Evaluation of service quality and customer satisfaction of EDP Distribution with the supply of electricity

Avaliação da qualidade do serviço e da satisfação dos clientes da EDP Distribuição com o fornecimento de energia elétrica

Manuel Afonso Machado*
Escola Superior de Tecnologias de Fafe, Medelo, Portugal

Mário João F. S. Basto
Escola Superior de Tecnologia do Instituto Politécnico do Cávado e do Ave, Portugal

Manuel João Lemos de Sousa
Universidade Fernando Pessoa, Porto, Portugal

ABSTRACT

The objective of this work was to evaluate the quality of service and customer satisfaction of EDP Distribution with the supply of electricity. In order to respond to the proposed objective, the ACSI and ECSI Portugal models were applied for the first time in Portugal in order to verify if there was a superiority in the explanation of one of the models and, if so, what best of both. The main results point to a very slight superiority of the ECSI Portugal model, with an explanation of the quality of service of 47.8% versus 47.7%, and an explanation of customer satisfaction of 78.4% versus 76.8% of the model ACSI. The remaining 52.2% of the quality of service and 21.6% of the satisfaction of the ESCI Portugal model are explained by other variables not considered in the model. The values found by the two models for customer satisfaction allow us to affirm that EDP Distribution customers are quite satisfied with the electricity supply.

KEYWORDS: Quality; Satisfaction; ACSI; ECSI P.

RESUMO

O objetivo deste artigo é avaliar a qualidade de serviço e a satisfação dos clientes da EDP Distribuição com o fornecimento da energia elétrica. Para responder ao objetivo proposto, foram aplicados, pela primeira vez em Portugal, os modelos ACSI e ECSI Portugal em relação ao fornecimento de energia elétrica, com o intuito de verificar se existe diferença na aplicação de um dos modelos e, em caso afirmativo, qual seria o melhor dos dois. Os principais resultados apontam para uma modesta superioridade do modelo ECSI Portugal, com uma diferença da qualidade de serviço de 47.8% *versus* 47.7% e, da satisfação dos clientes, de 78.4% *versus* 76.8% do modelo ACSI. Os restantes 52,2% da qualidade de serviço e 21.6% da satisfação do modelo ESCI Portugal, são explicados por outras variáveis não consideradas no modelo. Os valores encontrados pelos dois modelos para a satisfação dos clientes, permitiu afirmar que os clientes da EDP Distribuição estão bastantes satisfeitos com o fornecimento de energia elétrica.

PALAVRAS-CHAVE: Quality; Satisfaction; ACSI; ECSI P.

*Manuel Afonso Machado
PhD in Business Sciences by University Fernando Pessoa, Porto, Portugal. Professor at the school of Technologies of Fafe, Portugal.
Address: EDP Distribuição, Av. do Sol, n. 18, 4714-509, Braga, Portugal.
E-mail: manuelafonsomachado@gmail.com

Mário João F. S. Basto
PhD in Engineering Sciences, Faculty of Engineering, University of Porto, Portugal. Professor at the Department of Sciences in the School of Technology of the Polytechnic Institute of Cávado and Ave, Portugal.
E-mail: mbasto@ipca.pt

Manuel João Lemos de Sousa
PhD in Geology from the Faculdade de Ciências da Universidade do Porto, Portugal. Professor and Director of the Research Center for FP-ENAS (UFP research unit in energy, environment and health) at the University Fernando Pessoa, Porto, Portugal.
E-mail: LemosdeSousa@gmail.com

1   INTRODUCTION

Research into service quality and customer satisfaction is very important for companies to understand and plan their future, as it has a strong influence on their loyalty, according to several authors (Fornell, Johnson, Anderson, Cha, & Bryant, 1996; Vilares & Coelho, 2011).

Authors like Alves and Raposo (2007) who study the quality of service and customer satisfaction to understand their loyalty, say that satisfaction measure, is an economic indicator, together with the unemployment rate or the value of the Gross Domestic Product (GDP), because with this, companies can verify if they are reaching their market objectives.

In 2006, EDP Distribution (EDP D) ceased to commercialize energy, passing all customers to the regulated market for a company of the EDP group, EDP - Universal Service (EDP SU), which is the Last Resort Supplier (CUR). Recently, the Decree Law no. 75/2012 changed, giving permission to anyone wishing to return to the regulated market, which is expected to end in 2020.

Since 2006, suppliers have acquired the energy they need to serve their customers in the free market, as well as the company EDP SU, whose energy is distributed by EDP D to all suppliers in the free and regulated market, paying its customers a fee for each kw/h for the transportation of energy through distribution networks. The value of this fee is decided by the regulator (ERSE) and is applied to all suppliers who bill the cost of transit of energy to their customers, which is included in the price, as well as the marketing margin decided by the regulator.

EDP D, as Distribution Network Operator (ORD), is responsible for the management and proper functioning of the network, for the quality of the energy supplied, for the possible number of interruptions and interruption times, for the meter readings, for the commercial service, for the regulation/alteration of the contracted power requested by the customers and for the resolution of the faults.

The main objective of this paper is to verify the perception that electric energy consumers have of the service provided to them by the ORD and how satisfied they are with the service and product received. To achieve the proposed objectives, two structural equation models treated with Smart PLS 3.0 software, 30-day full evaluation version (Ringle, Wende, & Becker, 2015) were applied. Thus, the variables of the model with the main focus on the evaluation of service quality and customer satisfaction were evaluated, using the American and Portuguese models (ACSI and ECSI Portugal), widely tested in other activities and applied for the first time to the supply of electricity in Portugal.

2   REVIEW OF THE LITERATURE

To carry out a study in mainland Portugal, it was the purpose of this study to choose a company that had customers in all parts of the country. Due to the regional asymmetries, EDP D fulfilled this requirement as an energy distributor in High, Medium and Low Voltage, with about six million points of electricity delivery to customers.

EDP D is the main distribution network operator in Portugal and the only one in High and Medium Voltage. In Low Voltage, there are twelve small operators that have residual importance. Since 2006, EDP D distributes only the energy that is acquired by the suppliers of the liberalized market and by EDP SU, which is the Last Resort Marketer (CUR), where the customers who, in the first stage, were not convinced by the suppliers to pass to the free market, remain.

The EDP D is an EDP group company, privately-owned and dispersed by several entities, with private management appointed at the General Meeting of the Company, in accordance with current regulations. Until the end of this study, no other study was known about the quality of service and satisfaction that binds only the characteristics of the distributing company and as sole supplier of energy in AT, MT and majority in BT to all suppliers of the free and regulated market.

To evaluate the quality and satisfaction, a quantitative empirical study was carried out to evaluate the service quality and customer satisfaction, and two models of satisfaction were used: the American index model of structural equations ACSI and the index model of structural equation ECSI Portugal,

to which the same sample was applied to verify which of the two models explains better the quality of service and the satisfaction of the customers with the electric power supply.

Services are currently the economic support of the developed economies of several countries for creation of wealth, measured by the gross value added (GVA), surpassing the average of the 34 countries that make up the Organization for Economic Cooperation and Development (OECD) and contributing with more than 60% of job creation.

