MODELLING CUSTOMER SATISFACTION AND LOYALTY ON AGGREGATE LEVELS - EXPERIENCE FROM THE ECSI PILOT STUDY

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Abstract

Aggregate Customer Satisfaction Index (CSI) measures are becoming more and more common as indicators of business performance in different industries, and used for a multitude of purposes. However, any comparison of such figures from one domain to another calls for tightly harmonized and coordinated methodological frameworks.

In this paper we study the pre-requisites for developing a common model structure useful for devising aggregate CSI results throughout Europe, and comparing also with similar efforts in other parts of the world. Our study is based on an evaluation of the stability and robustness of empirical results from the European Customer Satisfaction Index (ECSI) pilot survey round.

In spite of the fact that European customers, product supplies and cultural environments are different. it is found possible to specify a common structural model to be used in so diverse industries as telecoms, banking and supermarkets, and throughout 11 European countries. This model is not optimal in the majority of cases (in terms of explanatory power), but neither in any case very far away from fulfilling high quality criteria. Thus, it fulfils the pre-specified requirements in terms of robustness, and is proposed to be used as the standard in future Pan-European activities of this character.

In the second part of the paper the prerequisites for finding adequate manifest (measurable) variables for the structural latent variable model are very briefly considered. A comprehensive factor analysis study of all ECSI pilot corporate models (about 150) are scrutinized. The results of this study are rather comforting in terms of generating adequate factors (similar to the ones pre-defined as latent variables) and using a common (master measurement instrument (questionnaire). However, for a few latents (especially perceived value) certain problems of measurement are identified.

Introduction

The current paper addresses the issue of finding comparable, satisfying. models for cross-industry and cross-national analysis of customer satisfaction index (CSI). The background of the issue is the currently initiated project to generate and compare CSI measures for a number of European countries. and comparing these with similar results from other parts of the world. The two inter-related problems in structural model analysis considered here are:

- Robustness of model structure for comparability
- Measuring manifests for building latent variables

The empirical data for the comparative study is taken from the ECSI (European Customer Satisfaction Index) pilot survey conducted in 11 countries in 1999. The purpose is that these results may be used for devising a robust and meaningful common structural model, and accompanying measurement instrument to be implemented broadly in Europe within the EPSI-Rating (European Performance Satisfaction Index) initiative jointly taken by EFQM (European Foundation for Quality Management) and IFCF (International Foundation for Customer Focus).

Model robustness

In the report (ECSI, 1998) prepared by the Technical Committee for the ECSI Steering Committee an initial structural equation model was defined involving seven latent variables aiming at measuring and explaining customer satisfaction and customer loyalty thereby providing useful information for improving the performance of companies and perhaps even more important serving as a benchmarking tool for comparing and improving the economies of different countries in Europe and for positioning Europe in relation to USA and countries in Asia. It is vital that the model:

- Gives a reasonably good description of the process underlying the customer behaviour which when due attention is given to it leads to good company performance. The statistical/economic model must have a firm theoretical footing based on the logical causal chain describing the process.
- Is flexible enough to make it possible to adapt the model to most companies in different sectors/industries and European countries.
- Provides a basis for comparisons between companies industries and countries.

The above-mentioned report gives a more detailed list of requirements for the model. Here we will report the result of a study of the robustness of the ECSI model over industries and countries versus a number of different model formulations. The study is based on data from the ECSI pilot study conducted in 1999. Primary datasets from Belgium, Denmark, Finland, France, Greece, Iceland, Italy, Portugal, Spain, Sweden and Switzerland are used for the study.

More specifically, we will try to get answers to questions like:

- Is the ECSI model a reasonable description of the process?
- Should some for example the Image latent variable be excluded?
- Are some connections between the latent variables superfluous? Are some missing?
- How does the model perform in different industries and countries?

In the pilot study the common sectors were banking, fixed telephones, mobile phones and supermarkets. Since data were collected for seven latent variables that is: Image, Expectations, Perceived product quality, Perceived service quality, Perceived value, Customer satisfaction and Customer loyalty, the set of possible structures became very large.

