Data Article

Advanced PLS-SEM models for bank customer relationship management using survey data

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A R T I C L E   I N F O

A B S T R A C T

This data article focuses on a complex path model to explain and predict the relationships between dimensions of corporate reputation, relational trust as well as customer satisfaction and loyalty. The sample was collected in Germany in 2020 with German bank customers above the age of 18 via an official market research institute located in Cologne, Germany (Respondi). The German bank customer data were collected using an online survey that was programmed using the software SurveyMonkey. The subsample described in this data article comprises 675 valid responses and the data analysis was performed applying the SmartPLS 3 software.

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Specifications Table

Subject	Marketing
Specific subject area	Structural equation modeling using bank survey data on customer-perceived reputation, relational trust, satisfaction, and loyalty.
Type of data	Survey data Figure Tables
How the data were acquired	An online survey was carried out among German bank customers above the age of 18 and sent out via an official market research institute.
Data format	Raw Analyzed Cleaned
Description of data collection	The survey link was disseminated via the market research institute Respondi [1]. Respondents had to be owners of a German bank account and be at least 18 years old.
Data source location	The data were acquired via a market research institute located in Germany. • Institution: Respondi [1] • City/Town/Region: Cologne • Country: Germany
Data accessibility	Repository name: Mendeley Data identification number: Doi:10.17632/4wyg7vdzzm.3 Direct URL to data: https://data.mendeley.com/datasets/4wyg7vdzzm/3
Related research article	S. Damberg, M. Schwaiger, C.M. Ringle, What's important for relationship management? The mediating roles of relational trust and satisfaction for loyalty of cooperative banks' customers, Journal of Marketing Analytics 10 (2022) 3-18. https://doi.org/10.1057/s41270-021-00147-2.

Value of the Data

- The data allow to explain the relationships between customer-perceived corporate reputation, relational trust, customer satisfaction and loyalty in the context of the banking industry.
- The data are useful for marketing scholars as well as marketing researchers who are interested in learning how to improve corporate reputation, relational trust as well as customer satisfaction and loyalty using validated marketing constructs.
- The dataset provides insights into diverse aspects of corporate reputation, customer satisfaction, relational trust, and customer loyalty.
- With this data, both academics and marketing practitioners (from banks) find a practical example of how basic and advanced PLS-SEM modelling methods can be used in the field of relationship marketing, such as identifying the drivers and relevant elements of customer satisfaction and loyalty.
- The data can be adapted in future studies, as the same survey could be conducted again in Germany (e.g., now in the aftermath of the Covid-19 pandemic) or in different countries.
- The German cooperative banking sector dates back to the beginning of the 19th century and is a stable pillar of the German financial system, in that approximately a quarter of the German population is a member of a cooperative bank. This type of bank is part of the highly competitive European banking market and competes with direct banks on the market. Cooperative banks, however, have incorporated a strong local focus, are organized in a democratic manner and strive to maintain strong relationships with customer-members, i.e., those customers that are also members of the cooperative bank. The value of this dataset, which is representative of the target group, thereby also lies in the opportunity to derive further measures for cooperative bank customer and member relationship management.

1. Objective

The data were collected as part of the author's doctoral research and the full bank dataset of n=3090 comprising different types of banks (i.e., cooperative banks, saving banks, commercial banks, direct banks, sustainable banks) was used for the monograph of the author, whereas the cooperative bank subsample was used for the published article [2]. The reasoning behind focusing on the cooperative banking industry was the fact that cooperative banks have a strong local and member focus, while at the same time being exposed to a highly competitive international bank market with different bank types. The path model was developed to identify drivers of customer loyalty and strategies for the bank-customer relationship. This data article describes the dataset used in the published article, openly and transparently shows the main descriptive statistics, and thereby makes the study replicable for future research.