The effects of the global economic and financial crisis have lowered the overall performance levels of the economies of the EU Member States when analyzed over the last decade. Between 2004 and 2014 the average annual growth rates of the EU-28 and the euro area (AE-19) were 0.9% and 0.7%, respectively. When measured in this way, the highest growth was recorded in Poland (average growth of 3.9% per year) and Slovakia (3.8% per year), followed by Romania (2.7%), Bulgaria, Latvia and Malta (all with 2.5%). On the other hand, overall GDP growth in real terms during the period 2004 to 2014 was negative in Greece, Italy and Portugal (Eurostat, 2015).

Marketing services are classified in five different dimensions by Lovelock and Wirtz (2006): the nature of the service, the type of relationship with the customer, the degree of customization, the nature of the demand and supply, and the mode of delivery of the service.

The European Commission (EC) (2005) drew attention to the relevance of business-related services, which are the key to the competitiveness of organizations, including public services, particularly electricity, telecommunications, gas and water, that are generally considered to be public services, which shows the interest and importance of services in the world economy.

There is no clear frontier in some cases between the industrial sector and the services sector, since, increasingly, the business of many industrial companies results from the offer of complementary services to their traditional products, as referred by Dantas (2013).

3 METHODOLOGY

This study employs the original formulation of the ACSI and ECSI Portugal models, applied to a sample obtained in mainland Portugal. The latent variables of the original models and the respective relationships were maintained, as indicated by Fornell et al. (1996).

3.1 Selection of measurement variables

To select the manifest variables appropriate to this investigation, a group of twelve specialized technicians was created, who selected the measurement variables that they judged appropriate to evaluate each of the latent variables. This choice was made among a set of manifest variables already tested in the SERVQUAL, SERVPERF, ACSI, ECSI, ECSI Portugal and ANEEL models, which were best suitable to the ACSI and ECSI Portugal models to evaluate satisfaction and quality in the electric power supply. The indicators were ordered in descending order of importance of what was considered to be the most adequate for each of the latent variables, which allowed to make an evaluation of all the measurement variables.

After selecting the indicators that the literature and the technicians advised, these same variables were used as measurement variables of the respective latent variables in the two models.

3.2 Data collection instrument

For the data collection, a quantitative structured questionnaire was elaborated with questions measured on a Likert scale of 1 to 10. The collection was performed by random stratified interview by quotas and by districts, according to the number of residences with fixed telephone numbers obtained through the Census of 2011.

In most cases the interviewers went personally to the places to do the interviews, in others, telephone interviews were conducted 426 questionnaires of energy consumers of EDP Distribution,

residing in the national territory, were collected and validated. According to Vilares and Coelho (2005, 2011), for the application of these models, a sample of 250 respondents is sufficient, and this number was well surpassed by the 426 questionnaires, effectively collected and validated.

The sample was analyzed by the software SPSS 22 and the relationships between the variables and the outputs of the models were estimated by the software SmartPLS, such as the relations between variables, the scores of the latent variables and their impacts. These outputs and the estimated indices were compared with those obtained by the ECSI Portugal model published in 2015. The application of these two models widely used to measure the national indices of satisfaction and quality of service also allows one to verify which one best explains the quality of service and customer satisfaction of EDP Distribution in mainland Portugal.

4   RELATIONSHIP AND SERVICE MARKETING

Energy quality can be assessed by lamp flickers and abnormal noises in washing machine motors, dishwashers, vacuum cleaners and other appliances. For example, when the illumination exhibits changes of brightness in the normal or fluorescent lamps, when these turn off and on in service. Although this study is aimed to the domestic customers, industrial customers become also dissatisfied when power supply is interrupted or when it is not of technical quality. These anomalies can cause damage to equipment, production losses and non-compliance in delivery times.

Implementing improvements in service quality, is part of any process of continuous improvement, but may not be sufficient to lead to results that allow the companies to remain in the long term. In order to have business continuity, it is also necessary to sell the product, improve the profit margin, create new products, improve the products on the market and consult clients to obtain their justified opinion on improvements to be introduced in the final product and their satisfaction with the product or the service provided.

Companies must know the customer segments, their needs and expectations to study the content of the response to be implemented. Information from the end consumer is achieved in the market by marketing studies and should be the subject of in-depth research.

The study of the relationship between services and performance marketing strategies deserves a lot of attention. The studies of Sheth, Mittal and Newman (2001) indicate that the link between quality of service and organizational performance is one of the critical issues that deserve the attention of the researchers. Kotler (2002) asserts that service growth has caught marketers' attention by realizing that traditional marketing practices, essentially directed to consumer goods, were not always adequate and applicable to services. From a broader perspective of the concept, Kotler and Conner (1977) have made it possible to extend the concept of marketing as a social and management process by which individuals and groups obtain what they need. Thus, the integration of the concept of service marketing in which the concepts of internal marketing, relational marketing and quality of service are also associated, as Almeida and Pereira (2014, p. 63) assert.

4.1 Marketing as a management tool

Service marketing is relevant to service providers as it is to service producers or of physical goods as referred by Kotler (2002).

The objective of this study is to understand the mechanisms and indicators of the service that most concur to the formation of customer satisfaction with the supply of electricity by the distribution network operator. It is known that this service of energy supply has permanent use, be it in industry, commerce as well as residential customers and any disturbance in the service is soon detected and assimilated by the consumer.

Electric energy is present in people's daily lives, as stated by Machado (2014). In the present case, the electricity distribution service is a public service subject to regulation by the Regulatory Entity of Energy Services (ERSE) that stipulates in the law, the rules that are negotiated with the ORD,

regarding the quality of the technical and commercial service which can be implemented for the continuous improvement of the service.

The quality of services provided influences consumer satisfaction and is directly related to customer satisfaction, according to studies by Hunt (1977), Day (1977) and Alves (2003), who consider satisfaction in three ways: functional, sensorial and psycho-sociological. Inclusively, Alves (2003, p.125) states that satisfaction has great influence because it evaluates the proposals in relation to perceived quality of service.

Loyalty intentions were also studied by Johnson, Herrmann and Huber (2006) who evaluated the customer's perceived satisfaction over the years and stated that it creates loyalty intentions in these clients.

Vilares and Coelho (2011) point to customer satisfaction as the center of economic activity, where suppliers compete for buyers and the basic idea of a market economy is that companies exist to compete in order to satisfy their customers.

Marketing, as an area of knowledge that integrates all exchange-related activities aimed at satisfying customer needs, has evidenced strong changes over time. With the increasing importance of services, marketing had to adapt to new emerging needs and it is the activity that aims to satisfy them. Thus, the new discipline of Service Marketing was born. Service marketing is different as the focus shifts to customer needs. They are associated with service marketing, relationship marketing, service quality, and customer satisfaction, as stated by Almeida and Pereira (2014: 63).

The term relationship marketing in the area of services emerged in the 1980s, by Berry (1983 apud Palmatier, 2008), remains current and in permanent evolution. Their introduction and extension to services clearly reveals how companies started to see the customer, which is the central part of the organization, and the relationships they seek to maintain. Focusing on services is becoming less and less transaction and more relationship, essentially having customer retention and loyalty as the objective. The relationship has been the basis of success (Palmatier, 2008). The marketing of services is in a new stage in which technology assumes a preponderant role. Today marketing and information and communication technologies are two inseparable realities.

