchase reinforcing information results in a decrease in psychological discomfort about the choice ([Mao and Oppewal, 2010](#)). Therefore, sharing information helps to diminish uncertainty, enable to customer to make better use of the product, increase benefits which impacts customer satisfaction ([Spekman et al., 1998](#); [Homburg et al., 2002](#); [Li and Lin, 2006](#); [Agnihotri et al., 2016](#)). User manuals can provide this information to reduce consumer dissonance, and therefore a quality manual can influence satisfaction judgments.

Another elucidation of the product evaluation process is provided by contrast theory. Contrast theory predicts that the

customer will magnify the difference between the product received and the product expected. If the actual performance of the product fails to meet expectations, the customer will evaluate the product less favorably (Anderson, 1973; Korgaonkar and Moschis, 1982). Marketers often provide consumers with a wealth of information about their products or services through marketing communication tools, which influence consumers' pre-purchase expectations. The authors argue that pre-purchase information about the product affects customers' satisfaction judgments (Westbrook *et al.*, 1978; Gardial *et al.*, 1994; Spreng *et al.*, 1996), and departing from this standpoint, the user manual as post-purchase product information in turn similarly influences customers' satisfaction judgments. Therefore, as an essential element of post-purchase product involvement, consumers are expected to integrate their experience with the user manual as a part of their satisfaction evaluation for the related product. Additionally, signaling theory can also explain the need for information at the post-purchase stage. Signaling theory emerged from the study of information economics under conditions in which buyers and sellers possess asymmetric information when facing a market interaction (Spence, 1974). Because the situation of unobservable quality is quite common, user manuals can be used as a signal that helps customers assess the product and the related satisfaction judgments. Although very limited, some prior research has suggested that user manual quality is viewed as an important factor in customers' satisfaction judgments and influences their ideas about a company and its products (Schriver, 1993; Smart *et al.*, 1996). Based on the related theories and prior evidence, we thus hypothesize the following:

H2. UMQ is positively related to CS.

#### 2.4 Perceived product quality – customer satisfaction link

Interestingly, the links between PPQ and CS are widely researched in services settings (Oh, 1999; Cronin *et al.*, 2000; McDougall and Levesque, 2000; Tam, 2004), but very limited research focus has been placed on this link in the product context (Churchill and Surprenant, 1982; Selnes, 1993; Olsen, 2002; Tsiotsou, 2006; Beneke *et al.*, 2013). The disconfirmation of the expectations approach has been the predominant research paradigm in the area of quality and satisfaction research in the marketing domain. This defines an individual's perception of quality or level of satisfaction with an experience in terms of the magnitude of his or her disconfirmation (Oliver, 1980; Baker and Crompton, 2000; Barnes *et al.*, 2004; Chang *et al.*, 2009). Oliver (1980) defined satisfaction as "a function of an initial standard and some perceived discrepancy from the initial reference point." This is the consumer's fulfillment response, the degree to which the level of fulfillment is pleasant or unpleasant (Oliver, 1997).

In the marketing field, perceived quality and satisfaction are considered highly intercorrelated constructs (Churchill and Surprenant, 1982; Anderson and Sullivan, 1993; Bitner and Hubbert, 1994), and a vast amount of research suggests that quality relates to satisfaction with transaction-specific exchanges (Selnes, 1993; Gotlieb *et al.*, 1994; Matzler *et al.*, 1996; Dabholkar *et al.*, 2000; Olsen, 2002; Tsiotsou, 2006; Chang, 2006). Therefore, this research stream results in a "quality leads to satisfaction" school of thought. Those researchers suggest that quality is a multidimensional

construct, and when assessing quality, consumers evaluate all product characteristics important to their satisfaction. Considering modeling approaches of prior studies, perceived product quality and customer satisfaction were investigated in relation to price, brand quality and perceived value in the related literature (Vera, 2015; Beneke *et al.*, 2013; Kalita *et al.*, 2004; Snoj *et al.*, 2004; Munger and Grewal, 2001). However, the impact of user manual quality on perceived product quality and customer satisfaction has not been studied likely due to presumption of low usage rate of manuals and thus anticipated limited influence of manuals on consumers' quality and satisfaction appraisals. As the user manual is an intrinsic part of the product experience, it has potential to affect both quality and satisfaction appraisals of customers for that specific purchase situation. Thus, we propose that consumers evaluate the UMQ as a part of the whole product experience and hypothesize the following:

H3. PPQ is positively related to CS.