After preliminary scanning we focused on ten models (including the one used to generate provisional pilot phase results) ranging from a minimal basic model where the causal

chain is represented by only one connection to the next step in the chain which gives 6 possible links to estimate to a fully reduced model where all possible one way forward pointing links between the steps in the chain were estimated. We also included models with some latent variables missing for example the Image variable. For each sector the ten models were estimated for all companies surveyed in the countries[1] . Diagrams 1, 2 and 3 show the structure of the basic minimal model (model 7), the initial ECSI model (model 8), and the fully saturated model with all possible connections included. These were among the alternatives considered.

Diagram 1: Fully Reduced Model (Model 7)

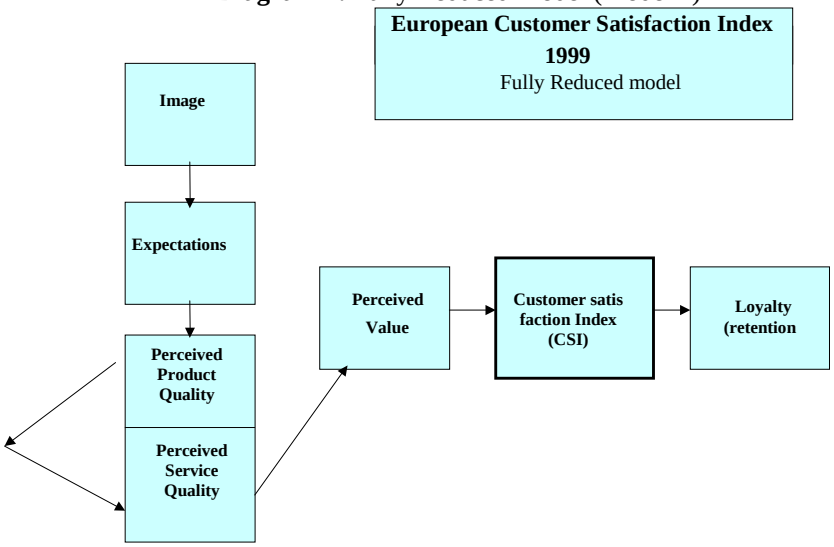
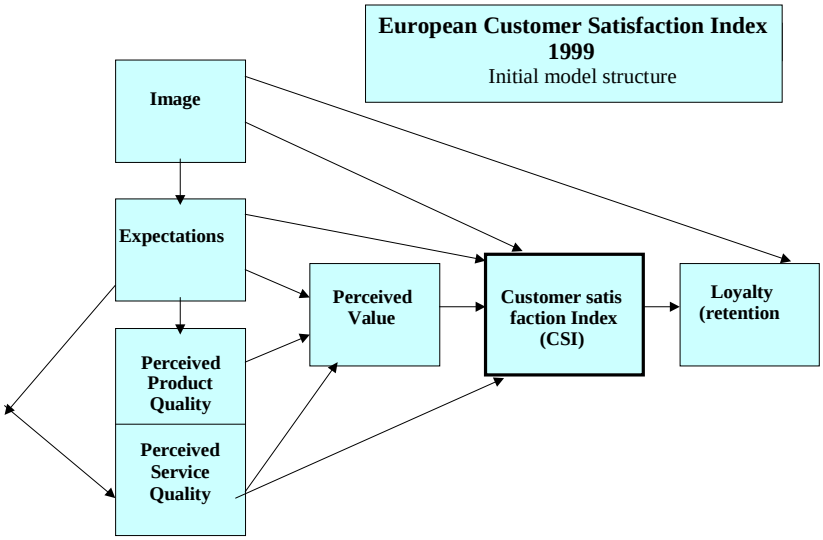
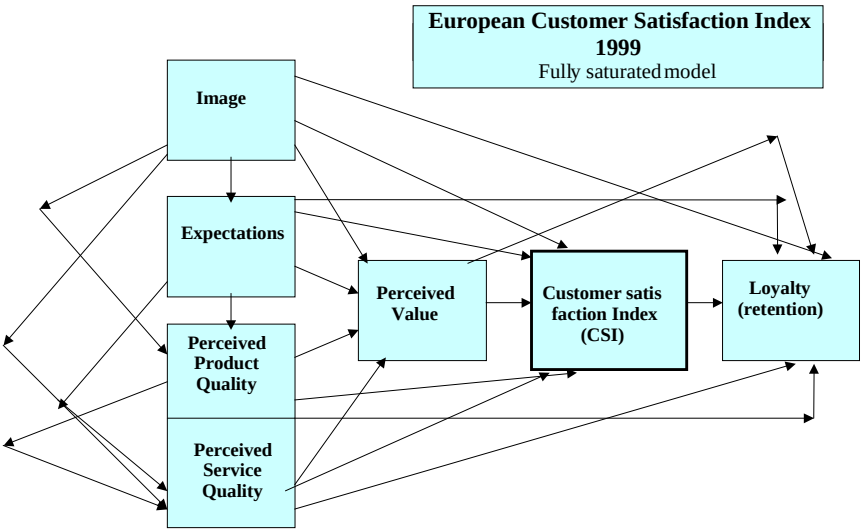


