Differentiated satisfaction response of beneficiaries of a food assistance social program in Mexico using structural equation models (SEM)

Respuesta diferenciada en la satisfacción de beneficiarios de un programa de asistencia alimentaria en México usando modelos de ecuaciones estructurales (SEM)

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Abstract

The main purpose of this research is to identify the characteristics and conditions determining the satisfaction response of the poor household beneficiaries from both urban and rural areas of Mexico´s social food assistance program "Programa de Apoyo Alimentario-Esquema Sin Hambre" (PAL-ESH, by their Spanish acronyms). A national survey was applied to 2,199 PAL- ESH recipients throughout the country in order to elaborate a PAL-ESH beneficiary satisfaction index using partial least squares structural equation modeling (PLS-SEM). The results confirmed that the characteristics and conditions that determine food poverty in countryside and city are different, hence the beneficiaries´ satisfaction response, are also differentiated. This paper suggests the need to redesign this social program according to the characteristics of the target population on which they operate and provides evidence that justifies the need for new differentiated public policy instruments that recognize the various urban and regional socioeconomic characteristics of the recipients of public programs.

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Resumen

El propósito de esta investigación es identificar las características y condiciones que determinan la respuesta de satisfacción de los beneficiarios del programa de asistencia "Programa de Apoyo Alimentario -Esquema Sin Hambre" (PAL-ESH). Se levantó una encuesta nacional con 2,199 aplicaciones a beneficiarios del PAL-ESH para construir un índice de satisfacción de beneficiarios utilizando un modelo de ecuaciones estructurales estimado con el método de mínimos cuadrados parciales (SEM). Los resultados confirman que las características y condiciones que determinan la pobreza alimentaria en el campo y la ciudad son diferentes, por lo que también se diferencia la respuesta en la satisfacción de los beneficiarios de este programa. Este trabajo sugiere la necesidad de rediseñar este programa gubernamental de acuerdo con las características de las poblaciones objetivo en las que opera, justificando la necesidad de nuevos instrumentos de política pública diferenciados que reconozcan las diversas características socioeconómicas de los receptores de programas gubernamentales.

Introduction

This paper shows the findings of a national study carried out assessing beneficiaries' satisfaction with the so called Programa de Apoyo Alimentario, Esquema Sin Hambre (Food Support Program-Scheme Without Hunger, PAL-ESH, by its Spanish acronym), a governmental social program for improving food supply to thousands of families in food poverty both in rural and in urban areas in Mexico.

Mexico has a wide range of social programs to support people in extreme poverty, many of them are focused to reduce vulnerability (Rosas and Sanchez, 2019), including those with no access to adequate nor enough food (Salazar and García 2015). For instance, the PAL, which was part of the National Crusade Against Hunger (CNCH) in the last federal administration, as a program targeted at poor families with low or no income and inappropriate nutrition (Huesca et al. 2016).

Although there are some studies highlighting the contribution of this program in improving food and nutrition of poor households and those pointing out the challenges that still faces in terms of coverage and focus (Huesca et al. 2016; Morales-Ruan et al. 2013), and considering that people might have a different response according to their own socio-economic and urban context, the current knowledge that exists about the factors determining the level of beneficiaries' satisfaction is currently limited.

Thus, the general goal of this research was estimating and comparing the PAL-ESH beneficiaries´ satisfaction in high and very high marginalized urban and rural localities throughout the country. Based on the fact that the characteristics and conditions determining food poverty in rural areas are different from those in urban areas, we hypothesized that the beneficiaries' satisfaction response ought to be differentiated among rural and urban localities. The specific purpose of this study was contributing to demonstrate that social policy programs and their instruments should be implemented in a differentiated way for populations in rural and urban areas based on the recognition of the factors that determine the level of satisfaction of the own beneficiaries. For this study a national survey was applied to 2,199 PAL-ESH program beneficiaries in 211 Mexican localities, between November 2015 and February 2016, and conducted 60 semi-structured interviews with key informants involved in the programs' operation in order to build a PAL-ESH beneficiary satisfaction index using structural equation models.

Therefore, the aim of this study was focused on analyzing beneficiaries' satisfaction with the PAL-ESH program as a result of their own experience receiving this government support through three different modalities of service offered by Diconsa: 1) rural stores, 2) truck-shops, and 3) beneficiary supply centers (CABES by its Spanish acronym). For this aim, a PAL-ESH beneficiary satisfaction index (BSI) was built using structural equation models (SEM). The purpose of SEM is linking two or more complex concepts (so-called latent constructs or unobservable variables), which are measured through other empirical indicators or observable variables (Henseler and Sarstedt 2013). The core idea is that the internal complexity of a system of relations can be examined taking into account the complicated network of causality between latent concepts (latent variables; LV), which are expressed through different observed indicators (manifest variables; MV) (Hair et al. 2010, 2017b).

Literature review

The study was supported by a consistent literature review in two areas: on the one hand, social programs aimed at poverty and food poverty in Mexico, and on the other hand, the structural equation modeling applied for calculating satisfaction indexes.

Social programs aimed at poverty and food poverty in Mexico

One of the major social challenges faced by Mexico is reducing poverty (ENSANUT 2016). According to CONEVAL, in the year 2018 poverty in Mexico afflicted 61.1 million people (48.8% of the total country population), of which 21 million were extremely poor, and at least 25.5 million (20.4%) lacked

access to basic food (CONEVAL, 2019). Nonetheless, another recent study reports that population reaching the food security range has contracted, from 50.1% in 2000 to 46.7% in 2018, which expresses that more than half of Mexico´s population present some level of food insecurity (Torres and Rojas 2020).

In order to reduce poverty, social programs were developed and introduced by federal government, but they are focused mainly on economic welfare (25%), education (29%), health (17%) and only 4% is applied to reduce huger and the lack of food (CONEVAL, 2017).

Social food policy in Mexico, dates back to the Mexican Revolution (Barquera et al, 2001). The main objective has been to guarantee peoples' access to food that allow them to satisfy their needs, and to fulfill the nutritional requirements necessary for a healthy living. (INSP, 2007: 91). Throughout the history of social policy, different food programs had emerged. They can be classified in two groups: 1) programs focused in food security, subsides for productive activities and self-consumption; 2) strategies oriented to end poverty, transfer programs and subsides (Huesca et al. 2016).