4.2 Marketing of mix services

Market-oriented services are developed for sale at a price that ensures cost coverage and ensures a margin for the service marketer. Services related to the activities of organizations, business-related services, are critical to the competitiveness of organizations, including the so-called utilities such as electricity, water, gas and telephone. Currently, some of these services are already provided by private companies. The concept of service marketing is used by companies to keep and attract new customers in the sale of their services, which emphasize the importance of the mix marketing, emphasizing relationship marketing, since this is the main tool for customer loyalty.

4.3 Marketing of relationship

Relationship marketing is important in this study, since companies need the loyal customers who reiterate the purchase for the company to survive and, for that, they need to be satisfied with the service provided by the organization. Relationship marketing is a way of dealing with consumers differently, identifying their needs and offering benefits in order to give them the impression that they are being served by a company that understands their desires as individuals (Jamil, Tavares, & Gonçalves, 2002, p. 92).

According to Martins (2006, p. 80), relationship marketing corresponds to a philosophy of business administration based on the acceptance of customer and profit orientation, by the whole company and the recognition that it is desired to seek new forms of communication to establish a deep and lasting relationship for customers, future customers, suppliers and all intermediates, as a mean to obtain sustainable competitive advantage. In relationship marketing, companies seek to meet the needs of

their consumers by providing quality products and/or services by creating value for customers with the aim of making them loyal.

Relationship marketing is the task of making customers loyal to the brand. The investment in relationship marketing is distinguished by five levels: basic, reactive, responsible, proactive and partnership. The basic level is understood as the primary needs of the customers. At the reactive level, the commitment is made by the organization to offer a product or service better than the competition. The proactive level refers to anticipating competition by offering customers innovative services. It is in partnership with customers that one seek a relationship of complicity with customers, in order to always please them. For this, it is important that they have, in relation to the product or service, a high perceived value (Cobra, 2009, p. 27).

4.4 Marketing of public services

Service marketing has as its main basis its origin, the assumption that services, since they are different from consumer goods, lack a different marketing whose focus shifts from the characteristics of the product to the needs of the customer.

Service marketing can be defined as a group of operational activities that aim to investigate, obtain and serve the customer. In addition, it includes activities such as analyzing, planning, implementing, and controlling consumer needs with quality and profitability.

In a broader perspective of the concept, one refer to marketing as a social and management process, whereby individuals and groups get what they need as Kotler (2002) states. In this context, the notion of marketing also integrates, as tradable or exchangeable, not only physical products, but also services.

The concept of marketing of public services is also associated with the concept of internal marketing, relationship marketing and quality of service focused on customer satisfaction. This customer orientation, seen as the interiorization of its needs by all elements of the company, should be valued by the service marketing. In a marketing context, the marketing approach shifts from the physical characteristics of the product to the needs of the customer. Value creation and customer perception and its needs are central elements that constitute the rationale of the business, and the structural basis of service marketing lies in the binomial solution offered versus benefits harvested, as reported by (Almeida & Pereira, 2014, p. 64).

Marketing researchers have tried to characterize the marketing of services and subsisted two distinct trends: one by similarity to the concept of marketing of consumer goods, another by fully distinguishing the two concepts. Those who advocate the difference between product or service marketing claim that services are intangible in nature. Some argue that some products have characteristics in which intangibility is also observed. It is not disputed that there are situations in products where there are also services rendered, but the transaction is mostly tangible and collides with the service concept that is predominantly intangible by essentially intangible actions, processes and performances, that a part can provide to the other and that they are neither appropriable nor can be returned, where consumption is simultaneous with the production of the service. One example was the supply of electricity. The service is present, but it is the acquirer who decides when to use it, its production is simultaneous with its consumption and does not result in ownership of anything. Cable and satellite television and telecommunications are examples of services in which customers decide their simultaneous production and consumption, according to Dantas (2013).

5   APPLICATION OF ACSI AND ECSI PORTUGAL MODELS

As it is well known, almost 99% of electricity is supplied by EDP Distribution, which uses energy networks to distribute energy to the final consumer. Electricity purchased by the marketers and EDP SU from the free market (MIBEL) is distributed daily to around six million points of delivery to consumers.

The study of the satisfaction with the service received from such a large number of clients is an important challenge to be taken into account when it is proposed to apply the two widely used structural equation models (ACSI and ECSI Portugal) in the assessment of customer satisfaction that receive energy from the energy networks managed by EDP Distribution. The application of this study to the reception of electricity in the six million points of delivery to customers of EDP D, who receive the energy they spend in their home or company, acquired by any marketer through the distribution networks, is a good incentive to work. The United States implemented the American Customer Satisfaction Index (ACSI) in 1994, which began with application in 40 industries. The European Union also recommended to its members the development of national indices (Fornel et al., 1996). In Europe, the American model (ACSI) was adapted and resulted in the European Customer Satisfaction Index (ECSI), which was launched in Portugal in 2001 by Vilares and Coelho (2005). Others presented new models or modified models for measuring quality of service and customer satisfaction and loyalty. These models have in common being econometric models of multiple items, in which the latent variables are related to each other by means of a structure whose central variable is satisfaction.

The ACSI and ECSI Portugal models aim to provide general satisfaction indices, even allowing comparison between sectors of the economy. The supply of electricity, in its multiple aspects, mainly continuity of supply, commercial and service provided quality, are critical factors for any modern and competitive economy. Thus, it is considered extremely relevant to evaluate the evolution of the current quality of service and customer satisfaction, to assess the impact of quality of service on customer satisfaction and on loyalty and complaints, to know how the customer perceives the quality of service and its satisfaction/dissatisfaction with the service provided. The suggestion of Hamer (2006) is that managers who want to increase the quality perceived by the client should decrease the distance between the expected quality and the actual service received. Quality management allows the creation, implementation and evaluation of work methods, procedures and models that, used in an integrated way, carry to the organization an organizational culture of continuous improvement. In the organizational context, quality is a key factor that has to be considered. Jones (2002) states that quality of service has a positive effect on customer loyalty. Quality management tools have a timeless strategic application, according to Capricho and Lopes (2007). Quality is presented in this context from the perspective of perceived quality, since it is the most used in services, but also in studies of quality. The service delivered or the quality of the service provided depends on how the service managers were able to meet or not, the needs and expectations of the client to provide quality service and customer satisfaction.

6 METHODOLOGIES

This section presents and justifies the process used in the research that included the following phases: formulation of the problem, specification of the objectives and definition of the hypotheses. Research design, determination of the data collection instrument, selection of the sampling process, and methods of data analysis are reported by Churchill and Peter (1984).

In an empirical research, observations are made to better understand the phenomena to be studied. All natural and social sciences are based on empirical research, because observations from this type of research can be used to construct better explanations or theories. An empirical research includes the following aspects:

- It aims to contribute to the enrichment of knowledge in the area in which the research was made;
- It needs choices in terms of the theme and the specific hypotheses to test;
- Requires planning of data collection methods;
- It needs a forecast to plan the data analysis before beginning the empirical part of the research, as stated by (M. Hill, & Hill, 2008).

