Structural equation model for measuring the value of client-companies

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This work has, like basic objective, to contribute a feasible solution to the problem of how modeling of precise and reliable way the value that has each client, for a certain company, to effect to incorporate the causality of the variables that affect to generate this value. The hypothesis that is postulated, by means of an econometric model can be measured the value of the client, in terms of the yield, the specific weight and the behavior. Construct theoretical: value of the client, was measured with the information of 80 companies pertaining to the segment of the Mexican Bank and that is clients of a National Company, which provides the service to them of telecommunications.

SEM, Model of Measurement, Model of Structure, Value.

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Introduction

In this research work, the concept *client* is attained to a company that acquires services from another. The fact that an individual is a client of a company is not dismissed; even thought, the research is focused on the role played by the *clients* of a supply company. From this point on, whenever the word *client* is written, it will be referring to a company.

Until few years ago, many entrepreneurs thought that losing a client was not important since they could be easily replaced by two. Nowadays reality shows that it is hard to get new clients and even harder to take them from the competition.

A classic example is given when the companies, often, tries all their clients in a standardized way, like if everyone were equals. This is an important mistake, because there are "preferred" and "non-preferred" customers. The "preferred" customers are those who generate high margin utilities with relatively low cost, due to big consume. There are also "non-preferred" clients who buy little, generate different problems and negotiate until the last dollar.

The usual is that, even though the company has "non-´referred" clients who make them loss money, "preferred" clients will be the ones who compensate the losses so the financial outcomes are positive. Nevertheless, what would happen if all the "non-preferred" clients become "preferred"? What would be the impact on the utilities?

Even thought, naturally, the answer to this question depends particularly on each company, the positive impact would be important if improvement points are earned in the income statement only redefining the strategy of customer conversion to the company.

Client number	% over total billing	% contribution benefits
2	19,04%	49,42%
10	20,31%	37,12%
80	41,38%	17,2%
83	11,29%	5,83%
301	7,85%	-9,2%

Chart 1 Example of the client ranking according to benefits and billing percentage.

On chart 1, it is observed how the contribution to benefits of the national telecommunications company (and in a great manner, from the billing) comes from twelve clients (approximately 3, 5 % of the total number of clients), while 301 clients of minor billing cause a loss in the profitability (a 9, 2%)

Does it seem logical to spend the same resources onto the 12 clients who represent almost 40% of the total billing, than to the other 384 who represent only 19 % of the billing?

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If we think in the organizational structure of a company, there are different process and sub process designed in an independent way to the size of the order, so such processes will be very profitable for large orders / customers, but very little otherwise. Examples of the costs that have these threads are, from a business view, the internal logistics or sales management.

Hypothesis

- There is a positive causal effect between company profitability and the income earned per customer.

- There is a positive causal effect between the specific weight[5] of the client and the benefit the company has per segment-client.

- There is a positive causal effect between the specific weight of the client and the income the company has per segment-client.

- There is a positive causal effect between the specific weight of the client and the segmentation of the client per income.

- There is a positive causal effect between the specific weight of the client and the segmentation of the client per benefits.

- There is a positive causal effect between the behavior of the client and the income the company has per client.

- There is a positive causal effect between the behavior of the client and the time as a client of the company.

- There is a positive causal effect between the behavior of the client and the quantity of products and services required from the company.

Objective

General objective

It is intended to demonstrate the importance of applying the structural equations model in the clients' measurement to evaluate strategically the study case.

Specific objective

To validate the functioning of the structural equation model using data of 80 companies from the Mexican Bank that have contracts with a national company for the telecommunication services.

The client value can be defined as the utility income obtained by an organization when it determines the importance of each acquirer or buyer of services and goods that such company trades.

Answer proposal

Equations for measuring the clients' value.

As established previously, the clients' value is directly related with the clients' profitability, with the clients' behavior and with the client's weight, namely:

[5] Specific weight is defined as the ratio between the revenue the customer generates to the company and the revenues generated by all the customers who are in the same segment.