H4. PPQ mediates the relationship between UMQ and CS.

#### 2.5 Moderators

To study the interactions among UMQ, PPQ and CS in detail, recent research has analyzed the possible moderating effects of several variables on these relationships. Accordingly, our second research problem is: Do our proposed model relations among UMQ, PPQ and CS differ among several contingencies? By analyzing the effect of each contingency variable, implicitly we will be testing the hypothesis that the particular variable moderates the indirect effect of UMQ on CS (through PPQ). Several researchers have argued that the quality–satisfaction relationship has a context-dependent nature (Oh, 1999; Cronin *et al.*, 2000; Wang *et al.*, 2004). Pham *et al.* (2002) suggest that major product document elements depend on the complexity of the product, the circumstances in which it is supplied and used and the information needs of different user groups. We include product complexity as a moderator to determine whether the consumers' assessment of quality and satisfaction levels varies, as durable products can be viewed as complex products (Völckner and Hofmann, 2007). When there is uncertainty in making judgments about more complex products, customers may tend to depend on the qualified information provided (Anderson, 1973). Thus, as anticipated, consumers more often need user manuals when dealing with complex products (Wiese *et al.*, 2004). As technology is evolving dramatically, rapid changes in the technical features of products influence the customers' expectation of quality and their adaptation. Furthermore, the importance of product documentation is increasing with the advances in technology, new and unfamiliar products that are introduced to the marketplace and customers' demand for greater usability in the products they buy (Mead, 1998). Prior studies (Gardner, 1970; Johnson and Kellaris, 1988; Rao and Monroe, 1988) point out that customers' familiarity and experience with a product influence their quality evaluations (Völckner and Hofmann, 2007). When consumers do not have enough knowledge about the product or the company, the manuals may provide a first insight to evaluate the product quality, usability, and performance (Pedraz-Delhaes *et al.*, 2010). Ganier (2004) also suggests that the usage



behaviors associated with manuals differ according to the user's prior knowledge about the product. Earlier studies point out the effects of product value on quality (Snoj *et al.*, 2004) and satisfaction judgements (Dodds and Monroe, 1985; Monroe and Chapman, 1987; Zeithaml, 1988). Caruana *et al.* (2000) suggest that the effect of quality on satisfaction is moderated by product value. Thus, we also embrace value of the product as a moderator variable in our research model.

### 3. Research design and method

#### 3.1 Sample and data collection

This study utilizes a cross-sectional survey approach to validate the proposed model empirically. We recruited a convenience sample from a metropolitan area of Turkey, all of whom had purchased an electrical appliance within the last three months. Using convenience sampling, we conduct face-to-face interviews with people who read more than half of the user manual for the appliance. Electrical appliances (both brown and white goods) were chosen as the focus of the present study, e.g. dishwasher, refrigerator and oven. As these are high-involvement products, consumers are more likely to search for and be better informed about electrical appliances than about non-durable goods (Tellis and Wernerfelt, 1987; Sweeney *et al.*, 1997). Prior research also suggests that consumers tend to read manuals for more complex and expensive products, like a new home appliance (Wright *et al.*, 1982; Wogalter and Baneth, 1994). Additionally, the electrical appliance purchase decision is more likely to be rational and well considered, and consumers are expected to find it relatively straightforward to respond to questions for this type of product (Sweeney *et al.*, 1997).