Since 2013, Mexican federal government changed its approach of solving poverty issues, by launching a comprehensive transversal strategy to combat poverty, malnutrition, and social marginalization (López and Gallardo 2015) entitled National Crusade Against Hunger (CNCH by its Spanish acronym), in accordance with the United Nations´ Zero Hunger Challenge (Gills et al. 2015). The overall strategy of the CNCH includes a set of articulated public programs attempting to address the problem of social policy fragmentation (Cejudo and Michel 2015). This latter topic is an indispensable condition for public policies in order to solve complex problems as a part of the same sphere, such as poverty and food poverty in particular (Cejudo and Michel 2016). In this sense, the CNCH is not a program but a strategy looking to achieve food security -and other several social goals-, through community participation and the cooperation of several government ministries (Gil et al., 2014).

One of these CNCH programs was the so called Programa de Apoyo Alimentario (Food Support Program; PAL by its Spanish acronym), aimed at increasing access to basic food for beneficiary households by means of money transfers in order to compensate families´ low incomes, enhancing their economic welfare and nutrition. PAL is focus on families with a per capita income below poverty line, and it represents the transition to the Prospera (Prosper) program from the former Oportunidades (Opportunities) program, but its coverage is proportionately low, as Morales-Ruan et al. (2013) had estimated that by 2012, PAL was attending only 2% of households nationally.

PAL was operated using an electronic debit card for money transfers, and the program had two operating modalities: the conventional modality allowing beneficiaries to purchase items of their free choice at any shop or store with an electronic terminal (PAL-Cash hereafter), and a modality called PAL-Scheme Without Hunger (PAL-ESH by its Spanish acronym) exclusively allowing the usage of the

electronic card for acquiring 19 basic food products at lower prices that distributed through the national network of Diconsa (with over 27,000 selling points). Diconsa was a federal public company dedicated to ensure food supply and other basic commodities in high and very high marginalized areas, and by the second half of 2013 was in charge of operating the PAL-ESH (Huesca et al., 2016). Beneficiaries of PAL-ESH had received additional support to the PAL-Cash. As a reference, from the beginning of 2015, a regular family could receive annually from $ 454.27 US dollars for households with no children and up to $ 747.35 US dollars for families with three children under nine years old.

The structural equation models (SEM) and its application to calculate satisfaction models

The satisfaction index calculus arose from the necessity to explain the customer linkage to the goods and services supplier through their own satisfaction. Nowadays, there are several national satisfaction indexes that have been constructed for particular socioeconomic and cultural contexts. For instance, there is the Swedish Customer Satisfaction Barometer (SCSB), the American Customer Satisfaction Index (ACSI), the German Barometer, the Norwegian Barometer (NCSB), the Swiss Index (SWICS), the Korean (KCSI), the Malaysian (MCSI) and the Canadian (CCSI) (Johnson et al., 2001). Countries such as Brazil, Argentina and Mexico are developing their own national consumer satisfaction index (Rodríguez, 2012).

Usually, these index focus on perceptions and attitudes, which are abstract items that allow to include a measurement of the satisfaction of some goods and services (Hayes, 2012). The knowledge of beneficiaries' perceptions and attitudes concerning the products and services offered, in this case by a social program such as the PAL-ESH, provides a solid basis to designers, operators, and program managers in general, to enhance the decision-making process applied to implementation and results of this program.

As a background of measuring beneficiaries´ satisfaction from social programs in Mexico, in 2011 Lobato et al. (2011) developed the Mexican User Satisfaction Index (IMSU), based on the American Consumer Satisfaction Index model (ACSI), and applied it to the social program "70 and above"; obtaining a satisfaction index of 79% using PLS. Similarly, Rodríguez (2012), developed the Mexican Index of Beneficiary Satisfaction (IMSaB) applied to some social programs implemented by SEDESOL in Mexico, whose estimation was obtained by the maximum likelihood method. This index was applied empirically on four social programs: the program which obtained the highest valuation was the Liconsa, Social Supply Program of Milk (91.2%), and the lowest level of satisfaction was the Productive Options Program (65.9%). The variables "Quality of Benefit" and the "Quality of

management" resulted the best ones explaining the variable "Satisfaction" (Rodríguez, 2012). This result about the Liconsa program is consistent with León and Christian (2010), and Cogco et al. (2013) whom report values of 91% and 91.2% respectively.

Finally, the method of estimating Partial Least Squares (PLS) applied to Structural Equation Modeling has become a standard tool for analyzing complex inter-relationships between observed and latent variables in social science research (Sarstedt et al., 2020), and also has been recognized as one of the most effective methods to explain the residual variance of the LV (Esposito et al., 2010), and when the structural model is complex and includes many constructs, indicators and / or model relationships (Hair et al., 2019). In addition, it has the advantage of not requiring strong assumptions about the normal distribution of the data, size of the measurement scale, etc. (Esposito et al., 2010; Bonales et al., 2018). However, these advantages must be contrasted with some disadvantages, for example, the absence of a global optimization criterion implies the lack of fit measures of the model as a whole (Hair et al., 2010). Although the possible bias in the estimation decreases with the increase in sample size (Lobato et al., 2011).

Method

Generalities

The beneficiaries of the PAL-ESH program were considered as the study group. For comparative analysis, the results were contrasted between different types of beneficiaries according to two criteria: on the one hand, type of locality in which they live (i.e. rural or urban settlements), and on the other hand, the degree of marginalization (high or very high). These groups were identified from a proxy variable (i.e. the modality in which the governmental support is delivered) as follows: Group 1 includes beneficiaries from high marginalized rural areas (customers of Diconsa rural stores); Group 2 includes beneficiaries from very high marginalized rural localities (customers of Diconsa truck-stores); and Group 3 includes beneficiaries from high marginalized urban localities (customers of Diconsa CABES).

Type and size of sample

The total sample size for the national survey (n = 3,199) was the result of estimating an independent sample for each of the three compared groups, ensuring a level of confidence of 95% and a 3.2% margin

of error, with the following sizes: Group 1 = 1,246 households, Group 2= 994 households, and Group 3= 959 households.