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Clients' profitability

It is derived from the benefit generated by the client minus the loss generated by the clients plus the income generated by the clients:

Importance of the clients' benefit = importance of the clients' income – (sale expenses + marketing expenses)

Importance of the clients' income = importance of the payment made by the client for the received good.

Client weight

It is derived from the income per segment level and the benefit per segment level plus the client per income segmentation and the client per benefit segmentation:

Importance of income per segment = importance of the client income regarding the total income of the clients of the same segment.

Importance of benefits per income = Importance of the client benefits regarding the total benefit of the clients of the same segment.

Segmentation per income level = ranking per segment level according to the client's income volume.

Segmentation per benefit level = ranking per segment level according to the client's benefit volume.

Client's behavior

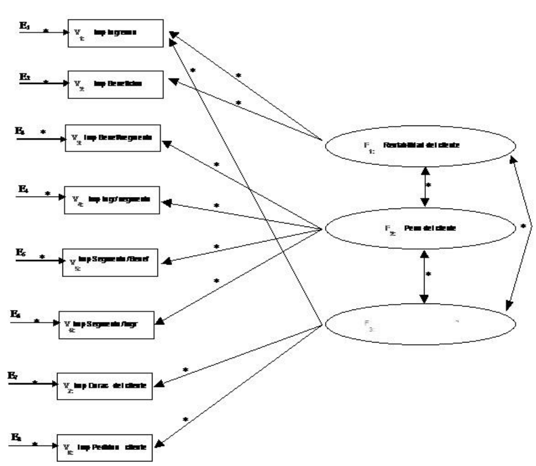
It is derived from the antiqueness of the client and the client's income level plus the client's request both in a year period:

Client's antiqueness = duration of the sale/ buy relation between the company and the client respectively in a given period.

Importance of the client's income = importance of the payment made by the client for the received good.

The following measurement model is a first approximation that allows revealing the causal relationship between variables and through the application of a structural equation model is possible to do the estimation of the cargo factors in the dependent variables: client's profitability, clients' weight and client's behavior with which the presence and grade in which such factors are corresponding to the independent variables can be determined.

From these, the independent variables, which have higher weight than the proposed profitability, weight and behavior of the client variables, can be identified, and thus which variables need to be strengthened. The previous constructs and their causal relations are illustrated in the following figure



Graphic 1 Preliminary cause-effect relations diagram.

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The database used consists of 80 observations that has 11 variables, which conformed the 11 measurable attributes of the Commex[6] Company. Three types of data are used. The first one refers to the clients' value regarding his profitability; the second one refers to the clients' value regarding his weight; and the last one refers to the client's value regarding his behavior.

It is assumed a priori that the examined data should provide a comprehension about both the characteristics of their clients' value as well as the relation between their behaviors towards Commex. In the chart 2, a brief description of the database variables is provided, in which they are ranked as dependent and independent, metric and non-metric.

Variable description

Variable type.

Clients' profitability.

V_1, income importance metric

V_2, benefit margin importance metric

Client's weight (portfolio)

V_3, income per segment importance metric.

V_4, income segmentation importance metric.

V_5, benefits per segment importance metric.

V_6, benefits segmentation importance metric.

Client's behavior

V_7, number of designations importance metric.

V_8, delivery speed importance metric.

V_9, market positioning importance (economic) metric.

V_{10}, purchase volume importance metric.

V_{11}, purchase frequency importance metric.

Three specific measures that reflect the measure results of the client's value were obtained:

F1 client profitability

F2 client weight

F3 client behavior

Modelling through structural equations

In order to model the *client's value* for the specific Commex case, we will proceed to develop the seven steps of structural equations modelling, exposed the previous chapter.

First step: development of a theory-based model.

The variables derived from our model are:

[6] The company name COMMEX is fictitious in order to preserve the anonymity of the Mexican telecommunications company from who we have taken their client companies data.

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V_1 = client's income importance, is the valuation (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to payments made by the client for the good he receives.

V_2 = client's benefits margin importance, is the valuation (scale: one= very low, 2= low, 3= normal, 4= high y 5 = very high) to the payments made by the client for the good he receives minus the expenses generated in the client itself.