To ensure the quality of the questionnaire and the content and face validity of the survey items, a pilot test was conducted on six academics and ten consumers. Based on the feedback, some items were eliminated while others were corrected or reworded. Random sampling could not be used as it was not possible to identify and access all the consumers that read user manuals. In total, 30 questionnaires were unusable due to relatively high portions of missing data within these cases. Subsequent data analyses were conducted on the 189 usable questionnaires. The final sample included a high incidence of an equal number of female and male customers (52.4 per cent female and 47.6 per cent male) with an average age of 35 years (SD 17 years). As a signal for sampling quality, the respondents' reported choices of appliance brands are highly similar to the national market data (White Good Sector Report, 2016).

#### 3.2 Measurement development

Instruments to measure the constructs for the study are based on available constructs in the relevant literature. Multiple item scales were used for the measures of user manual quality, customer satisfaction, and perceived product quality. In recognition of the complex nature of the quality concept, several researchers have defined and operationalized quality with multiple items and dimensions, usually for a specific context. As no prior study has directly addressed the elements of UMQ, we depart from information quality and consumer research to trace the elements of this construct. The scale is adapted from Lee *et al.* (2002), Chen and Dibb (2010), and Pedraz-Delhaes *et al.* (2010). Lee *et al.* (2002) suggest the elements of information

quality for users of organizational information and emphasize that information should be accessible, meet the needs of the user, and be sufficient, concise and easy to understand. Pedraz-Delhaes *et al.* (2010) argue that a quality document is well written, understandable, accurate, readable and functional, and it has a usable structure, clear content, consistent terminology, images and diagrams. Similarly, Chen and Dibb (2010) examine the elements of web site quality and suggest that easy-to-understand, relevant, accurate, accessible, clear information should be provided. The PPQ scale is based on Dodds *et al.* (1991). The items of the scale capture reliability and quality of products from the consumers' perspective. Customer satisfaction is measured using a three-item construct that is a widely used scale adapted from Cronin *et al.* (2000). Note that all first-order constructs have a reflective measurement, where the indicators are considered to be functions of the latent construct (Hair *et al.*, 2010; Hair *et al.*, 2011). Detailed information on the constructs is listed in Appendix 1.

### 4. Analysis and results

#### 4.1 Data analysis and validity

Our analyses of the measurement and structural models follow the procedures outlined by Anderson and Gerbing (1988). To test the reliability and validity of our construct measures, we apply both exploratory and confirmatory factor analysis (CFA). Correlations among the variables are shown in Appendix 2 and detailed information on the constructs, the coefficient alpha, average variance extracted (AVE), and composite reliability scores (CR) are listed in Appendix 1. To test the dimensionality of the constructs, we use factor analysis via SPSS 22. Multiple preliminary tests are conducted to ensure that the constructs have acceptable psychometric properties. The initial exploratory factor analysis (EFA) suggests a reasonable statistical fit. All the items load on their respective constructs with loadings  $\geq 0.5$  and all eigenvalues are  $\geq 1.00$ , fulfilling the convergent validity criterion. Also, the average variance extracted of each construct exceeds the recommended value of 0.50 (Fornell and Larcker, 1981), providing further evidence of strong convergent validity. The reliability indicators also exceed suggested limits (Nunnally and Bernstein, 1994). The coefficient alphas of most of the multi-item scales are greater than 0.70. All 17 items of UMQ are analyzed using oblique rotation (Tsoukatos and Rand, 2006) through EFA. In the UMQ scale, ten items are loaded with high alpha coefficient  $>0.50$ , but seven are loaded with low alpha coefficient  $<0.40$ . The items:

The manual provides sufficient product information, The manual provides easy-to-understand product information, The manual provides consistent product information, The manual provides accurate product information, The manual was written in proper language, The manual includes several unnecessary information, The manual was neither too big nor too small were deleted due to low factor loadings and the analyses are repeated.