2. Data Description

The sample of cooperative customer-members that was developed for the companion article [2] is part of the dataset the corresponding author had collected for their doctoral dissertation (subsample, n=675 valid responses). The software SurveyMonkey [3] was used to program, distribute the online survey, and collect the data via the market research institute (Respondi).

Translated survey items are provided in Table 1. The original survey was conducted in German.

Table 1
Measurement and operationalization.

Construct		Items	Exemplary Sources
QUAL	QUAL_1	My main bank always pays great attention to my concerns.	[4,5,6,7]
	QUAL_2	The range of services offered by my bank is in line with my needs.	
	QUAL_4	I consider my bank to be a trustworthy company.	
	QUAL_5	The products and services offered by my bank are of high quality.	
	QUAL_6	I think that the products and services offered by my bank are good value for money.	
	QUAL_7	In my opinion, my bank is a pioneer rather than a follower in competition with other banks.	
PERF	PERF_1	My main bank is an economically stable company.	[4,5,6,7]
	PERF_2	My main bank is a well-managed company.	
	PERF_3	I consider the economic risk of my main bank to be low compared to competitors.	
	PERF_4	My main bank seems to have a clear vision about the future of the company.	
	PERF_5	I believe that my main bank has growth potential.	
CSOR	CSOR_1	I have the impression that my main bank is not only interested in profit.	[4,5,6,7]
	CSOR_2	My main bank is also committed to preserving the environment.	
	CSOR_3	My main bank behaves responsibly towards society.	
	CSOR_4	I have the impression that my main bank informs the public honestly.	
	CSOR_5	I have the impression that my main bank behaves fairly towards its competitors.	
ATTR	ATTR_1	My bank is an attractive company.	[4,5,6,7]
	ATTR_2	I like the appearance of my bank (branches, logo, website, etc.).	
	ATTR_3	In my opinion, my bank employs highly qualified staff.	
	ATTR_4	I could well imagine working for my bank.	

Table 1 (*continued*)

Construct	Items		Exemplary Sources
LIKE	LIKE_1	I can identify better with my main bank than with other banks.	[4,5,6,7]
	LIKE_2	If my bank no longer existed, I would regret it more than with other banks.	
COMP	COMP_1	My main bank is a leading provider in the market.	[4,5,6,7]
	COMP_2	As far as I know, my main bank enjoys a good reputation.	
	COMP_3	I believe that my bank provides services of the highest standard.	
SAT	SAT_1	My main bank meets my expectations.	[9]
	SAT_2	I have a positive attitude towards my main bank.	
	SAT_3	I prefer my main bank to other banks.	
LOY	LOY_1	How likely is it that you will remain a customer of your bank?	[10,11]
	LOY_2	I will purchase new banking products in the future.	
	LOY_3	In the future, I will make use of other banking products or financial services offered by my bank.	
TRUST	TRUST_1	My main bank always listens to me when I share my concerns and problems.	[8]
	TRUST_2	My main bank always responds to my concerns and problems with constructive solutions.	
	TRUST_3	My main bank and I share the same values.	
	TRUST_4	I have the feeling that my bank always acts in accordance with the wishes of its customers.	

Note: Items were translated from German into English for this submission. Scale: 1 (do not at all agree) to 7 (do completely agree).
QUAL = perceived quality, PERF = perceived performance, CSOR = perceived corporate social responsibility, ATTR = perceived attractiveness, LIKE = perceived likeability, COMP = perceived competence, SAT = customer satisfaction, LOY = customer loyalty, TRUST = relational trust.

The sources to derive the question items are a construct validation article by Schwaiger [4], which has been validated in various countries and contexts [5,6,7]. The author adapted the items to fit the banking context, where corporate reputation plays an important role in the highly competitive banking market and extended the model with relational trust (original scale adapted from [8]) as a mediator. The scale deals with trust items based on the customer-bank relationship. Customer satisfaction and loyalty were used as further outcome variables and are based on previously validated constructs from the highly cited marketing literature [9,10,11]. In Fig. 1, the model developed in the companion article [2] built upon relevant and validated relationships from the marketing literature is presented.