V_3 = client's income per segment importance, is the valuation (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to the client's revenue ratio regarding the total income of a client in regard to the total income of the segment in which the client is.

V_4 = client segmentation by income importance, is the valuation (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to the weighting of the client segment based on their income concerning other segment based on the income of their underlying clients.

V_5 = client's benefits margin per segment importance, is the valuation (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to the benefit ratio of a client regarding the total benefit of a segment in which the client is.

V_6 = clients segmentation by benefits, is the valuation (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to the weighting of the client's segment based on their benefits concerning other segments based on the benefits if their underlying clients.

V_7: Importance of designations, is the valuation (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to the number of times a person (account executive) is assigned for customer support.

V_8: Delivery speed importance, is the valuation (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to the response time since the formal service request until the delivery of it to the client.

V_9: position importance, is the valuation (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to the economic position of the client.

V_{10}: purchase column importance, is the valuation (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to the number of services purchased by the client.

V_{11}: purchase frequency importance (scale: 1= very low, 2= low, 3= normal, 4= high y 5 = very high) to the number of requests during five semestral periods.

Second step: Construction of a sequence diagram of causal relations

We want to know the effects of V_1 over F_1, the effects of V_2 over $F_{1,}$ and simultaneously the effects of V_1 over $F_{3.}$ If we do not consistently estimate them, we would not be sure of representing their "true and isolated" effects. For example, this technique is needed to demonstrate the effects of V_2 on both F_1 and F_3, etc. The following diagram shows trajectories (causal relations) including nomenclatures regarding cargo factors to investigate, as well as the work hypothesis to develop:

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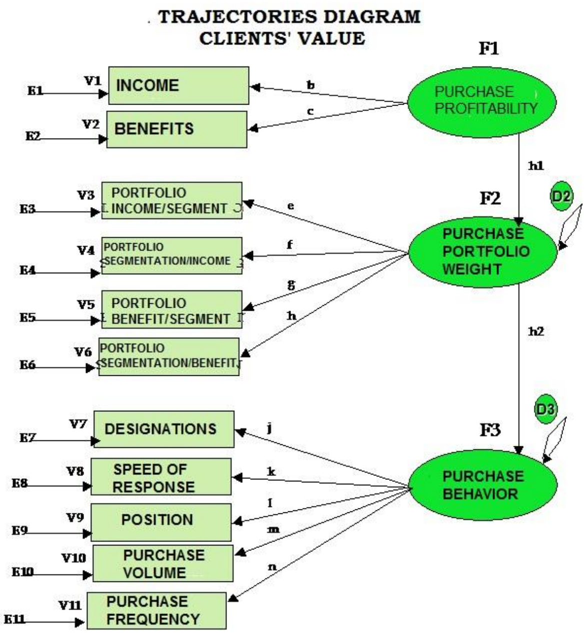

Graphic 2 Causal relations of client measurement diagram

Third step: Model specification in more formal terms

After developing the theoretical model and representing it in a sequence diagram, it will be necessary to specify the model in terms that are more formal, this is made through a series of equations that define (1) the structural equations that link the constructs

(2) The measure model that specifies what variables measure the constructs and (3) a series of matrix that indicate any supposed correlation between constructs and variables. The objective is link operational definitions of the construct to the theory to reach the appropriate empirical contrast.

Structural model

Transferring a sequence diagram to a series of structural equations is a direct proceeding. In the first place, each endogenous construct is the independent variable.

Each endogenous variable (F_j) can be foreseen as an exogenous variable (s) (V_j) as well as other endogenous variable (s). For each expected effect, we estimate a structural coefficient (b_{jm}). Since we know that we will have prediction errors, like in the multiple regression, we include an error margin (E_i) for each equation. The error represents the sum of the effects due to a specification error and a random measure error. In the following chart 3, a description of the structural equations is provided:

V1 =1F1+E1.

V2 =1*F1+E2.

V3 =1F2+E3.

V4 =1*F2+E4.

V5 =1*F2+E5.