Diagram 2: The model used during the pilot phase (model 8)



[1]In total about 1,500 alternatives were estimated and compared for some 150 domains.

Diagram 3: Fully Saturated Model (all possible links included)



Robustness and stability were specified as important quality criteria of the devised approach in the technical study report (ECSI, 1998). Thus the models were compared using the averages of the indexes (all 7 were evaluated), impacts and coefficients of determination (explanatory power) for the companies surveyed in the countries. For purposes of illustrations we focus on the effects of different models on the CSI.

For reasons of simplicity we will show the results only for four models below. The results for other indexes are similar. The tables 1, 2 and 3 show the results for the banking sector. the fixed telephone sector and the mobile phone sector respectively for four models 1, 7, 8 and 10. where model 1 is the fully saturated. model 7 the fully reduced. model 8 the one used initially. and model 10 is the same as model 8 but without the Image latent variable.

Table 1: Banking

CSI

	Average R^2				**Standard deviation**			
Country	**Model 1**	**Model 7**	**Model 8**	**Model 10**	**Model 1**	**Model 7**	**Model 8**	**Model 10**
Belgium	72.45	58.98	72.13	67.16	5.73	9.38	5.84	6.02
Denmark	73.47	47.20	72.43	64.07	4.21	7.57	4.14	5.01
Finland	75.31	59.51	74.03	74.03	9.50	10.33	8.62	8.62
France	70.12	22.44	69.38	59.11	2.98	8.08	3.19	3.85
Greece	78.81	62.06	77.75	71.18	2.46	8.80	3.11	4.74
Iceland	67.05	46.56	65.73	57.88	5.90	8.14	5.59	6.32
Portugal	62.01	35.78	60.12	49.82	6.33	4.59	7.06	7.31
Sweden	59.99	37.63	59.28	48.64	5.57	5.63	5.14	6.97
Switzerland	71.05	55.70	70.49	64.07	4.50	8.38	4.25	6.76

	CSI value Average				Standard Deviation			
Country	**Model 1**	**Model 7**	**Model 8**	**Model 10**	**Model 1**	**Model 7**	**Model 8**	**Model 10**
Belgium	75.0	74.9	75.0	75.0	2.2	2.1	2.2	2.2
Denmark	72.7	72.5	72.7	72.7	5.4	5.4	5.4	5.4
Finland	73.4	73.3	73.4	73.3	4.9	4.8	4.9	4.9
France	70.9	70.8	70.9	70.8	3.3	3.3	3.3	3.3
Greece	78.2	78.1	78.2	78.2	3.5	3.5	3.5	3.5
Iceland	75.3	75.1	75.3	75.2	3.0	3.0	3.0	3.0
Portugal	69.2	68.9	69.2	69.1	1.5	1.6	1.5	1.5
Sweden	64.4	64.4	64.4	64.4	4.2	4.3	4.2	4.3
Switzerland	72.8	72.7	72.8	72.7	7.2	7.3	7.2	7.2