The alpha coefficient, Kaiser–Meyer–Olkin (KMO), and Bartlett's test become significant at  $>0.90$ . In the PPQ scale, three items are loaded with high alpha coefficients but two items are loaded with low coefficients and thus are eliminated. In the CS construct, all items are loaded with high alpha coefficients. The same procedure is repeated using principal component extraction with varimax rotation. This procedure results in the same factors. The total variance explained by these three constructs is 78.8 per cent.

EFA reveals sufficiently high loadings per item per construct, and the items belonging to each construct are classified into separate factors. The analysis suggests that individual items representing the latent constructs are loaded appropriately and no cross-loadings are present. The robust maximum likelihood estimation is used to allow for the absence of multivariate normality (Kassim and Asiah Abdullah, 2010). Next, to confirm the measurement developed by EFA, we perform CFA to investigate the constructs' dimensionality (Appendix 1) using AMOS 22 software. The reliability statistics, Cronbach's alpha ( $\alpha$ ), of each latent variable and correlations among all variables in the model are examined. The measurement model's goodness-of-fit indices indicate an acceptable fit to the survey data ( $\chi^2/df = 1.66$ ; GFI = 0.92; CFI = 0.94; IFI = 0.95; TLI = 0.94; RMSEA = 0.049). The square roots of all the constructs' AVEs are greater than the correlation among all the constructs, which suggests discriminant validity among the constructs (Fornell and Larcker, 1981). The calculated composite reliabilities are all greater than 0.70 (Bagozzi and Yi, 1988). To test the discriminant validity, we estimate the 95 per cent confidence interval ( $\pm$  two standard errors) around the correlation estimate of all pairs of constructs. In none of the cases does the confidence interval contain 1.0, and thus, we justify discriminant validity for all pairs of constructs (Anderson and Gerbing, 1988). To eliminate the common method bias effect, the questionnaire is designed so that the questions about the dependent and independent variables are placed in separated sections (Podsakoff et al., 2003). We use Harman's one-factor test (Podsakoff and Organ, 1986) to assess for common method bias and perform a principal components analysis for all constructs examined in the study. The unrotated solution reveals three factors with eigenvalues  $>1.0$ , accounting for 61.49 per cent of the variance. Then, we estimate a CFA model in which all measurement items are restricted to load on a single factor (Malhotra et al., 2006). The single factor model reveals a poor fit to the data ( $\chi^2/df = 3.68$ ; GFI = 0.69; CFI = 0.72; IFI = 0.73; TLI = 0.69; RMSEA = 0.117). Additionally, we include an item in our questionnaire regarding economic confidence, which is not related to the variables in our study. We calculate correlations between this question and the major constructs in our model and find no significant or very low correlations. These tests show that common method bias is not a likely threat in our analysis.

#### 4.1.1 Second-order model

The goal of this study is to develop a reflective, second-order construct to measure UMQ, following the formative operationalization process Diamantopoulos and Winklhofer

(2001) suggest. A second-order factor analysis demonstrates that the two dimensions reflect user manual quality: content-related quality elements (UMQ1) and format/presentation-related quality elements (UMQ2). The second-order constructs, however, have a formative measurement, as the first-order variables are assumed to cause the second-order variables; that is, changes in the first-order variables cause changes in the underlying variable (Jarvis et al., 2003). This study uses AMOS 22 to estimate the measurement model of UMQ. The results suggest a good fit of the second-order specification for the measure of UMQ ( $\chi^2/df = 1.67$ ; GFI = 0.95; CFI = 0.95; IFI = 0.95; TLI = 0.94; RMSEA = 0.058).

The proposed approach therefore contributes to a systematic conceptualization of UMQ and can be divided into two categories as content- and format-related dimensions.