V6 =1*F2+E6.

V7 =1F3+E7.

V8 =1*F3+E8.

V9 =1*F3+E9.

V10 =1*F3+E10.

V11=1*F3+E11.

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Factorial analysis

To specify the measurement model, we make the transition from the factorial analysis in which the researcher has no control over which variables describe each factor, to a confirmatory mode, in which the researcher specifies which variables define each construct (factor). The observed variables that we obtain from surveyed are called indicators in the measurement model, because we used to measure or <<indicate >> latent constructs.

Variables	Rentabilidad	Peso	Comportamiento
V_1, importancia de ingresos		$1F_1$	
V_2, importancia margen de beneficios		1^*F_1	
V_3, importancia ingresos por segmento		$1F_2$	
V_4, importancia segmentación de ingresos		1^*F_2	
V_5, importancia beneficios por segmento		1^*F_2	
V_6, importancia segmentación de beneficios		1^*F_2	
V_7, importancia número de designaciones		$1F_3$	
V_8, importancia velocidad de entrega		1^*F_3	
V_9, importancia posición mercado (económico)		1^*F_3	
V_{10}, importancia volumen de compra		1^*F_3	
V_{11}, importancia frecuencia de compra		1^*F_3	

Chart 2 Model of the three constructs measurement

The researcher specifies a measurement model for both the exogenous contracts as well as for endogenous clients. See chart 3.

Forth step: selection of the entry matrix type and the proposed model estimation.

Data introduction

The structural equation model (SEM) uses only the variance-covariance or correlation model as the input data. The program entry is a variance-covariance or correlation matrix of all the indicators used in the model. The measurement model specifies then what indicators correspond to each constructo and the latent construct puntuations are the used in the structural model.

Data entry

With the structural equation model, both the covariance matrix and the correlation matrix are obtained. For the purposes of confirmatory factor analysis, any of the entry matrix can be used. Nevertheless, since the objective is an exploration of the pattern of interrelationships and for reasons of validation facilty, the correlation matrix will be used.

impsf03	impbf03	imprsf03	impsrf03	impbsf03	impsbf03	impnd	impvr	impmf03	impcf03	impfc
1.000										
0.941	1.000									
0.530	0.397	1.000								
0.856	0.738	0.532	1.000							
0.555	0.473	0.933	0.495	1.000						
0.939	0.851	0.593	0.861	0.556	1.000					
0.030	-0.066	0.118	0.047	0.031	0.064	1.000				
0.553	0.415	0.319	0.673	0.270	0.599	-0.022	1.000			
0.908	0.942	0.294	0.676	0.368	0.780	-0.044	0.422	1.000		
0.861	0.818	0.378	0.778	0.387	0.813	-0.012	0.496	0.793	1.000	
0.518	0.471	0.323	0.566	0.289	0.544	0.194	0.399	0.452	0.635	1.000

Chart 3 Correlation matrix of the eleven variables.

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imprf03	impbf03	imprsf03	impsrf03	impbsf03	impsbf03	impón	impar	impmf03	impcf03	impff
1.813										
1.561	1.518									
0.762	0.521	1.139								
1.842	1.453	0.907	2.553							
0.700	0.546	0.933	0.741	0.878						
2.091	1.735	1.047	2.275	0.861	2.737					
0.029	-0.058	0.091	0.055	0.021	0.077	0.518				

Chart 4 Covariance matrix of the eleven variables

Method of estimation

The size of our simple is 80 observations; the maximum likelihood method is used, which has recently received particular attention because of its insensitivity to non-normality of the data.

For the estimation of the measurment model and the correaltion of the construct, the structural equation program EQS is used. Consider the estimation of the measurement model for the constructs with more than one variable: due to the estimation procedure, the construct must be done "invariable to te scale", which mean that construct indicators must be "standardized" so that the constructs are made comparable.