We applied the cluster sampling method in two stages: in the first stage, our reference was the rural store DICONSA selecting those cases that had the three groups of beneficiaries; in the second stage, for each group we chose the beneficiaries randomly, taking into consideration the required number of questionnaires (between 8 to 30 applications according to the group). The survey was conducted between the end of 2015 and early 2016, with a total of 211 locations covering 82 municipalities in 26 Mexican states. (Figure 1).
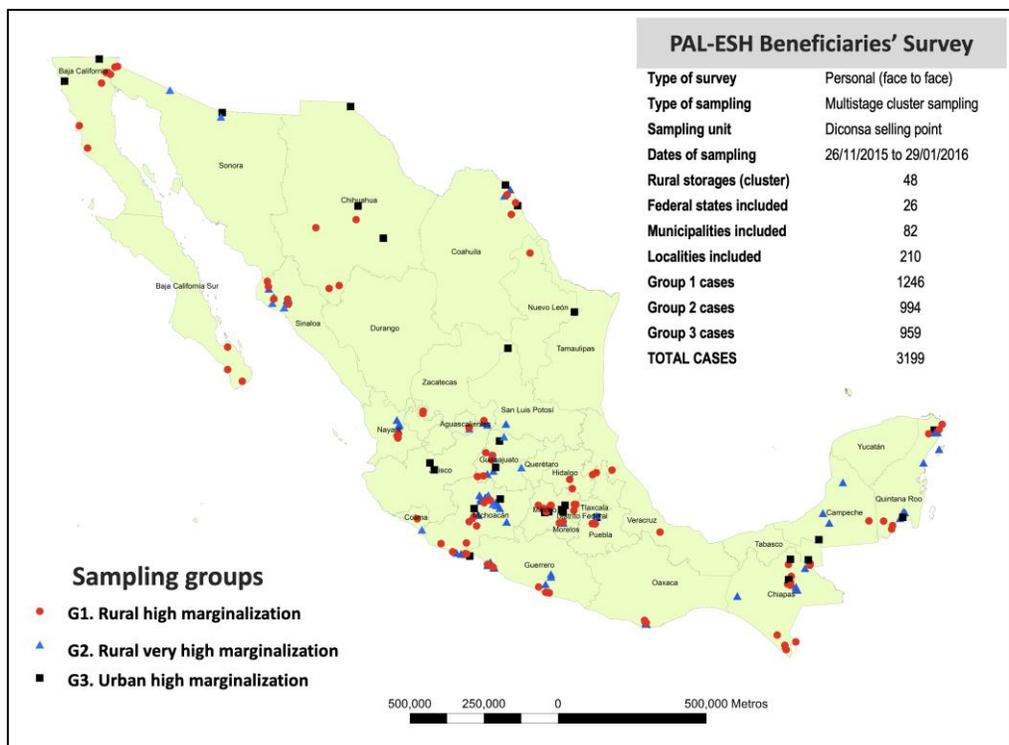

Figure 1. Sample profile and sampling points distribution
Source: Author's own.

Instrument

We used a Likert scale questionnaire with seven categories. The Reliability of the scale was assessed with Cronbach´s Alfa coefficient, obtaining a value of 0.863, which is highly acceptable for this kind of

study (Hernández et al. 2010). The main statistical descriptors for each sample are showed in Annex A1, including age, years of education, family income (monthly) and family food expenditure (weekly).

Data was analyzed by Statistical Program for Social Sciences (SPSS) version 22 for descriptive statistics and reliability tests. The structural equation modeling was made using the partial least squares method with the SmartPLS software package (Informer Technologies Inc.).

The structural equation model for beneficiary satisfaction index (BSI)

Stages for building the SEM

The structural equation model was based on Hair and authors (2010), following five stages: (i) model specification: the theoretical and empirical knowledge upon beneficiaries´ satisfaction was applied to study the relationship of the causal effects of the manifest variables (observables) on the (unobservable) latent variables; (ii) model identification: we assured that they could be estimated model parameters, following identification rules, so-called conditions of order and identification range; (iii) model estimation: it consisted in obtaining the values of the parameters that fit best into the observed matrix; this was done by the Partial Least Squares method; (iv) model evaluation: it was applied a test of goodness of fit of X^2 as well as the reliability composite test (composite reliability) and the average variance extracted (average extracted variance); and (v) index construction: this index was calculated considering the estimated parameters for each case and proceeding to apply the corresponding measurements. The generalities for structural equation models are shown in Annex A2.

PAL-ESH beneficiaries' satisfaction model

The model to assess beneficiaries' satisfaction with PAL-ESH began with the conceptualization of latent variables shown in Table 1.

Table 1
Conceptual definition of latent variables for modelling of the satisfaction of PAL-ESH beneficiaries

Latent Variable	Conceptual definition
Beneficiary expectations	Benefits expected by beneficiaries from the PAL-ESH program, including low prices, supply of 19 food commodities authorized by the program, and physical accessibility to Diconsa stores.
Perceived quality of food products provided by the PAL-ESH program	Expresses the qualitative characteristics of the 19 food commodities in the program (e.g., maize, rice, egg, etc.).
Perceived quality of store services provided by the PAL-ESH program	Refers to the perceived qualitative characteristics of the store service provided by Diconsa after purchasing experiences.
Perception of social value	Refers to the beneficiaries´ perception of the social value provided to the communities by the PAL-ESH program.
Beneficiary satisfaction	Evaluates the beneficiaries' perception of their experiences with the PAL-ESH program.
Beneficiary loyalty	This variable is a product of beneficiary satisfaction with the PAL program expressed as the preference to remain in the PAL-ESH modality rather than in the traditional PAL-Cash modality.

Source: Author's own

Model for calculating the ESH program beneficiary satisfaction index

The model used in this study was adapted from the European Consumer Satisfaction Index (ECSI) from previous studies made by the National Public Health Institute (INSP 2014) and the Universidad Michoacana de San Nicolás de Hidalgo (Ayala, 2011).