#### 4.2 Hypotheses testing and results

The study uses structural equation modeling (SEM) to test the hypotheses. Using AMOS 22, SEM performed with maximum likelihood estimation is applied to assess the hypothesized model. Overall, the tested model provides a good fit to the data ( $\chi^2/df = 1.66$ ; GFI = 0.92; CFI = 0.96; IFI = 0.95; TLI = 0.94; RMSEA = 0.059). The structural model is acceptable. Table I reports the estimated results.

The results show that ( $\beta = 0.634$ ,  $p < 0.001$ ), so UMQ has a positive effect on PPQ, supporting H1. A similar positive relationship exists between PPQ and CS ( $\beta = 0.85$ ,  $p < 0.001$ ) and H3 is strongly supported. We find no significant direct effect of UMQ on CS ( $\beta = -0.007$ ,  $p = 0.939$ ). Thus, the result does not support H2.

To test H4, we use a bootstrapping framework. Although developments in statistical theory provide alternative methods for testing direct and indirect effects in moderation models, the bootstrap framework is particularly useful in studying sampling variability of estimates of indirect effects (Shrout and Bolger, 2002). We apply a bootstrap analysis with 5,000 resamples by using the SPSS Process Mediation Model 4. The 95 per cent confidence interval of the indirect effect between the UMQ and CS is 0.2285 and 0.4300 (Hayes and Preacher, 2014). Because zero is not in the 95 per cent confidence interval, this result suggests that the indirect effect is significantly different from zero ( $p < 0.001$ , two-tailed tests). Thus, mediational analysis using the Hayes Mediation Model 4 indicates that the effect of user manual quality on customer satisfaction is fully mediated by perceived product quality, as shown in Table II.

Table I Results of hypothesized model

Hypothesis	Independent variable	Dependent variable	Proposed effect	p Value	Path coefficient	Results
H1	User manual quality	Perceived product quality	Positive	$<0.001$	0.634	Supported
H2	User manual quality	Customer satisfaction	Positive	0.939	-0.007	Not supported
H3	Perceived product quality	Customer satisfaction	Positive	$<0.001$	0.85	Supported
Summary statistics	$\chi^2/df = 1.66$ GFI = 0.92 CFI = 0.96 IFI = 0.95 TLI = 0.94 RMSEA = 0.059					

Table II Moderated mediation analysis results of contingency variables

Path	Moderator	Grouping mode	Indirect effect		Direct effect		Boot 95% CI		Mediation type	Proposed effect	Results
			$\beta$	p value	$\beta$	p value	LL	UL			
UMQ $\rightarrow$ CS	Value	Low	0.707	<0.001	0.197	0.029	0.557	0.857	Partial Mediation	Positive	Supported
		High	0.368	<0.001	0.085	0.317	0.172	0.563	Full mediation		
UMQ $\rightarrow$ CS	Product complexity	Low	0.733	<0.001	0.174	0.030	0.018	0.330	Partial Mediation	Positive	Supported
		High	0.212	<0.001	0.068	0.489	0.125	0.262	Full mediation		
UMQ $\rightarrow$ CS	Product technology	Low	0.359	<0.05	0.329	0.001	0.230	0.548	Partial Mediation	Positive	Supported
		High	0.238	<0.05	−0.012	0.885	0.095	0.375	Full Mediation		
UMQ $\rightarrow$ CS	Consumer experience	Low	0.212	<0.05	0.157	0.034	0.121	0.306	Partial Mediation	Positive	Supported
		High	0.317	<0.05	0.028	0.816	0.080	0.643	Full Mediation		

Notes: CI = Confidence Interval; LL = Lower Limit; UL = Upper Limit

We also investigate the contingent nature of the relationships in our model. To do this, we include variables that may affect our model and test their effects on mediation relations through moderated mediation analysis. If evidence of moderation differs between the subgroups, mediation is moderated by the subgrouping variable (Edwards and Lambert, 2007). The moderators' effects on UMQ and CS are tested with the SPSS macro "Process" suggested by Hayes (2012), which can test the mediating effect, moderating effect and moderated mediating effect in a single model. The process has recently been used by several scholars for similar research (Chen *et al.*, 2014; Paparoidamis *et al.*, 2017; Wu *et al.*, 2018; Zhang *et al.*, 2018). Table II presents the total, direct and indirect effects for subgroups of moderators and the *p*-values of these effects, which are based on the results of the bias-corrected percentile method. The results indicate whether the difference between indirect effects of subgroups of moderators is zero.