	Impacts to CSI Model 8 averages from			
Country	**Image**	**Expect**	**Serv Q**	**Value**
Belgium	1.87	0.55	0.92	1.32
Denmark	2.21	0.45	1.6	0.63
Finland	1.42	0.29	1.99	1.47
France	2.34	0.82	1.13	0.89
Greece	2.35	0.33	0.74	1.39
Iceland	2.04	0.5	1.08	1.15
Portugal	2.31	0.17	1.15	0.76
Sweden	2.28	0.05	1.43	0.6
Switzerland	1.75	0.26	1.41	1.34

Table 2: Fixed Telephones

	CSI Average R^2				Standard Deviation			
Country	**Model 1**	**Model 7**	**Model 8**	**Model 10**	**Model 1**	**Model 7**	**Model 8**	**Model 10**
Belgium	71.93	55.6	71.86	61.76	0	0	0	0
Denmark	61.22	46.25	60.07	54.29	6.56	5.6	6.65	6.94
Finland	62.22	43.39	60.7	51.95	0.18	5.69	1.09	1.01
France	73.29	39.98	70.01	57.21	1.42	2.52	2.68	2.4
Greece	83.33	63.21	82.89	71.09	0	0	0	0
Iceland	69.68	51.68	67.56	61.88	3.74	10.19	6.1	8.27
Portugal	56.13	33.98	55.54	46.67	0	0	0	0
Sweden	66.41	53.01	63.28	54.67	14.14	9.24	14.24	10.47
Switzerland	73.21	60.78	71.96	67.66	0	0	0	0

CSI value

	Average				Standard Deviation			
Country	**Model 1**	**Model 7**	**Model 8**	**Model 10**	**Model 1**	**Model 7**	**Model 8**	**Model 10**
Belgium	70.8	70.7	70.8	70.8	0[2]	0	0	0
Denmark	68.5	68.3	68.4	68.4	7.8	8	7.8	7.8
Finland	73.2	73.1	73.2	73.1	1.1	1.1	1.1	1.2
France	67.3	67.1	67.2	67.2	0.4	0.5	0.5	0.5
Greece	64.3	64.3	64.3	64.3	0	0	0	0
Iceland	67.4	67.4	67.4	67.3	0.3	0.3	0.3	0.3
Portugal	67.1	67.1	67.1	67.1	0	0	0	0
Sweden	62.9	62.8	62.9	62.8	0	0	0	0
Switzerland	74.6	74.6	74.7	74.6	5.7	5.9	5.7	5.7

Impacts to CSI Model 8 averages from

Country	**Image**	**Expect**	**Serv Q**	**Value**
Belgium	1.32	0.42	0.33	1.28
Denmark	1.64	0.3	1.05	1.61
Finland	2.14	0.47	0.75	1.22
France	2.73	0.79	0.16	1.28
Greece	2.89	0.28	1.13	0.66
Iceland	1.82	0.19	1.43	1.2
Portugal	2.18	0.32	0.84	1
Sweden	2.27	0.19	0.32	1.78
Switzerland	1.62	0.55	0.76	2.01

Table 3 Mobile Phones

CSI

	Average R2				Std			
Country	**Model 1**	**Model 7**	**Model 8**	**Model 10**	**Model 1**	**Model 7**	**Model 8**	**Model 10**
Belgium	62.87	45.13	60.34	51	13.1	15.7	11.38	13.65
Denmark	66.95	45.97	64.3	53.81	6.92	7.47	6.2	5.26
Greece	75.13	58.16	73.68	65.85	5.4	7.01	6.84	6.97
Portugal	68.81	45.46	68.58	57.68	4.07	9.96	4.3	7.5
Sweden	64.09	37.01	64.14	53.13	3.56	5.54	3.48	2.92

[2]While zero, this means only one provider in the country (measured).