The ECSI indicates a direct influence on beneficiary satisfaction of beneficiary expectation, product quality perception, service quality perception, and social value perception. In addition, the beneficiary expectations have an impact on the social value of the PAL-ESH program. In this model the beneficiary expectations and the social value of the program have a direct influence on beneficiary satisfaction. Finally, beneficiary satisfaction has a direct effect on loyalty to PAL-ESH, as shown in Figure 2.
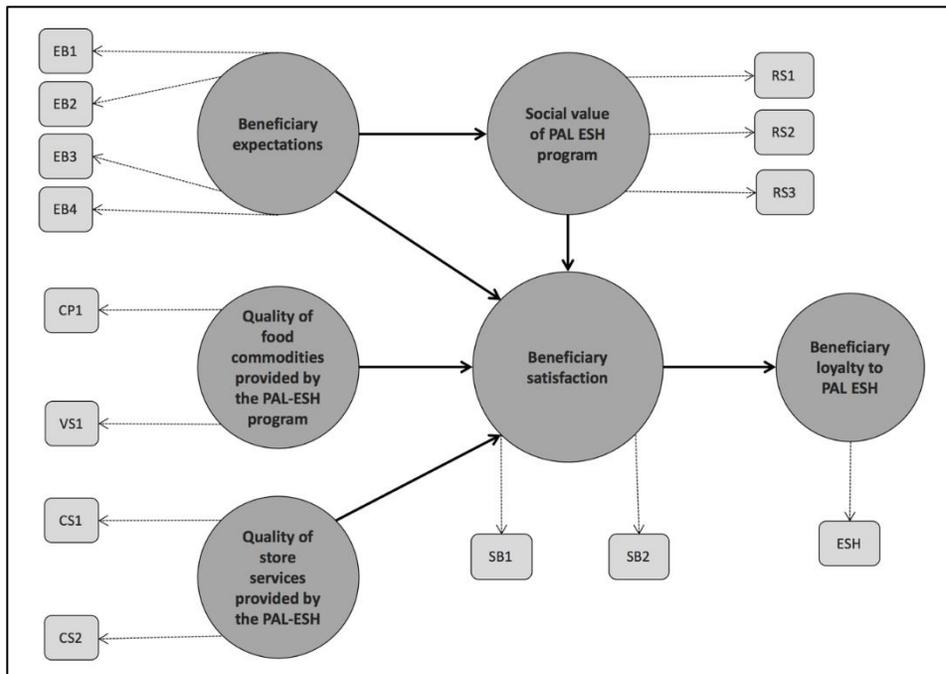
Figure 2. Causal model of Beneficiaries' satisfaction index
Source: Author's own.

Operational definition

For the measurement and comparison of the latent variables, manifest variables were used (i.e. observed variables) and were included in the questionnaire for assessing beneficiary satisfaction by means of 16 items. Table 2 shows the manifest variables explaining the latent variables.

Table 2
Operational definition of latent variables of beneficiary satisfaction

Latent variable	Manifest variable	
Beneficiary expectations	Perception of price (19 products)	(EB1)
	Perception of store accessibility	(EB2)
	Perception of calendar for delivering ESH benefits	(EB3)
	Perception of product assortment (19 products)	(EB4)
Perceived quality of food commodities provided by the ESH program	Perception of quality of 19 products provided	(CP1)
	Perception of variety of 19 products provided	(CP2)
Perceived quality of Diconsa store services provided by the ESH program	Perception about the helpfulness of store employees	(CS1)
	Perception about the promptness of attention by store employees	(CS2)
Beneficiary satisfaction	Global satisfaction with store (Diconsa)	(SB1)
	Perception about the Diconsa store relative to the ideal store	(SB2)
Perception of social value	Perception about the goodness of food offered to the locality	(RS1)
	Perception about the low prices offered to the locality	(RS2)
	Perception about local wellbeing	(RS3)
Beneficiary loyalty	Prefers the PAL-ESH mode instead of the PAL-Cash mode	(LB1)

Source: Author's own

Findings

Beneficiary satisfaction model

We began by specifying the manifest variables and then it was possible to define the complete structural model including both, the latent variables (inner model) and the manifest variables (outer model). As an example, the path diagram for Beneficiary Satisfaction Model in Group 1 is shown in Figure 3. Path diagrams for model groups 2 and 3 feature the exact same structural conformation, varying only about the values obtained in each of the analyzed relationships. The comparative results for all groups are presented in the following tables.
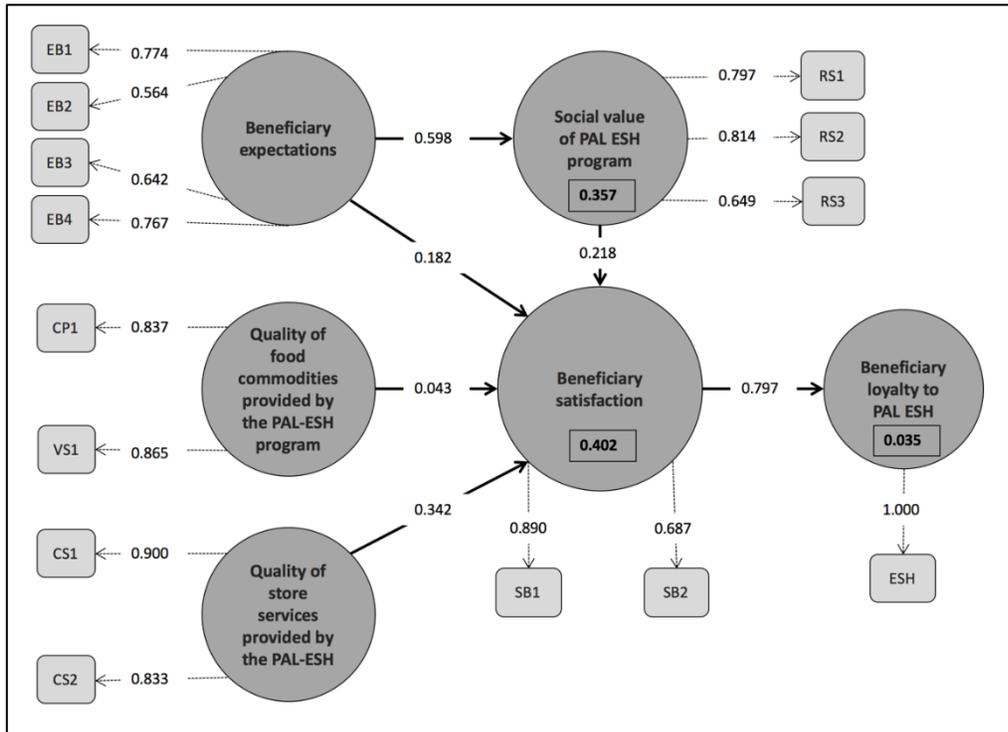
Figure 3. Path diagram of beneficiary satisfaction showing the causal model for Group 1
Source: Author's own.