There are two types of common aproaches to this procedure. In first place, one of the weights of each construct can be anchored to the fixed value 1.0. The second approach is to estimate the variance of the construct directly. With each approach the same estimates are obtained, but for contrasting effects of the theory, the second approach is recommended (the estimated variance of the construct will equal 1 for this study, that is, F1, F2, F3. have variance equal to 1).

```
BENTLER-WEEKS STRUCTURAL REPRESENTATION:
  NUMBER OF DEPENDENT VARIABLES = 13
    DEPENDENT V'S:  1  2  3  4  5  6  7  8  9  10
    DEPENDENT V'S:  11
    DEPENDENT F'S :  2  3
  NUMBER OF INDEPENDENT VARIABLES = 14
    INDEPENDENT F'S:  1
    INDEPENDENT E'S:  1  2  3  4  5  6  7  8  9  10
    INDEPENDENT E'S:  11
    INDEPENDENT D'S:  2  3
```

Chart 5 EQS analysis of endogenous and exogenous variables

It can also be seen from Chart 5, that the determinant is positive, which is another necessary condition for the non-singularity of the matrix.

Sixth step: Evaluation of the adjust quality criteria.

The first step of the results evaluation is an initial inspection of infractor estimations.

Infractor estimations.

The results are examined searching for infractor estimations. They are estimated coefficients in the measurment models as well as in the structuralones which exceed the acceptable limits. The most common examples of infractor estimations are:

- Negative or non significative error varinces for any cosntruct.
- Standarized coefficients that surpasses or are closet o 1,0.
- Very high standard errors associated with any estimated coefficent.

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If infractor estimations are found, the researcher must solve in first palce each case before evaluating any specific result from the model.

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EQS 6 M086 Licencia: Fernando Ojeda Villagómez

MAXIMUM LIKELIHOOD SOLUTION (NORMAL DISTRIBUTION THEORY)

PARAMETER ESTIMATES APPEAR IN ORDER,

NO SPECIAL PROBLEMS WERE ENCOUNTERED DURING OPTIMIZATION.

RESIDUAL COVARIANCE MATRIX (S-SIGMA):

	IMPRF03 V 1	IMPBF03 V 2	IMPRSF03 V 3	IMPBSF03 V 4	IMPSBF03 V 5
IMPRF03 V 1	-0.010				
IMPBF03 V 2	0.000	0.010			
IMPRSF03 V 3	-0.101	-0.227	0.121		
IMPBSF03 V 4	0.105	-0.005	-0.085	-0.095	
IMPSBF03 V 5	-0.066	-0.141	0.423	-0.112	0.137
IMPBSF03 V 6	0.140	0.061	-0.063	0.080	-0.090
IMPND V 7	-0.344	-0.456	-0.190	-0.319	-0.272
IMPVR V 8	0.108	-0.026	-0.047	0.237	-0.090
IMPMF03 V 9	0.342	0.382	-0.172	0.122	-0.090
IMPCF03 V 10	0.251	0.215	-0.123	0.182	-0.106
IMPFF V 11	0.020	-0.022	-0.087	0.079	-0.114

	IMPBSF03 V 6	IMPND V 7	IMPVR V 8	IMPMF03 V 9	IMPCF03 V 10
IMPBSF03 V 6	-0.192				
IMPND V 7	-0.325	0.114			
IMPVR V 8	0.136	-0.358	-0.003		
IMPMF03 V 9	0.191	-0.472	-0.087	-0.250	
IMPCF03 V 10	0.179	-0.472	-0.052	0.096	-0.353
IMPFF V 11	0.026	-0.182	-0.049	-0.117	0.022

	IMPFF V 11
IMPFF V 11	-0.104

AVERAGE ABSOLUTE COVARIANCE RESIDUALS = 0.1569

AVERAGE OFF-DIAGONAL ABSOLUTE COVARIANCE RESIDUALS = 0.1607

Chart 6 Analysis of the covariance matrix of S-Sigma

The chart 7 has EQS estimations of the measurement model and of the consdtructs correlations, in which various matters are detected:

- The message *"NO SPECIAL PROBLEMS WERE ENCOUNTERED DURING OPTIMIZATION"*, indicates that the EQS program has not detected problems by the lack of the model identification or other numerical difficulties that could have arised, reason why it considers correct the identification to the model that is over identified to proceed to the next revision.