6.1 Empirical research

In an applied research it is intended to discover new facts (empirical data) that help to solve practical problems in the short term. For example, to investigate why several customers in a particular district are less satisfied with the quality of service provided by EDP Distribution in the electricity supply. It is possible to investigate and list the causes of this dissatisfaction and to solve them in the short term. An investigation must contribute to the enrichment of knowledge in the area chosen. It forces timely planning in data collection. In this study, it was preferred to stratify the sample by districts. Thus, instead of having only information at the national level, information is also available at the district level, where the closest and technically achievable intervention is possible, given the information is able to reach the level of council, which is a field inserted in the database by the respondents. All information taken from the database was analyzed before the research questionnaire was drawn up. M. Hill and Hill (2008, p. 21) argue that any investigation requires planning data collection methods and that a forecast is made to plan the data analysis before beginning the empirical part of the research. The universe of this sample was the Portuguese population consuming electricity. As previously mentioned, the sample consisted of 429 respondents, a figure higher than the 250 considered necessary to apply the models proposed by Vilares and Coelho (2011).

6.2 General objectives

To resort on the ACSI and ECSI Portugal models to evaluate the quality of service perceived by the Portuguese customers with the supply of electricity and their satisfaction, using a database representative of the universe under study. The analysis was performed with the SmartPLS software, applied to a random sample collected in continental Portugal, stratified by districts.

6.3 Specific objectives

In order to reach the proposed objectives, the ACSI and ECSI Portugal models were used and their original relationships among the latent variables. It was also intended to know which latent variables have the most influence on quality of service and satisfaction, and to verify which of the models explains more about quality of service and customer satisfaction.

6.4 PLS-SEM Analysis

To test the validity of the proposed models, the most appropriate procedure is the analysis of structural equation models, SEM. The analysis of structural equation models is a generalized statistical procedure used to test the validity of theoretical models that define hypothetical causal relationships, taking into account the existence of multiple endogenous and exogenous latent variables (variables not observable directly), each measured by multiple variables or indicators (directly observable variables). It can be seen as a mixture and generalization of factor analysis, regression analysis and path analysis, being a more powerful alternative to these procedures, allowing simultaneous analysis of complex relationships between variables. The model comprises the analysis of two conceptually distinct submodels. The measurement model that specifies the relationship between the manifest variables and the hypothetical latent variables and the structural model that specifies the causal relationships between the latent variables.

The two most common procedures for the application of this type of model are the analysis of covariance-based structural equations models, the CB-SEM (Jöreskog 1970, 1973; Wiley, 1973), and the analysis of partial least squares PLS-SEM (Wold, 1981, 1985). PLS-SEM is often referred to as component-based SEM, in contrast to CB-SEM analysis called covariance-based SEM.

CB-SEM is characterized by allowing complex causal relationships between latent variables. It allows the confirmatory factor analysis of the measurement scales, tests and analyzes the explanatory relationships between multiple latent or manifest variables, simultaneously handles data with auto

correlated errors or compares alternative models by evaluating the relative adjustment. It allows the simultaneous evaluation of the measurement model and the structural model and considers the measurement errors of the manifest variables as a constituent part of the model. It has as the statistical objective to reproduce the theoretical covariance matrix, that is, to minimize the difference between the observed covariance matrix and the one estimated by the model. This type of model gives particular emphasis to the global adjustment of the covariance matrices, and that is why it has particularly importance in confirmatory analyzes.

CB-SEM tests and confirms the theory accepted *a priori*. Small changes in the model specification may result in major changes in its fit (Hair, Hult, Ringle, & Sarstedt, 2013). It assumes multivariate normality of data and large samples. Alternative estimation methods for maximum likelihood allow one to analyze data that do not meet the requirement of the multivariate normal distribution and missing data estimation methods based on the model allow one to deal with MCAR or MAR data.

PLS-SEM is an alternative method of structural equation analysis that applies the ordinary least squares method to each equation of the structural model. The generic PLS model can be implemented as a regression model (PLS-R), predicting one or several dependent variables from a set of independent variables or can be implemented as a model similar to SEM, with causal relationships between predictors and variables (PLS-SEM). For the present study the second approach is of interest.

The objective of PLS-SEM is to maximize the variance explained by endogenous variables, minimizing residuals (either from the measurement model or from the structural model) and may be more appropriate in predictive and exploratory analyzes. The goal is the theoretical development and the forecasting.

PLS-SEM, compared to the CB-SEM, is a more adequate technique when the purpose is the forecast and the sample is small or when the purpose is exploratory modeling. In general, CB-SEM is preferred when the purpose is confirmatory, interpretative or explanatory. PLS-SEM is poor as an explanatory technique, because it is poor in the ability to filter the variables of lower causal expression (Tobias, 1997). Emphasis is placed on prediction rather than understanding the relationships between variables. PLS-SEM can also be used as an exploratory technique prior to an explanatory technique such as CB-SEM.

7   RESULTS

7.1 ACSI Model

7.1.1 Analysis of the measurement model

The values obtained for Cronbach's alpha and the composite reliability index exhibited good or excellent internal reliability, with all values above 0.81 for Cronbach's alpha and above 0.89 for the composite reliability index, supporting the unidimensionality and the convergent validity of the different constructs (Table 1).

Table 1 - Cronbach's alpha and composite reliability

	Cronbach's alpha	Composite reliability
Expectation	0.818	0.891
Loyalty	0.838	0.901
Quality	0.913	0.932
Complaint	0.913	0.938
Satisfaction	0.902	0.939
Value	0.859	0.904

As for the Average Variance Extracted (AVE) all values were well above 0.5, as it can be seen in Table 1, which corroborates the values of Cronbach's alpha and composite reliability as a support for a good convergent validity of the constructs (Table 2).

Table 2 – Average Variance Extracted (AVE)

	AVE
Expectation	0.731
Loyalty	0.754
Quality	0.697
Complaint	0.792
Satisfaction	0.837
Value	0.703

In Table 3, where the square root of the AVE for each construct is in the diagonal, it is observed that the proposed model verifies the Fornell-Lacker criterion, which, together with the values obtained by the crossed loadings and loadings, support a good discriminant validity of the model.

Table 3 - Fornell-Larcker criterion (correlations with the square root of the AVE in the diagonal)

	Expectation	Loyalty	Quality	Complaint	Satisfaction	Value
Expectation	**0.855**					
Loyalty	0.621	**0.868**				
Quality	0.690	0.634	**0.835**			
Complaint	0.607	0.698	0.695	**0.890**		
Satisfaction	0.762	0.747	0.793	0.710	**0.915**	
Value	0.411	0.535	0.586	0.497	0.650	**0.839**

As for the Heterotrait-Monotrait Ratio for evaluating the discriminant validity, all values obtained were lower than 0.9 and only two higher than 0.85, which supports the existence of a good discriminant validity among the reflexive constructs (Table 4).

Table 4 - Heterotrait-Monotrait Ratio (HTMT)

	Expectation	Loyalty	Quality	Complaint	Satisfaction
Loyalty	0.706				
Quality	0.774	0.705			
Complaint	0.671	0.761	0.743		
Satisfaction	0.866	0.833	0.866	0.767	
Value	0.469	0.627	0.655	0.561	0.724

7.1.2 Analysis of the structural model

Before this analysis being performed, it was necessary to test the collinearity of the structural model. The highest value of VIF obtained was 2.420, a value well below 5, which indicates that there are no problems of multicollinearity in the model.