The moderated mediation results (see Table II) show significant differences for low and high values of moderators. For high and low product value, the influence of UMQ on CS through PPQ ( $\beta_{\text{low value}} = 0.707, p < 0.001$ ), ( $\beta_{\text{high value}} = 0.368, p < 0.001$ ) is positive and significant. Similarly, for product complexity variable's high and low values, the influence of UMQ on CS through PPQ ( $\beta_{\text{low value}} = 0.733, p < 0.001$ ), ( $\beta_{\text{high value}} = 0.212, p < 0.001$ ) is positive and significant. Again, for product technology variable's high and low values, the influence of UMQ on CS through PPQ ( $\beta_{\text{low value}} = 0.359, p < 0.05$ ), ( $\beta_{\text{high value}} = 0.238, p < 0.05$ ) is positive and significant. Additionally, for consumer experience variable's high and low values, the influence of UMQ on CS through PPQ ( $\beta_{\text{low value}} = 0.212, p < 0.05$ ), ( $\beta_{\text{high value}} = 0.317, p < 0.05$ ) is positive and significant. Thus, our moderated mediation results demonstrate that product value, product complexity, product technology and consumer experience influence the relationship between UMQ and CS through PPQ (Table II). Concerning high-value subgroups of moderator variables, we observe no significant direct relationship between UMQ and CS, and thus, PPQ fully mediates the relationship between UMQ and CS for these subgroups. However, as we find a significant direct relationship between UMQ and CS for low values of moderators, we conclude that PPQ partially mediates the relationship between UMQ and CS for low-value subgroups.

## 5. Discussion

Recent research is the first empirical study in the marketing and business literature addressing the antecedents and consequences of user manual quality. To extend our knowledge on the issue, we attempt to understand the relevant elements of UMQ and uncover the impact mechanism of UMQ on customers' quality perceptions and satisfaction. We also design our model to allow testing the relevant moderators' effects on the proposed relationship structure. To derive relevant elements and dimensions of UMQ, we follow the evidence of technical documentation literature, information quality and consumer research. We find two major dimensions of UMQ as content-related elements and representational/format-related elements of the user manual. Our factor structure is tenable considering the prior findings and judgments in the relevant research (Schriver, 1993; Wang and Strong, 1996; Lee *et al.*, 2002). Thus,

consumers perceive two major factors in considering the quality of user manuals. The first dimension comprises items related to the information provided in the manual and includes items of adequacy, relevancy, easy access of information, diagrams/images provided and user-friendliness. The second dimension includes representational and format-related items, such as font size, volume, language of the manual and print quality.

Our findings reveal a positive significant relation between UMQ and PPQ, and this result demonstrates that consumers perceive UMQ as a part of their quality evaluation related to the product. Although popular belief suggests that consumers have low interest in user manuals, prior research has found that particularly high-involving, expensive, technological and complicated products require consumers to consult the manuals. We find that consumers judge their interaction with the user manuals as an intrinsic part of the whole product experience and quality perceptions. Satisfaction theories assert that consumer dissonance is at a maximum right after the purchase decision but before experiencing the product, and this stage is very important for satisfaction formation (Oliver, 1997). Thus, a high-quality manual is particularly valuable and supportive for consumers' product quality and satisfaction judgments as manual interaction takes place at a very critical stage for the formation of consumers' overall assessment related to that specific purchasing experience. Our evidence supports that a high-quality manual can add significant value to a product, enhance product differentiation and positively support consumers' product quality appraisals.