CSI value

	Average				Standard Deviation			
Country	**Model 1**	**Model 7**	**Model 8**	**Model 10**	**Model 1**	**Model 7**	**Model 8**	**Model 10**
Belgium	71.7	71.5	71.7	71.6	0.3	0.4	0.3	0.3
Denmark	65.1	64.9	65.1	65	3.7	3.5	3.6	3.6
Greece	75.4	75.4	75.4	75.4	2.5	2.5	2.5	2.5
Portugal	67.5	67.4	67.5	67.5	0.7	0.7	0.7	0.7
Sweden	64.2	64.1	64.2	64.2	2	2.1	2	2

Impacts to CSI Model 8

Country	**averages Image**	**From Expect**	**Serv Q**	**Value**
Belgium	2.25	0.71	0.24	1.2
Denmark	2.25	0.05	1.07	1.22
Greece	2.47	0.53	0.44	1.33
Portugal	2.45	0.05	1.11	1.06
Sweden	1.52	0.19	1.18	0.73

Overall, the results of this comparative study were positive for the possibilities of devising a robust, common, model structure. Even though customers and environmental aspects differ strongly from one domain and country to another, the informational value, and explanatory power of a common analytical framework was found acceptable. At the same time, the interpretation of results between domains has to take into account the special conditions of that market. The recommendation is to slightly change the model structure in terms of impact relationships. Two new impacts are proposed to be added, and one of the initial to be cancelled.

Clustering of Manifest Variables

In a special study, the clustering of manifest questions have been analysed in terms of relating to the various latent pre-defined construct. For this purpose all models in all countries covered in the ECSI pilot of 1999 were considered in a factor analysis study (in total about 150 models). This was done for the purpose of analysing whether the selected manifest questions function appropriately as indicators for the latents, and if it is at all possible to devise a master questionnaire. The hypothesis is that in case they group relatively well into factors similar to the ones defined by the latent variables this will support the assumption of good measurables.

The main results of this comprehensive study (reported in Cassel and Eklöf. 2001) are:

- The overall picture supports the general choice of manifest as the grouping works relatively well on the average
- It is possible to find rather acceptable (satisfying) structures even when a large

number of industries and countries are considered using the same structural model
- The measurement for perceived value show the least appropriate fit among the seven latents.

Even though markets are different and important aspects vary between consumers as well as between products, it was found possible to devise a master questionnaire basically common for all considered domains. At the same time, this analysis revealed specific problems with translating and implementing the (English language) conceptual framework in a few situation. This observation highlighted the importance of doing proper pilot testing of all measurement instruments before full scale field launching, as well as always conduct back-translation of national language versions.

General conclusions and proposals

The conclusions from the study are that

- The initial ECSI model (model 8) is very robust with respect to changes in companies. sectors and countries. It fulfils the requirements specified by the ECSI technical committee
- The properties of model 8 lies very near the properties of the full model (model 1) this goes both for companies. sectors and countries.
- The Image latent variable adds a significant amount of explanation to the model and should be included in the structural model.
- The Image latent variable has a strong impact on CSI.
- The different models do not affect the values of the indexes for the latent variables significantly but stay approximately the same irrespective of what model is used. By contrast this is not the case for the coefficient of explanation of the CSI.

Further, it was found that a common master questionnaire may be used, provided it is duly adopted to national conditions (proper translation, wording, training of interviewers, etc.).

References

ECSI, 1998; European Customer Satisfaction Index - Foundation and Structure for Harmonised National Pilot Projects. Report prepared by ECSI Technical Committee. ECSI Document no. 005 ed. 1 20-11-98

Cassel, Claes; Eklöf, Jan; 2001; Evaluation of Model Structures for the EPSI framework, IFCF publication series.