The first item to be analyzed was the predictive capacity of obtained inner as the outer models. The outer model was evaluated using three tests. Firstly, convergent validity was analyzed trough Average Variance Extracted (AVE). The criterion is: latent variables with an AVE at least 0.5 have the ability to explain at least half of the variance of those indicators on average (Hair et al., 2019; Sánchez et al. 2011). Table 3 shows all the latent variables that meet this criterion, except the latent variable "Beneficiary expectations", that records a lesser value.

Table 3
Outer model evaluation trough average variance extracted (AVE) and composite reliability (CR) of latent variables by group

Latent Variable	Group 1 AVE (CR)	Group 2 AVE (CR)	Group 3 AVE (CR)	All groups AVE (CR)
Products quality	0.724 (0.840)	0.672 (0.804)	0.678 (0.808)	0.661 (0.796)
Service quality	0.795 (0.886)	0.672 (0.803)	0.763 (0.866)	0.763 (0.866)
Beneficiary expectations	0.479 (0.784)	0.394 (0.703)	0.461 (0.772)	0.413 (0.736)
Beneficiary loyalty	1.000 (1.000)	1.000 (1.000)	1.000 (1.000)	1.000 (1.000)
Beneficiary satisfaction	0.632 (0.771)	0.573 (0.772)	0.637 (0.778)	0.628 (0.771)
Social value	0.573 (0.800)	0.532 (0.771)	0.584 (0.807)	0.566 (0.794)

Source: Author's own.

The composite reliability (CR) was a second test about the outer model, which describes internal consistency reliability (Hair et al., 2010), i.e. how much the manifest variables are representing the latent construct (unobserved). A commonly accepted threshold value for accepting the reliability hypothesis is between 0.60 and 0.70 ("acceptable in exploratory research,"), meanwhile values between 0.70 and 0.90 range is considered "satisfactory to good (Hair et al., 2019). In this case, Table 3 shows that all CR values are above this threshold, indicating a good model consistency (Sánchez et al., 2011).

Once the outer model evaluation provided evidence of reliability and validity, we proceeded to examine the goodness of fit of the model. In this way, we use the R^2 statistic which indicates the percentage of the fit has been achieved with the linear model. For this case, the percentage of endogenous variation in S (Beneficiaries' satisfaction), explained by the linear model, is estimated by the behavior of $\xi 1$, $\xi 2$ and $\xi 3$ (i.e. perception on "Beneficiary expectations", "Service quality" and "Products quality"); thus, R^2 indicates the predictive behavior of the structural model (Henseler and Sarsted, 2013).

Table 4 shows the R^2 values of the endogenous variable "Beneficiaries' Satisfaction" for the model according to the group, as well to the global case, which includes the evaluation as a whole with proportional information for each of the groups. Following Hair et al. (2011) "The judgment of which level of R^2 is high depends on the specific discipline of the research. While R^2 results of 0.20 are considered high in disciplines such as consumer behavior, R^2 of 0.75 would be perceived high in other studies". In the same sense, Chin (1999 in Henseler and Sarstedt, 2013) describes criteria for R^2: Models

estimated with PLS whose R^2 is around 0.67 are considered substantial, about 0.33 moderate and 0.19 weak (Henseler and Sarstedt 2013; Hair et al., 2019).

Table 4
Goodness of fit (R^2) in Beneficiaries' satisfaction, by group

Group	R^2
Group 1 (Rural high marginalization)	0.402
Group 2 (Rural very high marginalization)	0.259
Group 3 (Urban high marginalization)	0.342
Global (i.e. pooled data of all groups)	0.301

Source: Author's own

As observed in Table 4, the R^2 values for groups 1 and 3 were moderate, and weak for group 2 and for the global case. Nevertheless, these last values fall within the range that Ringle et al. (2010) considered moderate. Sometimes, moderate R^2 values are valid whereas an endogenous latent variable is explained by few – two or three- latent exogenous variables (Henseler and Sarstedt, 2013), as shown in this study.

Drivers of beneficiary satisfaction

Our central hypothesis stated that beneficiary satisfaction drivers and the level of beneficiary satisfaction ought to be differentiated according to the target group involved (i.e., BSI G1 ≠ BSI G2 ≠ BSI G3). For that purpose, standardized regression coefficients (beta) were used expressing the contribution of each exogenous variable for determining beneficiary satisfaction. In other words, the standardized regression coefficients determine the percentage of variance in beneficiary satisfaction which is partially explained by each of the causal variables. The results of this analysis are presented in Table 5 for each contrast group and for all groups (BSI Global).

Table 5
Percentage of variance explained by the causal variables of beneficiary satisfaction

	Causal Variables	Standardized regression coefficients β_j	Correlation with respect to Beneficiary Satisfaction	Percentage of explained variance by the causal variables of Beneficiary Satisfaction
BSI Group 1	Beneficiary Expectations	0.18	0.51	22.95%
	Quality (products)	0.04	0.43	4.59%
	Quality (services)	0.34	0.54	45.83%
	Social value (PAL-ESH)	0.22	0.49	26.67%

BSI Group 2	Beneficiary Expectations	0.09	0.39	13.98%
	Quality (products)	0.23	0.43	37.77%
	Quality (services)	0.13	0.32	15.71%
	Social value (PAL-ESH)	0.21	0.41	32.54%
BSI Group 3	Beneficiary Expectations	0.13	0.46	17.73%
	Quality (products)	0.08	0.43	10.27%
	Quality (services)	0.20	0.42	25.04%
	Social value (PAL-ESH)	0.31	0.52	46.96%
BSI Global	Beneficiary Expectations	0.06	0.34	7.12%
	Quality (products)	0.11	0.38	14.15%
	Quality (services)	0.22	0.40	30.57%
	Social value (PAL-ESH)	0.30	0.47	48.16%

Source: Author's own.