In order to evaluate the structural model that represents the relationship between the latent variables, relationships defined in the hypothetical model, the criteria consisted in the use of the SRMR global adjustment index, the evaluation of the significance of the coefficients, the computation of the coefficients of determination R^2, the estimation of the coefficients of the exogenous latent variables f^2 and the calculation of the predictive relevance Q^2.

To test the significance of the model, one employed a bootstrap resampling technique, a process implemented in SmartPLS, in which 5000 subsamples (bootstrap samples) were randomly taken from the original sample with replacement. In the measurement model, all loadings were strongly significant. In the structural model, all the coefficients were significant, except the impact coefficient associated with the path 'Expectation → Value'.

It becomes imperative to analyze the importance and impact of the significative relationships. The analysis is done in the same way as the standard least square linear regression. These coefficients

estimate the expected variation in the endogenous construct for each point of variation in the predictor construct. The only non-significant coefficient of impact has an estimated coefficient of very low value (0.012), showing that there is no direct influence of Expectation on Value (Table 5).

Table 5 - Coefficients of the structural model and their significance

	Coefficient	*t* statistic	p-value
Expectation -> Quality	0.690	13.449	0.000
Expectation -> Satisfaction	0.406	5.174	0.000
Expectation -> Value	0.012	0.086	0.931
Quality -> Satisfaction	0.350	4.031	0.000
Quality -> Value	0.578	5.116	0.000
Complaint -> Loyalty	0.338	2.547	0.011
Satisfaction -> Loyalty	0.507	3.866	0.000
Satisfaction -> Complaint	0.710	10.549	0.000
Value -> Satisfaction	0.278	3.458	0.001

Besides these direct effects between the variables, it is also important to analyze the indirect effects through mediating variables. The sum of direct and indirect effects provides the total effect of one variable on another (Table 6). All these total effects were significant.

Table 6 - Total effects and their significance

	Total Effect	*t* statistic	p-value
Expectation -> Loyalty	0.569	8.966	0.000
Expectation -> Quality	0.690	13.449	0.000
Expectation -> Complaint	0.541	8.080	0.000
Expectation -> Satisfaction	0.762	15.536	0.000
Expectation -> Value	0.411	4.618	0.000
Quality -> Loyalty	0.382	5.146	0.000
Quality -> Complaint	0.363	5.040	0.000
Quality -> Satisfaction	0.511	5.869	0.000
Quality -> Value	0.578	5.116	0.000
Complaint -> Loyalty	0.338	2.547	0.011
Satisfaction -> Loyalty	0.747	12.376	0.000
Satisfaction -> Complaint	0.710	10.549	0.000
Value -> Loyalty	0.208	3.379	0.001
Value -> Complaint	0.197	3.504	0.000
Value -> Satisfaction	0.278	3.458	0.001

The ASCI model, together with the values obtained for the impact coefficients and the determination coefficients, is shown graphically in Figure 1.

The overall fit of the model revealed adequate since a value of 0.078 was obtained for the SRMR, which is less than 0.08. The values of the R^2 coefficients obtained and displayed in Table 7, ranged from 0.344 to 0.768 for Satisfaction. This last value represents a substantial effect of the model in explaining EDP customers satisfaction, ie, the model explains about 76.8% of customer satisfaction, with 23.2% of satisfaction explained by other variables not considered in the model.
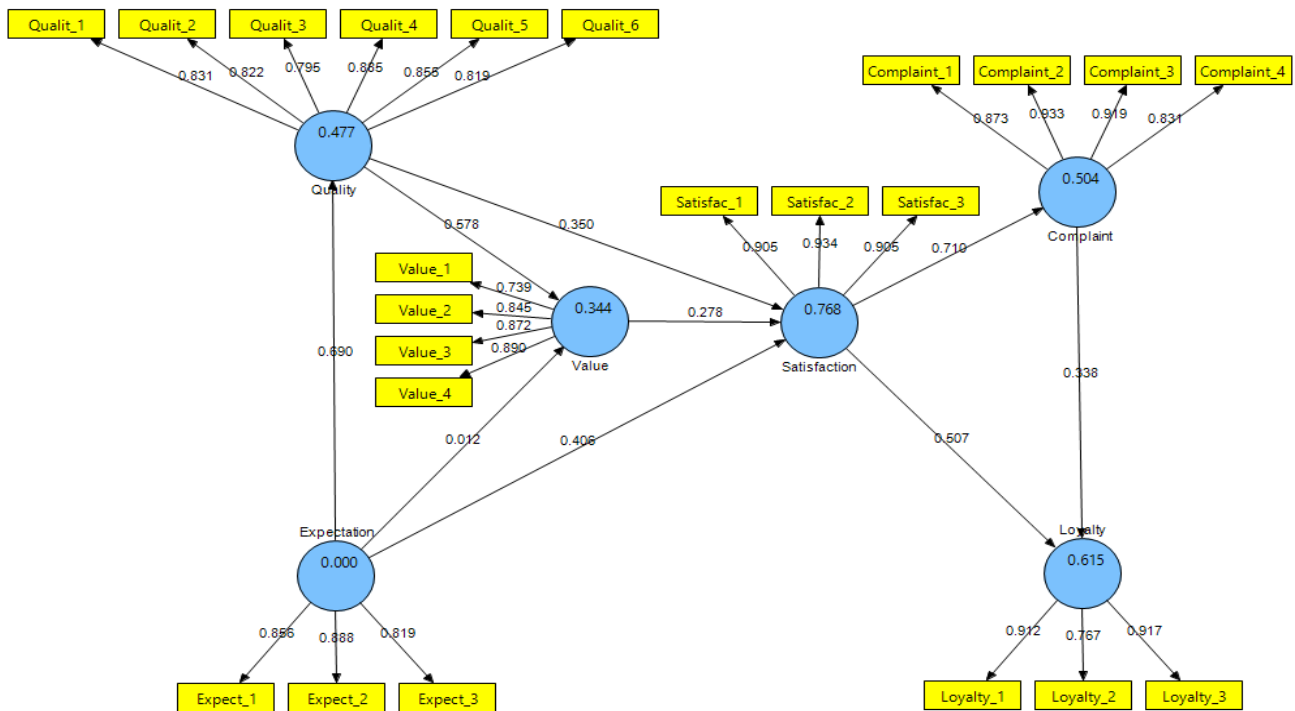
Figure 1 – ACSI Model
Source: Database analyzed by SmartPLS software.

Table 7 – R^2 and Redundancy

	R^2	cv-redundancy	cv-communality
Expectation			0.442**
Loyalty	0.615	0.443**	0.503**
Quality	0.477	0.313*	0.565**
Complaint	0.504	0.383**	0.641**
Satisfaction	0.768	0.633**	0.646**
Value	0.344	0.226*	0.495**

* medium relevance
** large relevance

7.2 ECSI P Model

7.2.1 Analysis of the measurement model

The values obtained for Cronbach's alpha and the composite reliability index showed a good or excellent internal reliability, with all values above 0.81 for Cronbach's alpha and above 0.89 for the composite reliability index, supporting the unidimensionality and the convergent validity of the different constructs (Table 8).