- The values of the difference between the observed matrix and the predicted matrix (S-SIGMA) are Little and are disperse between the variables so the fit to the data is good.

STANDARDIZED RESIDUAL MATRIX:

	IMPRF03 V 1	IMPBF03 V 2	IMPRSF03 V 3	IMPBSF03 V 4	IMPSBF03 V 5
IMPRF03 V 1	-0.010				
IMPBF03 V 2	0.000	0.010			
IMPRSF03 V 3	-0.101	-0.227	0.121		
IMPBSF03 V 4	0.105	-0.005	-0.085	-0.095	
IMPSBF03 V 5	-0.066	-0.141	0.423	-0.112	0.137
IMPBSF03 V 6	0.140	0.061	-0.063	0.080	-0.090
IMPND V 7	-0.344	-0.436	-0.190	-0.319	-0.272
IMPVR V 8	0.108	-0.026	-0.047	0.237	-0.090
IMPMF03 V 9	0.342	0.382	-0.172	0.122	-0.090
IMPCF03 V 10	0.251	0.215	-0.123	0.182	-0.106
IMPFF V 11	0.020	-0.022	-0.087	0.079	-0.114

	IMPBSF03 V 6	IMPND V 7	IMPVR V 8	IMPMF03 V 9	IMPCF03 V 10
IMPBSF03 V 6	-0.192				
IMPND V 7	-0.325	0.114			
IMPVR V 8	0.136	-0.358	-0.003		
IMPMF03 V 9	0.191	-0.472	-0.087	-0.250	
IMPCF03 V 10	0.179	-0.472	-0.052	0.096	-0.353
IMPFF V 11	0.026	-0.182	-0.049	-0.117	0.022

Chart 7 Analysis of the standardized residual matrix

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Within the program it was specified that the analysis would be by correlation and this facilitates their interpretation, and from chart 8, it is concluded that there are not infractor estimations, i.e. there are no values that surpasse the number of one.

From chart 9 it can be apreciated the figure symmetry in regard their standardized residual distribution, so none of the resiaduals have a preoccupation and a good adjust of the model with its estimemd variables in regard to their variance and covariance are seen.