The target population were German bank customers from the age of 18 and above. The demographics are shared in Table 2 below. A total of 675 responses from German bank customers were collected, including 393 women (58.2%) and 282 men (41.8%). Approximately one third of the respondents is between 55-65 years old, whereas only 7.0% are in the age group of 18-24 years. Moreover, 41.6.6% of the respondents are married, 23.4.% living alone and 13.3% are living with a partner, while 11.9% are divorced. Most of the respondents completed vocational training (33.9%) or had at least completed 10th grade (22.7%) in the German school system. About half the respondents is employed (51%), whereas a third (25.9%) was retired. The average household income is between 1250-3500EUR after taxes.

Table 2
Sample demographics.

Sample criteria	n	%
Gender		
Male	282	41.8
Female	393	58.2
Age		
18–24	47	7.0
24–34	82	12.1
35–44	106	15.7
45–54	130	19.3
55–65	186	27.6
>65	124	18.4
Marital status		
Preferred not to answer	3	0.4
Living alone	158	23.4
Living with a partner	90	13.3
Registered civil partnership	9	1.3
Married	311	46.1
Divorced	80	11.9
Widowed	24	3.6
Education (highest level)		
Preferred not to answer	2	0.3
No education	1	0.1
"Hauptschule" (completed 9th grade)	40	5.9
"Mittlere Reife" (completed 10th grade)	153	22.7
"Fachhochschulreife" (completed 12th grade)	26	3.9
Abitur (High School Diploma)	85	12.6
Vocational training	229	33.9
University degree	139	20.6
Occupational status		
Preferred not to answer	14	2.1
Unemployed	23	3.4
Retired	175	25.9
Houseman/housewife	35	5.2
In education	13	1.9
Studying at a university	33	4.9
Self-employed	38	5.6
Employed	344	51.0
Monthly Household Income (after taxes)		
Preferred not to answer	89	13.2
< EUR 750	58	8.6
EUR 750–1250	84	12.4
EUR 1250–2000	145	21.5
EUR 2000–3500	196	29.0
EUR 3500–5000	83	12.3
> EUR 5000	20	3.0

Note: Own tabulation based on descriptive data on the sample; own calculations; n = sample size. (Primary source: [2])

For the companion article, the data were then assessed using SPSS [12] and the SmartPLS3 software [13] according to the latest PLS-SEM guidelines [14,15].

3. Experimental Design, Materials and Methods

Fig. 1 illustrates the research model including the hypotheses based on scales adapted from previous marketing literature. The developed path model proposes that corporate reputation consists of two dimensions (a cognitive dimension competence, COMP; and an affective dimension likeability, LIKE), which is driven by four antecedents (perceived quality, QUAL; perceived performance, PERF; perceived corporate social responsibility; perceived attractiveness, ATTR). Further, a positive corporate reputation leads to improved relational trust (TRUST) and customer satisfaction (SAT), which, in turn, leads to increased customer loyalty (LOY).
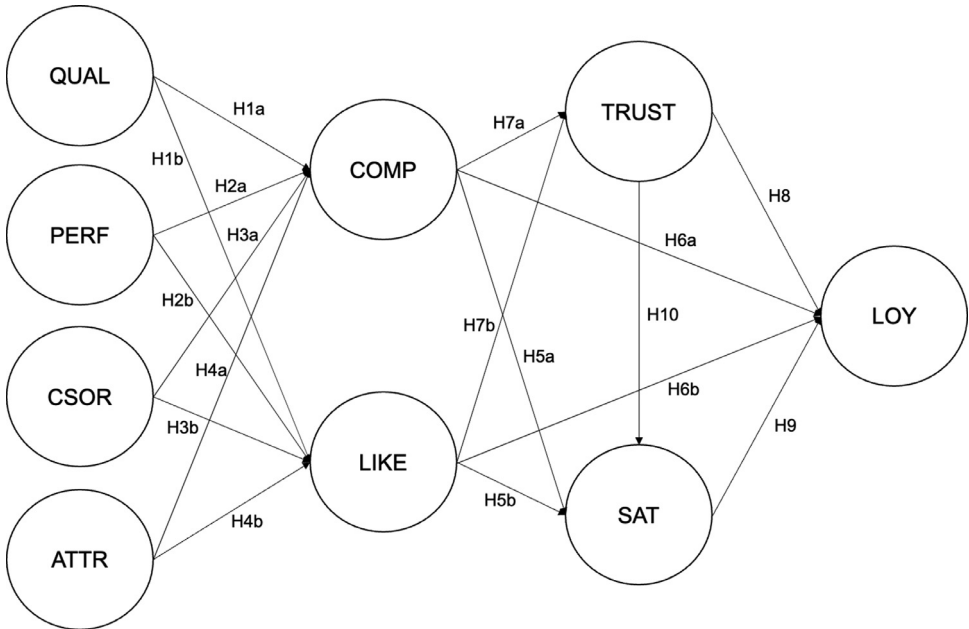