Table 8 - Cronbach's alpha and Composite reliability

	Cronbach's alpha	Composite reliability
Expectation	0.818	0.890
Image	0.921	0.944
Loyalty	0.838	0.901
Quality	0.913	0.932
Complaint	0.913	0.938
Satisfaction	0.902	0.939
Value	0.859	0.904

Concerning the AVE, all values were well above 0.5, as can be seen in Table 9, which corroborates the values of Cronbach's alpha and composite reliability as a support for a good convergent validity of the constructs.

Table 9 – Average Variance Extracted (AVE)

	AVE
Expectation	0.730
Image	0.809
Loyalty	0.754
Quality	0.697
Complaint	0.792
Satisfaction	0.837
Value	0.703

In Table 10, where the square root of the AVE for each construct is in the diagonal, it is observed that the proposed model verifies the Fornell-Lacker criterion, which, together with the values obtained by the crossed loadings and loadings, support a good discriminant validity of the model.

Table 10 - Fornell-Larcker criterion (correlations with the square root of the AVE in the diagonal)

	Expectation	Image	Loyalty	Quality	Complaint	Satisfaction	Value
Expectation	**0.854**						
Image	0.711	**0.900**					
Loyalty	0.623	0.670	**0.868**				
Quality	0.691	0.770	0.634	**0.835**			
Complaint	0.609	0.599	0.698	0.695	**0.890**		
Satisfaction	0.763	0.776	0.747	0.793	0.710	**0.915**	
Value	0.412	0.523	0.535	0.586	0.497	0.650	**0.839**

As for the Heterotrait-Monotrait Ratio to evaluate the discriminant validity, all values obtained were lower than 0.9 and only two higher than 0.85, which supports the existence of a good discriminant validity between the reflexive constructs.

7.2.2 Analysis of the structural model

Before this analysis was performed, it was necessary to test the collinearity of the structural model. The highest value of VIF obtained was 3.284, a value well below 5, which indicates that there are no problems of multicollinearity in the model.

In order to evaluate the structural model that represents the relationship between the latent variables, relationships defined in the hypothetical model, the criteria consisted in the use of the SRMR global adjustment index, the evaluation of the significance of the coefficients, the computation of the coefficients of determination R^2, the estimation of the coefficients of the exogenous latent variables f^2 and the calculation of the predictive relevance Q^2.

To test the significance of the model, one employed a bootstrap resampling technique, a process implemented in SmartPLS, in which 5000 subsamples (bootstrap samples) were randomly taken from the original sample with replacement. In the measurement model, all loadings were strongly significant. In the structural model, all the coefficients were significant, except the impact coefficient associated with the path 'Image → Loyalty ', which was marginally significant and for the coefficient associated with the path 'Expectation → Value' which was not significant.

Table 11 - Coefficients of the structural model and their significance

	Coefficient	*t* statistic	p-value
Expectation -> Quality	0.691	13.332	0.000
Expectation -> Satisfaction	0.336	3.577	0.000
Expectation -> Value	0.013	0.095	0.924
Image -> Expectation	0.711	12.201	0.000
Image -> Loyalty	0.189	1.736	0.083
Image -> Satisfaction	0.213	2.285	0.022
Quality -> Satisfaction	0.247	2.791	0.005
Quality -> Value	0.577	5.157	0.000
Complaint -> Loyalty	0.319	2.223	0.026
Satisfaction -> Loyalty	0.374	2.821	0.005
Satisfaction -> Complaint	0.710	10.597	0.000
Value -> Satisfaction	0.255	3.442	0.001

It becomes imperative to analyze the importance and impact of the significative relationships. These coefficients estimate the expected variation in the endogenous construct for each point of variation in the predictor construct. The only non-significant coefficient of impact has an estimated coefficient of very low value (0.013), showing that there is no direct influence of Expectation on Value (Table 11). The marginally significant coefficient that measures Image's influence on Loyalty has the second lowest value, 0.189, revealing that Image's impact on Loyalty is low. In fact, the introduction of the Image dimension in the model shows only a relevant impact on Expectation.

Besides these direct effects between the variables, it is also important to analyze the indirect effects through mediating variables. The sum of direct and indirect effects provides the total effect of one variable on another (Table 12). All these total effects were significant.

Table 12 - Total effects and their significance

	Total Effect	*t* statistic	p-value
Expectation -> Loyalty	0.367	4.674	0.000
Expectation -> Quality	0.691	13.332	0.000
Expectation -> Complaint	0.434	4.865	0.000
Expectation -> Satisfaction	0.612	6.322	0.000
Expectation -> Value	0.412	4.638	0.000
Image -> Expectation	0.711	12.201	0.000
Image -> Loyalty	0.578	7.688	0.000
Image -> Quality	0.491	7.083	0.000
Image -> Complaint	0.460	7.780	0.000
Image -> Satisfaction	0.648	11.079	0.000
Image -> Value	0.293	3.957	0.000
Quality -> Loyalty	0.237	3.583	0.000
Quality -> Complaint	0.280	3.942	0.000
Quality -> Satisfaction	0.395	4.607	0.000
Quality -> Value	0.577	5.157	0.000
Complaint -> Loyalty	0.319	2.223	0.026
Satisfaction -> Loyalty	0.600	6.279	0.000
Satisfaction -> Complaint	0.710	10.597	0.000
Value -> Loyalty	0.153	2.857	0.004
Value -> Complaint	0.181	3.447	0.001
Value -> Satisfaction	0.255	3.442	0.001

The ECSI P model, together with the values obtained for the impact coefficients and the determination coefficients, is shown graphically in Figure 2.

The overall fit of the model was adequate since a value of 0.08 was obtained for the SRMR. The R^2 values obtained in Table 13, ranged from 0.344 to 0.784 for Satisfaction. This last value represents a substantial effect of the model in explaining EDP's customer satisfaction, that is, the model explains