In this under-examined area, only one study suggests a significant impact of the user manual on customer satisfaction (Smart *et al.*, 1996). Although we do not observe a direct positive effect of UMQ on CS in our overall model, we find significant moderator effects on the relationship between UMQ and CS. The current study proposes that product value, product complexity, product technology and consumer experience moderate the direct and indirect effects of user manual quality on customer satisfaction via perceived product quality. Concerning product value, we observe no significant direct relationship between UMQ and CS for high-value products and, thus, PPQ fully mediates the relationship between UMQ and CS in this subgroup. However, as we find a significant direct relationship between UMQ and CS for lower value products, we conclude that PPQ partially mediates the relationship between UMQ and CS for lower value products. These findings point out that UMQ is essential for both low- and high-value products regarding CS. On the other hand, consumers directly associate user manual quality with product quality for higher value products. Consumers tend to relate user manual quality to both product quality and satisfaction for lower value products. For higher value products, the UMQ and product quality association is stronger and direct. We can extend this explanation for other moderators.

Providing user manuals is obligatory under many countries' laws and regulations, and in any case, firms have to invest in some cost for user manual design. Our findings indicate that product management theory and practice should not undervalue the effect of user manuals on customers' product quality evaluations, and firms should invest in providing high-quality user manuals as part of their product development efforts. Similar to the prior findings, our paper suggests that a user manual accompanying a product should be viewed as an extension of the "core product" that influences its assessment.



Consumers use these documents as an important informational cue to evaluate both the product and the company (Pedraz-Delhaes *et al.*, 2010). Our study reveals the underrated effects and significance of user manuals on consumers' quality and satisfaction evaluations. Thus, we put forward for both theoretically and in practice that the issue should be considered as an essential and critical part of the product development strategies and processes.

### 5.1 Management implications

A recent paper suggests that UMQ has a significant positive effect on consumers' product quality appraisals and these quality perceptions have a positive influence on satisfaction with high-involvement products like household appliances. When product complexity, technology, value and consumer experience are high, consumers directly associate user manual quality with product quality. Thus, experienced consumers consider expensive, high-tech and complex products' user manuals as an intrinsic quality element of the whole product experience. Product management teams of those companies should design an upscale and a premium quality manuals to be consistent with their high-tech and expensive products. For low values of those moderator variables, consumers tend to relate user manual quality both with quality and satisfaction judgements. Managers of those companies may more emphasize user manuals' simplicity and user-friendliness.

When it comes to user manuals, general belief suggests that consumers do not read manuals. Consumers are traditionally prejudiced against user manuals and they believe that manuals are too technical, complicated, and difficult to read (Gebert, 1988). This might be the result of companies' traditionally incorrect manual design practices. If company managers design manuals with a more consumer-oriented approach rather than an engineering-oriented approach, consumers will use the manuals more frequently and effectively. Integrating digital applications into law-enforced printed manuals may lead to manuals that are more pleasant to use, as well as increase usage rates and consumers' effectiveness. For instance, QR code applications can link to video materials, and thus, the information content of the manuals can be enhanced significantly by using smartphones. Particularly in case of diagnosis and troubleshooting, users may need more support than a printed manual can provide. Providing much richer and user-friendlier information with digital applications can significantly improve the quality of guidance and thus increase customer satisfaction (Pham *et al.*, 2002). As a part of product development efforts, company managers should gather customer data through formal customer surveys to determine how to improve user manuals. To design high-quality and more user-friendly manuals, the marketing team, product managers and technical communicators should engage in a close and concerted effort to do this from the early phases of product development. Our findings put forward that in a global competitive environment, companies that particularly sell complex products with long product life cycles must invest in providing high-quality user manuals. This will enhance perceived product quality and in turn customer satisfaction. Thus, our study shows that designing and providing a quality user manual should be an essential element of product management strategies for companies.