Table 7 presents the correlations of each manifest variable (i.e. variables observable in the field) determining beneficiary satisfaction. Each group is discussed in the following sections.

Beneficiary satisfaction index

Once we identified the main latent variables associated with BSI and the manifest variables (causal) that largely determine it, we could analyze the specific satisfaction levels we found in this study (Table 6).

Table 6
Beneficiary satisfaction index

Modality	BSI
Group 1	85.53
Group 2	87.69
Group 3	82.48
Global (all groups)	84.83

Source: Author's own

By that means we obtained an overall satisfaction rate of 84.8%. Comparing the three involved groups, Group 2 displayed a higher satisfaction rate of 87.6%, while the lower satisfaction rate of 82.4% corresponded to Group 3 (i.e. urban beneficiaries in high marginalization).

Drivers of beneficiary satisfaction in group 1 (rural, high marginalization)

The results of Group 1 including high marginalized rural localities showed that the main driver for beneficiary satisfaction was the latent variable of quality service, accounting for 45.8% of the explained variance, followed by social value of the PAL-ESH program (26.6%), and beneficiary expectations (22.9%; Table 5). In this group the main manifest variables correlating with each of the above-mentioned latent variables were perception about the helpfulness of store employees (r = 0.90), and perception about the promptness of attention by store employees (0.88). In the case of beneficiary expectations, the manifest variable perception about price dominated this correlation (r = 0.77), as shown in Table 7.

Drivers of beneficiary satisfaction in group 2 (rural localities with very high marginalization)

The analysis of Group 2, integrated by beneficiaries from very high marginalized rural areas, showed a greater contribution to BSI based on the perceived quality of products (37.7%; Table 5), which is mainly associated with the perception of overall price-quality relationship (including the 19 products in the PAL-ESH basket) (0.84). The second factor driving BSI in Group 2 was the perceived social value of the PAL-ESH program (32.5%), which correlated (r = 0.82) to the appreciation that the program allowed beneficiaries to buy cheaper products compared to other local stores (Table 7). Finally, BSI was incremented by quality of service (15.7%) and beneficiary expectations of the PAL-ESH program (13.9%).

Drivers of beneficiary satisfaction in group 3 (urban localities with high marginalization)

Table 5 shows that in Group 3, integrated by high marginalized urban localities with, the perception of the PAL-ESH program´s social value was the main factor, accounting for 46.9% of the explained variance in BSI, followed by perception of quality service (25.0%), and beneficiary expectations (17.7%). Among these latent variables, the manifest variables with the highest correlations with social value were the low prices offered (0.82) and the quality of offered products (0.77). Perception of quality service showed high correlations with the kindness of Diconsa employees (0.88) and, not statistically differing, with perception of promptness of attention by Diconsa´s employees (0.87) (Table 7).

Drivers of beneficiary satisfaction for all groups (BSI global)

Our results for the BSI value in the combined groups (Table 5) indicate that the variable that best explains BSI was the perception of social value of the PAL-ESH program (i.e., products´ quality, low prices, general satisfaction), a variable which accounted for 48.16% of the explained variance and was highly correlated (0.81) with the perception of low prices offered to the locality (Table 7). The second main determinant of BSI for the combined groups was the perception of quality service accounting for 30.57% of the explained variance. The two manifest variables included in the latter variable showed high correlation values about 0.87 for the perception of the helpfulness of Diconsa´s employees and 0.86 for the perception of promptness of attention by Diconsa´s employees (Table 7).

Table 7
Correlations between the main determinants of satisfaction and its manifest variables

Var. Manifest / Var. Latent	Group 1 ISB					Group 2 ISB					Group 3 ISB					Global Group ISB				
	ξ_1	ξ_2	ξ_3	ξ_4	S	ξ_1	ξ_2	ξ_3	ξ_4	S	ξ_1	ξ_2	ξ_3	ξ_4	S	ξ_1	ξ_2	ξ_3	ξ_4	S
P1.Perception on price (19 products) (EB1)	0.77					0.76					0.74					0.61				
P2. Perception on physical accessibility (to the store) (EB2)	0.56					0.29					0.59					0.57				
P3.Perception on calendar for delivering ESH benefits (EB3)	0.64					0.59					0.60					0.60				
P5.Perception on assortment (of 19 products) (EB4)	0.76					0.75					0.75					0.76				
P4.Perception on quality (of 19 products) (CP1)		0.83					0.79					0.80					0.77			
P9.Perception on price-quality relationship (19 products) (VS1)		0.86					0.84					0.84					0.84			
P7.Perception on kindness of the store employee (CS1)			0.90					0.83					0.88					0.87		
P8.Perception on rapidity to operate of the store employee (CS2)			0.88					0.80					0.87					0.86		
P13.Perception about the good food offered to the locality (RS1)				0.79					0.76					0.77					0.78	
P14.Perception about the low prices offered to the locality (RS2)				0.81					0.80					0.82					0.81	
P15.Perception about the local wellbeing (RS3)				0.64					0.60					0.68					0.63	
P11.Global satisfaction on store (DICONSA) (SB1)					0.89					0.88					0.81					0.82
P12.Perception about Diconsa store with respect to the ideal store (SB2)					0.68					0.60					0.77					0.75

ξ_1: Beneficiary expectations; ξ_2: Perception of quality in food products; ξ_3: Perception of quality about Diconsa store service; ξ_4: Perception of social value; S: Beneficiary satisfaction.
Source: Author´s own.

Discussion

The satisfaction measurement has been widely studied from costumer perspective in a pure commercial context (Ringle et al., 2010; Hayes, 2012). However, there are still few studies that measure the government programs beneficiaries' satisfaction (Murayama and Rabel, 2011; Lobato et al., 2016) in particular, for the Mexican context. For this reason, one of the central assets of this paper has been its contribution to understand the public social program beneficiaries´ satisfaction aimed at improving the food conditions for people in extreme poverty of Mexico.