about 78.4% of customer satisfaction, with 21.6% of satisfaction explained by other variables not considered in the model.
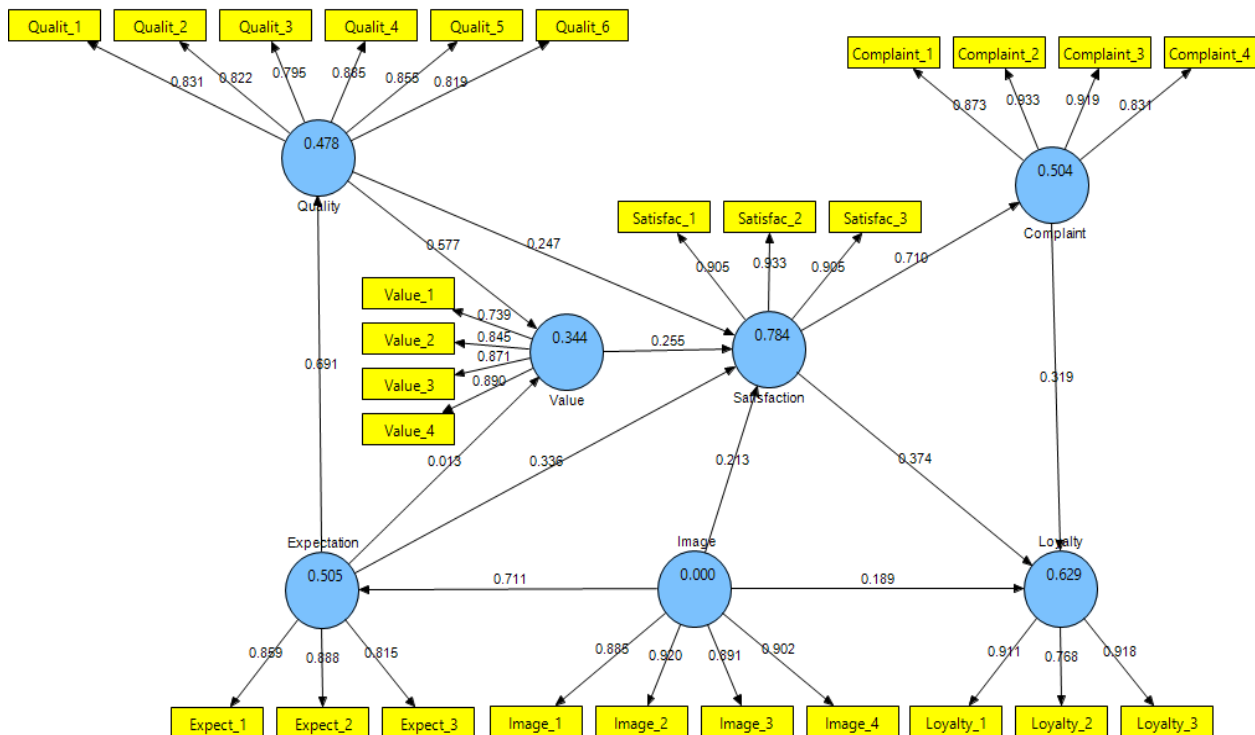

Figure 2 - ECSI P Model
Source: Database analyzed by SmartPLS software.

Table 13 – R^2 and Redundancy

	R^2	cv-redundancy	cv-communality
Expectation	0.505	0.347*	0.440**
Image			0.668**
Loyalty	0.629	0.449**	0.503**
Quality	0.478	0.314*	0.565**
Complaint	0.504	0.383**	0.641**
Satisfaction	0.784	0.642**	0.646**
Value	0.344	0.226*	0.495**

* medium relevance
** large relevance

8   CONCLUSIONS

No study was found in the literature that addressed the application of both the original ACSI and ECSI Portugal models to the electric power supply, in order to evaluate which explains more about perceived quality of service and customer satisfaction.

The ACSI model considers the existence of nine structural coefficients. Eight proved to be significant and only one was not significant, as shown in Table 5.

The following percentages in the explanation of the model variables were obtained: for the service quality the value of 47.7%, satisfaction 76.8%, loyalty 61.5% and complaints 50.4%, according to data shown in Figure 2.

Thus, satisfaction has a significant impact on loyalty, which proves that a satisfied customer has a propensity for loyalty to the company, just as satisfaction also has a positive impact on complaints, which shows that the more satisfied is the customer, less are the complaints.

The estimated structural coefficients for the ECSI Portugal model were 12, with 11 being considered significant and one not significant, exactly the same relation of the ACSI model, the Expectations → Value impact, as it can be seen in Table 11.

Analyzing the two models, ACSI and ECSI P, it can be seen that the ECSI P model explains more about the quality of service and satisfaction, although the differences are very small, as it can be seen in Table 14.

Table 14 – Comparison between ACSI and ECSI P models on the explanation of Quality of Service and Satisfaction

Models	Quality of service	Satisfaction
ACSI	47.7%	76.8%
ECSI P	47.8%	78.4%

The value of R^2 shows that the ECSI P model explains 78.4% of EDP Distribution's customer satisfaction, with the remaining 21.6% explained by other variables not considered in the model, compared to 76.8% of the ACSI model.

We also determined the impacts of the manifest variables in the respective latent variables allowing the company to act in situations where the values of these variables can be improved.

8.1 ACSI and ECSI P Model Indices

Table 15 shows the mean values obtained for each of the latent variables in each of the models, the indices of the model. One can check that, for the evaluation of the service quality and customer satisfaction, the image has no influence on the results of the models, since the ACSI model obtained values very close to those of the ECSI P model. Nevertheless, it may be important to know how the clients see the image of the company and in this case only the ECSI P model contains this variable that was evaluated positive. This information is important to the company's marketing direction. It was verified that the variables Expectation, Loyalty, Quality of Service, Complaints and Satisfaction, exhibit identical positive values in both models. The variable Value that relates to the ratio price quality has a slightly negative evaluation (3.966) in both models, since it is considered that values less than 4, are negative, positive between 4 and 6, greater than 6 very positive, and between 8 to 10, very positive.

The variable Value is penalized by the variable price of energy that customers consider excessive and so it is evaluated with a low value, but the price of energy is decided in the framework of the Regulatory Tariff Board which is dependent on the regulator (ERSE).

The Complaint variable, while positively evaluated, can be improved since some customers were not satisfied with the outcome of resolving their complaints, which affects customer satisfaction.

Table 15 - Indices of the latent variables

Variables	ECSI P	ACSI
Expectation	7.000	7.002
Image	6.204	-----
Loyalty	5.618	5.619
Quality	5.676	5.676
Complaint	5.007	5.006
Satisfaction	5.637	5.637
Value	3.966	3.966

Although the ECSI Portugal model explained the higher percentage of quality of service and satisfaction, the ACSI model was very close.

9   RECOMMENDATIONS AND LIMITATIONS

The service must be started with the objective of offering a product or service with quality to the client and must be finalized evaluating the perception the customer had of the service provision.

Quality must be reflected in all company activities, not just in its services. The client is connected to the entire structure of the company, the tasks are required to support the provision of services, so quality must be present in all activities. Quality also requires total commitment from management and employees. Quality will only be achieved if all company employees and external service providers are trained, motivated and willing to collaborate with the contracting company to apply the basic rules of service quality and customer service, without mistakes.

Quality requires highly competent partners. Any company that wants to provide quality services should select partners who also offer top quality services, as the service provided can be modified in a positive or negative way by the partners' intervention. It refers herein to tasks delivered to External Service Providers (PSE) that relate to direct interaction with customers, such as troubleshooting or providing technical or commercial information. Identifying employee stakeholder engagement, equilibrium and correction are essential factors to impress the client positively. Quality can always be improved. The company must observe continuous improvement in its activities by training employees in Lean or other continuous improvement tools to introduce adjustments to activities throughout the company. The use of benchmarking is also an example of how to copy, from similar companies, to adapt and suit to the best practices of other organizations to the internal and external activities of the company. Despite the obligation of continuous improvement, sometimes the company needs to set higher quality goals and demand compliance. The idea of quality is not to increase costs with quality, but to find better procedures that add value to the service. To improve corporate image, social concerns are fundamental when it proactively intervenes in social projects that benefit people. These actions are more effective than the marketing and advertising campaigns in the media. The dissemination of its activity with the local, regional and national media, its activities for the improvement, the services provided to the populations of the companies that provide public services through publicity and invitations to the most important events, thus highlighting their importance as agents of an increasingly active public opinion. The image of the company, given the nature of the service it provides, is subject to very serious incidents that are inherent to the risk of its own activity, when it distributes in the market the energy acquired in the free market by the marketers, which will reach about six million delivery points.