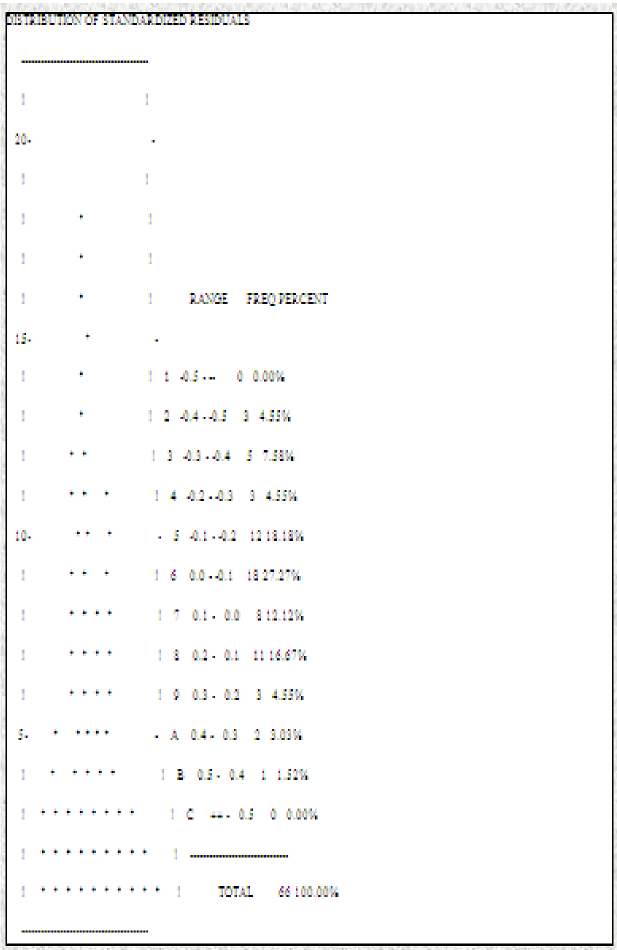

Chart 8 Analysis of the distribution of standardized residuals

GOODNESS OF FIT SUMMARY

INDEPENDENCE MODEL CHI-SQUARE = 1150.452 ON 55 DEGREES OF FREEDOM

INDEPENDENCE AIC = 1040.45189 INDEPENDENCE CAIC = 854.44043

MODEL AIC = 483.66282 MODEL CAIC = 307.79743

CHI-SQUARE = 587.663 BASED ON 52 DEGREES OF FREEDOM

PROBABILITY VALUE FOR THE CHI-SQUARE STATISTIC IS LESS THAN 0.001

THE NORMAL THEORY RLS CHI-SQUARE FOR THIS ML SOLUTION IS 465.826.

BENTLER-BONETT NORMED FIT INDEX= 0.489

BENTLER-BONETT NONNORMED FIT INDEX= 0.483

COMPARATIVE FIT INDEX (CFI) = 0.511

ITERATIVE SUMMARY

ITERATION	PARAMETER ABS CHANGE	ALPHA	FUNCTION
1	0.268395	1.00000	7.56532
2	0.072624	1.00000	7.44265
3	0.014391	1.00000	7.43888
4	0.002886	1.00000	7.43878
5	0.000837	1.00000	7.43877

Chart 9 Analysis of the goodness of the fit

The chart 10 shows the estimation of rescaled parameter, in other words, it follows the standardization of latent variables (F's) and residuals (E's) to reach a variance unity, from it can be esteemed that the value of R2 is infractor for the variables: V_7 and V_8, therefore, based on this results those variables are eliminated and we proceed to do the pertinent adjustment of the model, finishing as illustrated in graphic 3.

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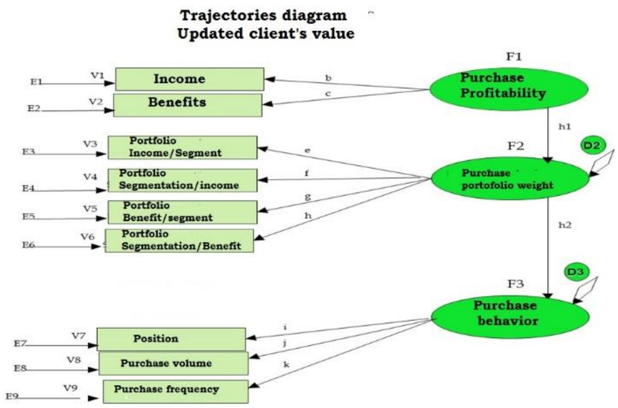

Graphic 3 Final model meeting the goodness of fit criteria

Also in the chart 10 a strong relationship between profitability and portfolio (estimation equal to 0.898) and the relationship between behavior and portfolio (estimation equals to 0,804) [7].

Seventh step: interpretation and modification of the model.

From the previous steps it can be observed that the model can be adjusted and, in fact, unnecessary data could exist, reason why the entry matrix has been adjusted, this allowed to reach a Cronbach Alpha equal to 0.940, which means a very high reliability.

Moreover, the Bentler rates, standardized and non standarized, were substantially improved, as well as the comparative rate, resulting in 0.55, 0.52 and 0.57, respectively.

[7]While singularity is not reached, collinearity is substantial. (HAIR, 1999)

Conclusions

STANDARDIZED SOLUTION:	R-SQUARED
IMPRF03 =V1 = .971 F1 + .239 E1	.943
IMPBF03 =V2 = .971*F1 + .241 E2	.942
IMPRSF03=V3 = .772 F2 + .636 E3	.595
IMPBSF03=V4 = .810*F2 + .586 E4	.656
IMPSBF03=V5 = .730*F2 + .684 E5	.533
IMPBSF03=V6 = .828*F2 + .560 E6	.686
IMPMF03 =V7 = .813*F3 + .583 E7	.660
IMPCF03 =V8 = .824*F3 + .567 E8	.679
IMPFF =V9 = .736*F3 + .676 E9	.542
CART =F2 = .910*F1 + .415 D2	.828
COMP =F3 = .951*F2 + .308 D3	.905

Chart 10 Analysis of the standard solution

Chart 11 shows that the value of R^2 is not longer infractor for any variables.