Fig. 1. Research Model from published article [2].

To assess the path model and test the hypotheses, we applied PLS-SEM in the companion article. In Table 3, the steps of analysis and most relevant thresholds are summarized. Step 1 is the assessment of the measurement models, followed by the assessment of the structural model in Step 2. We used the SmartPLS 3 software [12] to analyze our data.

Table 3
Assessment of PLS-SEM models.

Assessment of PLS-SEM models	Criteria	Threshold
Step 1: Evaluation of the measurement models		
Reflective:		
Convergent validity	Cronbach's α	>0.7
Composite reliability	CR	>0.7
Average variance extracted (AVE)	AVE	>0.5
Discriminant validity	HTMT	<0.85 or 0.90
Formative:		
Significance & relevance of the outer weights		
Variance inflation factors	VIFs	<3.3
Step 2: Evaluation of the structural model		
Significance and relevance of path coefficients	p-value and path coeff.	Generally, > 0.100 relevant
Explanatory power of the model	R^2	<0.19 unacceptable
Predictive relevance (PLSpredict)	Q^2	$Q^2 > 0$ and $RMSE_{PLS} <$ $RMSE_{LM}$ on indicator level

Note: HTMT=heterotrait-monotrait ratio of correlations.

Table 4 shows the reflective measurement results, which fulfil all assessment criteria. Table 5 summarizes the discriminant validity values for the reflective measurement models, and Table 6 shows the formative measurement model results.

Table 4
Reflective measurement model results.

Construct	Item	Outer Loadings	CI	r_A	AVE
Perceived Likability	LIKE_1	0.942	[0.932; 0.951]	0.860	0.879
	LIKE_2	0.933	[0.918; 0.945]		
Perceived Competence	COMP_1	0.798	[0.756; 0.835]	0.880	0.771
	COMP_2	0.902	[0.887; 0.916]		
	COMP_3	0.928	[0.919; 0.938]		
Customer Satisfaction	SAT_1	0.940	[0.926; 0.951]	0.927	0.872
	SAT_2	0.951	[0.942; 0.960]		
	SAT_3	0.909	[0.888; 0.927]		
Customer Loyalty	LOY_1	0.684	[0.613; 0.741]	0.748	0.639
	LOY_2	0.893	[0.877; 0.906]		
	LOY_3	0.807	[0.753; 0.847]		
Relational Trust	TRUST_1	0.912	[0.893; 0.928]	0.929	0.823
	TRUST_2	0.925	[0.908; 0.939]		
	TRUST_3	0.867	[0.843; 0.889]		
	TRUST_4	0.924	[0.912; 0.935]		

Note: CI = 95% bootstrap confidence interval; AVE = average variance extracted.
(Primary source: [2])

Table 5
Discriminant Validity (HTMT results).