The concern with quality of service should always focus on the customer and is fundamental to build the future of any company. Although EDP D does not have competition in the service it provides in Portugal, this makes it even more responsible since it can only compare its service with similar companies in other countries. The objective of continuous improvement has been a constant concern of EDP's management, given the investment made in the last 9 years in the critical sectors of the network. The annual accounts reports published on the company's website have relevant information on this subject, that is online for consultation, and its service is at the level of the best that is done in any country of the world in their respective counterparts.

A citizen company also intervenes socially providing assistance and services to society and developing partnerships with people and institutions to create employment, social development, and increase projects value for society.

EDP is one of the Portuguese companies that most invests in social causes. In the year 2016, it financed projects worth 2 million Euros.

Environmental sustainability has a goal to achieve by 2020. It has already achieved the goal of reducing CO_2 emissions, but it needs to invest permanently in renewable energy and new technologies that help to quickly exceed the targets set for reaching the much-desired environmental sustainability.

The main limitation of this study has to do with the target population, from which the sample was selected. The population was defined as all households with a landline, obtained from the 2011 Census. Customers who did not have landlines in 2011 or the most recent clients were unable to be selected, which can cause some bias in the results.

REFERENCES

Almeida, M., & Pereira, J. (2014). *Marketing de serviços.* Edições Sílabo.

Alves, H. (2003). *Uma abordagem de marketing à satisfação do aluno no ensino universitário público: Índice, antecedentes e consequências* (Tese de Doutorado em Gestão). Covilhã: Universidade da Beira Interior.

Alves, H., & Raposo, M. (2007, July). Conceptual model of student satisfaction in higher education. *Total Quality Management Business Excellence*, *18*(5), 571-588.

Berry, L. (1983). *Emerging perspectives on services marketing.* Chicago: American.

Capricho, L., & Lopes, A. (2007). *Gestão da qualidade.* Editora RH.

Churchill, G. A., & Peter, P. (1984, Nov.*).* Research design effects on the reliability of rating scales: A meta-analysis. *Journal of Marketing Research*, *21*, 360-375.

Cobra, M. (2009). *Administração de marketing no Brasil* (3a. ed.). Rio de Janeiro: Elsevier.

Dantas, J. (2013)*. Inovação em marketing de serviços,* Editora Lidel.

Day, R. (1977). Toward a Process Model of Consumer Satisfaction. In K. H. Hunt (Ed.). Conceptualization and measurement of consumer satisfaction and dissatisfaction, *Marketing Science Institute*, Cambridge, MA, 153-183.

Decreto Lei (75/2012). Publicado no Diário da República Portuguesa n. 61/2012, Série I de 2012-03-26.

Eurostat. (2015). Retrieved from http://ec.europa.eu/eurostat/web/lucas/data/primary-data/2015

Fornell, C., Johnson, M. D., Anderson, E. W., Cha, J., & Bryant, B. E. (1996, Oct.). The American Customer Satisfaction Index: Nature, purpose and findings. *Journal of Marketing, Chicago*, *60*(4), 7-18.

Hair, J. F., Jr., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2013). *A primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).* Sage Publications, Inc.

Hamer, L. (2006). A confirmation perspective on perceived service quality. *Journal of Services Marketing*, *20*(4), 219-232.

Hill, M. M., & Hill, A. (2008). *Investigação por questionário.* Edições Sílabo.

Hunt, K. H. (1977). Customer's satisfaction/dissatisfaction - Overview and future directions. In K. H. Hunt (Ed.). Conceptualization and measurement of customer satisfaction and dissatisfaction, *Marketing Science Institute*, Cambridge, MA, 71-109.

Jamil, G. L., Tavares, W. R., & Gonçalves, C. A. (2002). *Marketing de relacionamento*: *Database marketing.* Rio de Janeiro: Axcel Books.

Johnson, M., Herrmann, A., & Huber, F. (2006, April). The evolution of loyalty intentions. *Journal of Marketing*, *70*, 122–132.

Jones, G. (2002). What is this thing called mental toughness? An investigation of Elite Sport Performers. *Journal of Applied Sport Psychology*, *14*(3), 205-218.

Jöreskog, K. (1970). A general method for the analysis of covariance structures. *Psychometrika*, *34*, 183-202.

Jöreskog, K. (1973). A general method for estimating a linear structural equation system. In A. S. Goldberger, & O. D. Duncan (Eds.). *Structural equation models in the social sciences* (85-112). New York: Seminar.

Kotler, P. (2002). *Marketing management: Millennium edition* (10th Edition). Prentice Hall.

Kotler. P., & Connor, R. A. (1977). Marketing profissional services. *Journal of Marketing*, 71-77.

Lovelock, C., & Wirtz, J. (2006). *Marketing de serviços: Pessoas, tecnologia e resultados* (5. ed.). São Paulo: Pearson Prentice Hall.

Machado, M. (2014). *Avaliação da qualidade de serviço percebida e da satisfação dos clientes*: *O caso EDP Distribuição* (Tese de Doutoramento em Ciências Empresariais ramo de Gestão). Universidade Fernando Pessoa. Porto, Portugal.

Martins, L. (2006). *Marketing*. São Paulo: Universo dos Livros.

Palmatier R. (2008). Relationship marketing. *Marketing Science Institute*. ISBN 0965711498, 9780965711494

Porter, M. E. (1989). Vantagem competitiva: Criando e sustentando um desempenho quality–value–loyalty chain: A research agenda. *Journal of Academic of Marketing Science*, *28*, 168–174.

Ringle, C. M., Wende, S. & Becker, J.-M. (2015). *SmartPLS 3*. Boenningstedt: SmartPLS GmbH. Retrieved from http://www.smartpls.com

Sheth, J., Mittal, B, & Newman, B. I. (2001). *Comportamento do cliente: Indo além do comportamento do consumidor.* São Paulo: Atlas.

Tobias, R. (1997). *An introduction to partial least squares regression*. SAS Institute Inc. Cary, NC.

Vavra, T. (1997). *Improving your measurement of customer satisfaction: A guide to creating, conducting, analyzing, and reporting customer satisfaction measurement programs*. Milwaukie, Wisconsin : ASQ Quality Press.

Vilares, M., & Coelho, P. (2005). *Satisfação e lealdade do cliente.* Lisboa: Escolar Editora.

Vilares, M., & Coelho, P. (2011). *Satisfação e lealdade do cliente* (2 ed.). Lisboa: Escolar Editora.

Wiley, D. (1973). The identification problem for structural equation models with unmeasured variables. In A. S. Goldberger, & O. D. Duncan (Eds.). *Structural equation models in the social sciences* (69-83). New York: Seminar.

Wold, H. (1981). *The fix-point approach to interdependent systems*. Amsterdam: North Holland.