Finally, the client value was modeled taking as example a Mexican Company from the telecommunication sector and we achieve to identify, precisely and in a reliable way, the client value in a underlying form to his profitability, weight and behavior, resulting for these data: a storng relationship between profitability and portfolio (estimation equal to 0.91); and a strong relationship between poertfolio and behavior (estimation equals to 0.981)[8].

[8] While singularity is not reached, collinearity is substantial (HAIR, 1999)

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CART =F2 = .910*F1 + .415 D2 .828

COMP =F3 = .951*F2 + .308 D3 .905

Chart 11 Realtionship among independent variables

From the working hypotheses of value proposed through the model interpretation it is concluded that: there is a high grade of direct relation between the portfolio weight and the client profitability (estimation value equal to 0.910); and that there is a high grade of direct relation between the client's behavior and the client's portfolio.

References

Anderson, Mark C., Banker Rajiv D., Ravindran Sury. *Interrelations between Components of Executives' Compensation*.

Brown, Stanley. *Administración de la relacion con el cliente*. Primera Edicion, Editorial Oxford. Mexico, 2000.

Brown Stanley. *Administracion de la relacion con el cliente*. Primera Edicion. Editorial Oxford, pagina 711. Mexico, 2000.

Chain System with Stochastic Demand. North Carolina, A&T. State University, University of Missouri-Columbia, E. U. A.

Column Based Analytical Technology. The Missing Piece of the Analytics Puzzle. Chicago, Illinois, página 14.

Davidson, Paul, Boman Magnus. *Test Implementations of Information and Decision Support Systems*. Ronneby, Sweden, Kista Sweden; University of Karlskrona/Ronneby; Stockholm University; and the Royal Institute of Technology.

Hair, Joseph. *Analisis Multivariante*. Primera Edicion, Editorial Prentice Hall, paginas 611-669. Madrid, España, 1999.

Kalakota, Ravi. *eBusiness Roadmap for Success*. Novena Edicion, Editorial Addison Wesley, pagina 109-162. U. S. A., 1999.

Rao, P., Srinivasa, Swarup Saurabh. *Business Intelligence and Retailing Applications of data warehousing and data mining in the retail Industry*. Wripo Technologies, página 10.

Rao, P., Srinivasa, Swarup Saurabh. *Technical Manager*. BI DW Practice, Consultant BI DW Practice.

ISSN-Print: 2007-1582- ISSN-On line: 2007-3682

Rosales Vega, Gabriel. *B2B digital*. Primera Edicion, Editorial SICCO, pagina 284. Mexico, 2002.

Rosset, Saharon, Einat Neumann, Uri Eick, Nurit Vatnik y Yizhak Idan. *Customer Lifetime Value Modeling and Its use for Customer Retention Planning*.

Salterio, Steven. *The balanced scorecard*. CA Magazine, 136, 6. ABI/INFORM Global, pagina 39, Agosto, 2003.

Santorelli, Dina. *Leading companies get serious about measuring customer value*. Peppers & Rogers, special to SearchCRM.com.

Shahnam, Liz. *Customer Data Integration Strategies: part 1 Application Delivery Strategies*.

Singularity Consulting Intelligent Relationship Management. Pagina 12.

Tapscot, Don. *Capital digital*. Segunda Edición, Editorial McGraw Hill, página 189. México, D. F., 1999.

Tapscot, Don. *Economia digital*. Segunda Edición, Editorial McGraw Hill. Mexico, D. F., 1999.

Thompson, Arthur A. y A. J. Strickland III. *Administración estrategica. Textos y Casos*. Décimo tercera Edicion, Editorial Mc Graw Hill, pagina 168. México, 2005.

Trestini, Hector D. *Defining CRM for Business Success*.