Constructs	COMP	LIKE	LOY	SAT	TRUST
COMP	1				
LIKE	0.807 [0.765; 0.849]	1			
LOY	0.759 [0.698; 0.817]	0.820 [0.770; 0.869]	1		
SAT	0.841 [0.810; 0.872]	0.900 [0.873; 0.926]	0.848 [0.802; 0.890]	1	
TRUST	0.863 [0.827; 0.897]	0.833 [0.797; 0.866]	0.863 [0.825; 0.900]	0.902 [0.881; 0.923]	1

Note: One-tailed test ($p < 0.05$); HTMT = heterotrait-monotrait ratio of correlations. QUAL = perceived quality, PERF = perceived performance, CSOR = perceived corporate social responsibility, ATTR = perceived attractiveness, LIKE = perceived likeability, COMP = perceived competence, SAT = customer satisfaction, LOY = customer loyalty, TRUST = relational trust. (Primary source: [2])

Table 6
Formative measurement model results.

Construct	Item	Outer Weights	CI	VIFs
Perceived Quality*	QUAL_1	0.183	[0.172; 0.194]	2.448
	QUAL_2	0.193	[0.184; 0.202]	3.087
	QUAL_4	0.201	[0.193; 0.210]	3.130
	QUAL_5	0.204	[0.195; 0.214]	3.878
	QUAL_6	0.202	[0.193; 0.211]	3.373
	QUAL_7	0.195	[0.182; 0.207]	1.821
Perceived Performance*	PERF_1	0.223	[0.213; 0.232]	3.483
	PERF_2	0.251	[0.242; 0.262]	3.625
	PERF_3	0.203	[0.192; 0.213]	2.407
	PERF_4	0.242	[0.233; 0.252]	3.392
	PERF_5	0.229	[0.217; 0.240]	2.287
Perceived Corporate Social Responsibility*	CSOR_1	0.222	[0.201; 0.241]	2.005
	CSOR_2	0.202	[0.187; 0.216]	2.129
	CSOR_3	0.248	[0.237; 0.260]	3.029
	CSOR_4	0.264	[0.251; 0.277]	2.878
	CSOR_5	0.240	[0.227; 0.253]	2.538
Perceived Attractiveness*	ATTR_1	0.356	[0.340; 0.373]	2.580
	ATTR_2	0.306	[0.293; 0.320]	2.292
	ATTR_3	0.329	[0.314; 0.345]	2.257
	ATTR_4	0.211	[0.189; 0.232]	1.272

Note: CI = 95% bootstrap confidence interval; VIF = variance inflation factor.
(Primary source: [2])

As some of the HTMT-values are close to the threshold of 0.9, the average variance extracted (AVE) was further used to ensure discriminant validity of the data. The AVE-values for all constructs exceed the minimum threshold of 0.5.