From a methodological point of view, it has been relevant to analyze the BSI into three contrast groups. This study design has allowed us to know with accuracy the level of satisfaction of these groups, separating it from the effect of the PAL-Cash modality. Thereby, it was found that the determinants of satisfaction are differentiated between rural and urban beneficiaries (G1, G2 vs. G3), as well as among the marginalized (G1) and very highly marginalized (G2) rural beneficiaries. This fact evidences the need to have differentiated public policy instruments properly focused on the social, economic and territorial context in which they will be implemented without losing the integrality (Cejudo and Michel, 2015).

The validity of our results is supported by the fit coefficients (R^2) obtained for the endogenous variable (Beneficiary Satisfaction), which in two of the three groups (G1 and G3) and in the global case, are moderate but statistically significant. As is often the case for estimating complex structural equation models, which involve a high number of latent variables, these values frequently oscillate between 0.25 and 0.75 (Hair et al., 2011). In contrast, the result obtained in G2 was statistically poor, so it can only indicate a possible trend in their behavior. It is not omitted to point out that this group presented a large obstacle in the survey, since approximately one-third of the originally selected sample had to be replaced due to recent changes in the operation modality. However, the results of this study provide statistically significant evidence to support the validity of the hypothesis that the PAL-ESH program, whose operation is divided into three different groups of beneficiaries, it´s also different concerning the drivers of its satisfaction.

When we evaluated the high marginalized rural beneficiaries group (G1), we found that the "quality service" variable is the principal determining their satisfaction. In this case, the main correlated variables were: "Perception on kindness of the store employee" and "Perception on the employee's rapidity to operate the store". The practical implication of this finding suggests that the government - through Diconsa- should strive to provide a quality service, with friendly treatment from those in charge of operating PAL-ESH, especially through the so-called community stores. This result is consistent with Ayala (2011), who measured the beneficiaries' satisfaction of the Rural Supply Program.

Although the fit of the model was not statistically robust, when analyzing data from G2 (i.e. very high marginalized rural beneficiaries group), it was found that these people perceive a greater impulse of their own satisfaction in terms of "Quality of the products", which is mainly associated with the "price-quality ratio perceived" in the set of 19 products of the ESH program. This finding is remarkable due to a general notion: social groups in a high marginalized condition (or very high as in this case), do not evaluate the quality of products bought and consumed in relation to the price paid.

However, in spite of the statistical restriction already recognized, our results suggest that these social groups not only evaluate this relationship, but also expect a positive balance in it, in accordance to Appendini et al. (2003). A possible explanation for this result may be related to the fact that, for G2 the support received from the program represents almost 23% of household income, whereas for G1 it represents 21.1%, and only 16.3% for G3, in accordance with our data.

In the last group analyzed, i.e. very high marginalized urban beneficiaries (G3), the highest factor explaining the variance of satisfaction was the "perceived social value" (of the program ESH to locality). Within this variable, it was found that "low prices offered", is the manifest variable with the highest correlation with the "high social value" identified. This result makes sense, considering that the beneficiaries are forced to go to the program´s points of sale (by the rules of operation of the program) and they expect to find, at least, lower food product prices than those from the commercial stores. It is likely that this beneficiary group could expect to find a higher quality of products in commercial stores other than those offered by the ESH, considering the urban environment where they invariably have more options of stores. However, proving such an assumption would merit a new study.

For the global case, i.e. for the collective group of beneficiaries from the three cases, very close results to last described for Group 3 were observed. Thereby, the main driver of Beneficiary Satisfaction for this case was "the perceived social value" (of the program towards the locality) which refers to the beneficiary's perception in terms of good supply, low prices and general welfare. In addition, it is possible that possessing more accurate market information within the urban groups would also have an important role in their satisfactory level, considering that the information generates expectations.

Now, discussing about the beneficiary satisfaction index (BSI) obtained, the results showed an index of 85.53% for beneficiaries from Group 1; 87.69% for Group 2; and 82.48% for Group 3. The ESH Global Beneficiary Satisfaction Index was estimated in 84.83%; this score was significantly higher than the 72.4% reported by the unique previous study near this program (INSP, 2014). Nonetheless, it should be considered that in the 2014 study the beneficiaries' satisfaction was measured including both PAL-ESH and PAL-Cash modalities, and for this reason the comparison is not directly equivalent and should only be taken as a reference.

The latter values could be considered high according to some results from products, services or entities of commercial profile (Hair et al. 2017a, 2012); however, in the case of measuring social programs beneficiaries' satisfaction, where a person (i.e. the beneficiary) directly accesses a set of supports from the government, it is common to find high values (León and Christian, 2010; Rodríguez, 2012). In fact, this result is consistent with Cogco et al. (2013), who found a 91.2% value of Beneficiaries' Satisfaction Index in a similar study about the "Abasto Social de Leche", using a structural equation model with latent variables.

Finally, a significant achievement in the specification of this satisfaction model was to determine that the performance variable result in "loyalty to the ESH modality"; it´s that beneficiaries express their preference to remain in the PAL program as a beneficiary of the ESH modality, and not requesting to be transferred into the PAL-Cash modality. The results in the estimation of the loyalty index express a value of 90.63% for Group 2, higher by almost 2% than Group 1 and 4% than Group 3. This difference is statistically significant, and it is associated with the higher dependence that exists in rural areas (G1 and G2) to the food supply of commodities through this program.

As we can observe with this empirical work, the understanding of the public social program beneficiaries´ satisfaction is a very complex process that includes many manifest and latent variables. But more than this, there is also diverse social, economic, and cultural contexts that determine a higher or lower perception on satisfaction, and this is more evident when we compare rural versus urban conditions. So, the decision makers should take this into account and design social programs ad hoc these conditions.

Conclusions

This study results provided evidence confirming the working hypothesis and allowed us to conclude that the characteristics and conditions determining food poverty in marginalized communities in Mexico are different in rural and in urban areas, therefore beneficiary satisfaction of this social program is also differentiated between types of settlements inhabited by beneficiaries.

The main practical implication derived from this study is claiming the need for redesigning the PAL-ESH program with an emphasis on improving its operation by at least differentiating its implementation in rural and urban beneficiary households. For instance, in the case of rural implementation (i.e. G1 and G2), the program needs to improve quality, both in the products delivered as in the services it offers. Meanwhile, for urban implementation (i.e. for G3) it would be recommended to enhance the program´s social value through a stronger link to the community: more competitive prices and a permanent and stable offer of the 19 program products.