### 5.2 Limitations and future research

Despite its important findings, as with any study, several limitations arise from our research design. Like similar studies, our survey data results might signal a causal scheme between constructs; however, the cross-sectional nature of the study limits causality assertions. We only sampled consumers of the household appliances industry and, like several studies in this field, we collected the data from one country and, thus, our results are specific to this context. To test the generalizability of the findings, other researchers can extend the examination to different sectors and cultures. Cultural factors, country-specific product liability laws and the divergent expectations of consumers can potentially affect user manual studies and their results. This study is the first attempt to assess the interrelationships among UMQ, PPQ and CS constructs in the consumer marketing field. As an underrated research area, the issue of the user manual provides several potential avenues of research for consumer marketers. Future studies can explore relations between UMQ and other constructs, such as perceived value, brand image, word-of-mouth, behavioral intention and consumer trust in similar or more comprehensive model structures. Smartphone applications, and digitally supported and interactive user manuals, might also be timely and interesting topics for further studies.

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## Appendix 1

Table AI Definitions of key constructs, Factor loadings, AVE and construct reliability scores

Author/s	Construct	Item	Cronbach Alpha	AVE	CR			
Lee <i>et al.</i> (2002), Chen and Dibb (2010), Pedraz-Delhaes <i>et al.</i> (2010)	User Manual Quality (UMQ)	Information provided in the manual was sufficient for my needs	0.766	0.527	0.817			
		I found the necessary information easily in the manual	0.739					
		The user manual was easy to use	0.695					
		Appropriate images and diagrams were provided in the manual	0.685					
		The user manual includes relevant information for my needs	0.507					
		The font size of the user manual was large enough	0.811	0.550		0.857		
		The volume of the user manual was neither too big nor too small	0.782					
		The print quality of the user manual was good	0.782					
		The user manual was completely relevant to the product type/version	0.725					
		The user manual’s language was simple rather than technical	0.564					
		Dodds <i>et al.</i> (1991)	Perceived Product Quality (PPQ)	The product is reliable		0.870	0.674	0.860
				The product is a high-quality product		0.868		
				The workmanship of the product is good		0.716		
Cronin <i>et al.</i> (2000)	Customer Satisfaction (CS)	My choice to purchase this product was a wise one	0.873	0.714	0.882			
		I think that I did the right thing when I purchased this product	0.870					
		The product exactly meets my needs	0.790					
	Sampling Criteria	Have you read the user manual of the product you bought?						
		a. Had a quick read (Please end the questionnaire)						
		b. I read only a couple of pages of it (Please end the questionnaire)						
		c. I read half of it						
		d. I read all of it						
		Product Complexity Product Value	The product I bought is a complex product.					
			The product I bought is expensive.					
			Product Technology	The product I bought is a high-tech product.				
				Consumer Experience	Have you bought electrical appliances before from this company?			
	a. Never							
	b. 1-2 times							
	c. 3 or more times							
Summary statistics	$X^2/df = 1.67$ $GFI = 0.95$ $CFI = 0.95$ $IFI = 0.95$ $TLI = 0.94$ $RMSEA = 0.58$							

Notes: Likert scale : 1 = Completely disagree; 7 = Completely agree

## Appendix 2

Table AII Correlations and descriptive statistics

Variables	Mean	SD	1	2	3	4	5	6	7	8
1 UMQ1 (content)	6.070	0.814								
2 UMQ2 (representational/format)	5.838	0.795	0.618							
3 PPQ	6.192	0.747	0.356	0.527						
4 CS	6.152	0.746	0.291	0.462	0.676					
5 Product value	1.429	0.496	0.007	0.202	0.217	0.254				
6 Product complexity	1.407	0.493	−0.048	0.295	0.167	0.255	0.588			
7 Product technology	1.455	0.499	0.061	−0.008	0.130	0.17	0.046	0.021		
8 Consumer experience	1.318	0.467	−0.122	−0.246	−0.374	−0.409	−0.269	−0.357	−0.053	

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