Fig. 2 illustrates the structural model results. The model explains 55.1% of the variance in customer loyalty. The thickness of the arrows represents the size and relevance of the path coefficients.
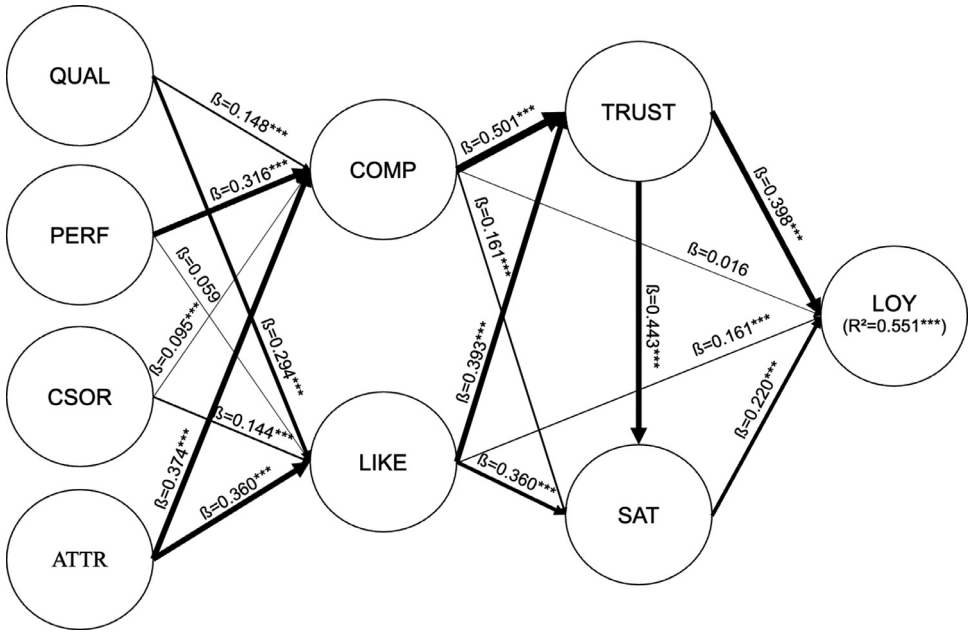
Fig. 2. Path coefficients and R² values.
Note: *** = p < 0.001. QUAL = perceived quality, PERF = perceived performance, CSOR = perceived corporate social responsibility, ATTR = perceived attractiveness, LIKE = perceived likeability, COMP = perceived competence, SAT = customer satisfaction, LOY = customer loyalty, TRUST = relational trust.

The mediation analysis [16] reveals that relational trust and customer satisfaction both act as mediators in the developed path model (Table 7).

Table 7
Specific indirect effects (mediation analysis).

Path	ß
COMP → TRUST → SAT	0.222***
COMP → TRUST → LOY	0.199***
COMP → SAT → LOY	0.036**
COMP →TRUST → SAT → LOY	0.049***
LIKE → TRUST → SAT	0.174***
LIKE →TRUST →LOY	0.157***
LIKE → SAT →LOY	0.079***
LIKE → TRUST →SAT → LOY	0.038***
TRUST → SAT → LOY	0.271***

Note: *** = p ≤ 0.01. LIKE = perceived likeability, COMP = perceived competence, SAT = customer satisfaction, LOY = customer loyalty, TRUST = relational trust.
(Primary source: [2])

The model also shows predictive relevance according to the most recent PLSpredict [17] guidelines, as for one of the indicators, the root mean square error is smaller for the PLS-model than for the linear model estimation (RMSE$_{PLS}$ < RMSE$_{LM}$; Table 8).

Table 8
PLS$_{predict}$ results for the target construct (Customer Loyalty).

Indicator	Q²$_{predict}$	RMSE$_{PLS}$	RMSE$_{LM}$	RMSE$_{PLS}$ - RMSE$_{LM}$
LOY_1	0.2454	1.2313	1.2240	0.0073
LOY_2	0.4314	1.1660	1.1505	0.0155
LOY_3	0.2516	1.3543	1.3545	-0.0002

Note: RMSE = root mean square error; LM = linear model; LOY = customer loyalty.
(Primary source: [2])

To conclude, the developed model shows significant results to explain and predict customer loyalty of German bank customers under consideration of the relevant variables in the model, in that corporate reputation (especially the affective reputation dimension, LIKE) is driven especially by attractiveness, which, in turn, positively influences relational trust and customer satisfaction as well as customer loyalty as the target construct.

Ethics Statements

I hereby confirm that participant data has been fully anonymized, and the market research institute's data redistribution policies were complied with. Ethical approval was not necessary and therefore not sought.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

Bank Customer Perceptions (Original data) (Mendeley Data).

CRediT Author Statement

Svenja Damberg: Conceptualization, Investigation, Methodology, Data curation, Validation, Writing – original draft, Visualization, Writing – review & editing.

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