Certainly, increasing beneficiaries´ satisfaction of social programs will not reduce poverty directly. But, even when our model is not focused on this concern, as a final reflection, we consider that it is very necessary to include other factors into the equation as linking local food production and social supply programs, as well as, increasing the inter-institutional articulation between different governmental social programs. The redesigning of food social programs should be more efficient in reducing food poverty in Mexico, as much as, strengthening national food security and increasing sustainable local development.

We hope that this article will contribute to increase the number of studies for measuring the satisfaction of beneficiaries of government programs applying PLS-SEM as a strong and reliable method. Furthermore, future research needs to extend these models to Mexico and other Latin-American countries.

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Annex

Table A1
Main statistical descriptors for each sample: age, years of education, family income (monthly) and family food expenditure (weekly)

Descriptors		N	Mean	Standard deviation	Standard error	95% confidence interval for mean		Min	Max
						Lower Limit	Upper Limit		
Age	Group 1	1242	36.15	13.027	0.37	35.42	36.87	14	93
	Group 2	993	34.49	12.313	0.391	33.72	35.26	17	90
	Group 3	956	38.05	11.743	0.38	37.3	38.79	18	79
	Global	3191	36.2	12.505	0.221	35.77	36.64	14	93
Years of education	Group 1	1231	7.35	3.404	0.097	7.16	7.54	0	19
	Group 2	987	7.02	3.311	0.105	6.81	7.23	0	18
	Group 3	951	7.81	3.402	0.11	7.59	8.03	0	19
	Global	3169	7.39	3.388	0.06	7.27	7.5	0	19
Family income (monthly)	Group 1	1217	$2,649.68	$1,459.99	$41.85	$2,567.57	$2,731.79	$0	$10,000
	Group 2	953	$2,502.93	$1,480.99	$47.97	$2,408.78	$2,597.07	$0	$15,000
	Group 3	951	$3,409.01	$1,643.07	$53.28	$3,304.45	$3,513.57	$0	$19,200
	Global	3121	$2,836.24	$1,571.48	$28.13	$2,781.09	$2,891.40	$0	$19,200
Family food expenditure (weekly)	Group 1	1232	$450.67	$445.11	$12.68	$425.79	$475.55	$0	$7,000
	Group 2	979	$412.52	$395.29	$12.63	$387.73	$437.31	$0	$8,000
	Group 3	955	$531.54	$438.05	$14.18	$503.72	$559.36	$0	$8,000
	Global	3166	$463.27	$430.63	$7.65	$448.26	$478.27	$0	$8,000

Source: Author's own.

Table A2
Generalities on Structural Models

The method for the estimation of structural models with latent variables is known as Partial Least Squares (PLS). This is the estimation method that we use in our effort to disclose the beneficiaries' satisfaction of this food supply program.

A model of structural equations has two components defined by two systems of linear equations: the structural or inner model, and the outer or measurement model. The inner model establishes the relationships between latent variables (LV), and the outer model postulates the relationships between the LV and their manifested variables (MV). The inner model that associates latent variables is expressed by:

$$Ŋ = ŊB + \xi\Gamma + \zeta$$

(1)

Where Ŋ is a g x h matrix of endogenous LV and ξ is an h x n matrix of exogenous LV. n is the number of observations, B and Γ corresponds to unknown parameters matrixes with g x g and g x h sizes, respectively. ζ is a g x n random errors matrix. Inherent to the model are the assumptions that their stochastic components satisfy the conditions $E(\xi\zeta')=0$ and $E(Ŋ\zeta')=\zeta\zeta'$ with a g x g diagonal matrix. These assumptions imply that the model (1) satisfies the follow predictive specification:

$$E(Ŋ|Ŋ;\xi) = ŊB + \xi\Gamma$$

The inner model is a causal system with uncorrelated errors. It is also assumed that the errors associated with endogenous LV are not correlated with their corresponding predictive LV. The equations for the outer model for endogenous LV are given by:

$$y = \Gamma_y Ŋ + Ɛ$$

(2)

Where y is an $m \times n$ matrix of MV linearly related to the endogenous LV, the coefficients of this linear structure are given by the m x g matrix, Γy and $Ɛ$ is an error matrix of the outer model. The equation of the outer model for the exogenous LV defines the relations of the outer model with the exogenous MV involved in the model given by:

$$x = \Gamma_x \xi + \delta$$

(3)

Where x is a MV matrix associated with exogenous LV, Γ_x is the linear structure coefficient matrix between x; ξ and δ is the model's errors matrix.

Generally the model implies that the MV are grouped into independent blocks, each block associated with an LV. Thus, each MV is associated only with one LV. As in the inner model, the outer model satisfies the follow predictive specification:

$$E(y|Ŋ) = \Gamma_y Ŋ$$

This equation assumes that the errors of the outer model are not correlated with the LV, nor with the errors of the inner model. A fundamental feature of PLS modeling is the assumption that all information in the observable variables is obtained by LV.

PLS estimation

The outer and inner models specified in equations (1), (2) and (3), form the theoretical model of structural equations necessary to calculate the beneficiary satisfaction index. In this model, the LV, the structural coefficients of the inner model, and the components or loadings of the matrixes Γ_y y Γ_x are estimated. The process for estimating PLS involves two steps. First, the iterative estimation of LV expressed as a linear combination of the associated MV; second, the non-iterative estimation of the coefficients of the inner and outer model, for example, the endogenous LV are estimated according to:

$$\eta = W_y y$$

(4)

Where W_y denotes a g x k matrix of weights. Equation (4) defines the estimated LV as linear combinations of their associated MV. Each column in the W_y matrix contains only one nonzero input, and the weights are determined so that the estimated LV have variance equal to one. The estimated LV, η, are used in the second step of the estimation process to estimate the loadings and coefficients of the inner model using ordinary least squares. Loadings are defined as zero-order correlations between VM and their associated LV. The coefficients of the inner model are estimated by ordinary least squares applied to each ratio of the inner model separately.

The fundamental part of the PLS method is the determination of the weights that define the estimates of the LV, W_y. PLS is considered a prediction-oriented methodology since the interest is in the prediction of LV and MV by least squares. PLS is a method that does not require distributional assumptions in the random variables of the model.