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MEIOS E FINS DO DESENVOLVIMENTO: UMA ANÁLISE A PARTIR DOS AGRICULTORES FAMILIARES DE ITAPEJARA D'OESTE/PR

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ABSTRACT

Income and wealth are not always enough to express an improvement in the living conditions of a community, since many countries with a high GDP have not solved social problems such as poverty and hunger, this demonstrates the need to consider other dimensions to evaluate human well-being. Thus, for Brazilian family farming, the following question arises: which mean and end variables of development can be employed as indicators of expanding liberties and rural well-being? Therefore, we attempted to reveal the ends and means of development for a representative group of family farmers in the municipality of Itapejara d'Oeste. Surveys were carried out in the years 2005, 2010, 2015, resulting in a panel survey, allowing the establishment of descriptive statistics and inferential econometric analysis concerning the movements and constraints of end indicators (Id_{af}), such as: patrimony, income, schooling, health, succession and social relations. It is conceded that in these cases context heterogeneity exists, where assets and their strengthening can both represent expansion of development in one scenario, and retraction in another. This study indicates that not all means considered for development explain the ends, but the mean indicators that had the greatest probabilistic effect on the Idaf were: funding and investment credit, per capita income, migrations, useful agricultural area, work, education of the head of the family, social transfers and other income from work.

Keywords: Development. Heterogeneity. Well-being.

RESUMO

Renda e riqueza nem sempre são suficientes para expressar a melhoria da condição de vida de uma comunidade, muitos países com elevado PIB não resolveram seus problemas sociais de pobreza e fome, o que evidencia a necessidade de que se considere outras dimensões para avaliar o bem-estar humano. Assim, para o conjunto da agricultura familiar brasileira se pergunta: quais variáveis meio e fim do desenvolvimento podem ser empregadas como indicadores que ampliem a liberdade e a promoção do bem-estar rural? E, para tanto, procurou-se desvendar os fins e meios do desenvolvimento de um conjunto representativo de agricultores familiares do município de Itapejara d'Oeste. Tais enquetes foram realizados nos anos de 2005, 2010, 2015, e resultaram numa pesquisa em painel, que permitiu estabelecer uma estatística descritiva e uma análise inferencial econométrica acerca dos movimentos e condicionantes de indicadores fins (Idaf), como: patrimônio, renda, escolaridade, saúde, sucessão e relações sociais. Admitindo-se, nesses casos, que existe uma certa heterogeneidade de contextos, onde os ativos e o seu fortalecimento podem tanto representar expansão do desenvolvimento em um cenário, como retração em outro. Por outro lado, este estudo indica que nem todos os meios considerados para o desenvolvimento explicam os fins, e os indicadores meio que tiveram maior efeito probabilístico sobre o Idaf foram: o crédito de custeio e investimento, renda per capita, migrações, superfície agrícola útil, trabalho, escolaridade do chefe da família, e nas transferências sociais e de outras rendas do trabalho.

Palavras-chave: Desenvolvimento. Heterogeneidade. Bem-Estar.

INTRODUCTION

For many centuries, nations sought to shape their social, cultural, environmental and economic organisation around the idea of progress, where regions were classified according to their wealth. An idea abandoned, according to Sen (2000), when realising that wealth is not enough to promote the expansion of liberties, such as health and education, among other aspects related to the expansion of well-being.

A higher level of well-being requires factors that range from education, longevity and nutrition, and those that also involve complex issues, such as the quantification of happiness itself, achieved by minimising privation and allowing access to these liberties. Through expanding capabilities, individuals are able to enjoy things they consider of value, thus achieving the full development of society (SEN, 2000; SEN, 2001).

It is necessary to cover aspects beyond wealth, even if this creates an environment for the expansion of some assets. For Sen (2000, p. 34) "há também outras influências sobre as capacidades

básicas e liberdades efetivas que os indivíduos desfrutam", among them education, and health, in addition to other assets, which also generate the expansion of economic opportunities.

Wealth is worthless without enjoying happiness, quality of life or even immortality (SEN, 2001). Given this, the question is: which means and end variables of development can be used as indicators that allow the expansion of liberty and the promotion of rural well-being? The heterogeneity of contexts is conceded, where the assets and their strengthening can represent either the expansion of development in one scenario, or its retraction in another. Development is based, then, on the strengthening of levels of patrimony, income, education, health, succession and social relations.

Thus, based on Amartya Sen's theory of capabilities, the objective of this work is to raise the relationship between end resource indicators and the set of development means, for a group of family farmers from Itapejara d'Oeste/PR in the years 2005, 2010, 2015. Specifically, we aimed: 1) to compose an end indicator for the development of family farming – Id_{af} encompassing patrimony, income, health, education, social relations and succession; 2) propose, based on the literature, a set of variable means for development; 3) descriptively present the variables of the ends and means; and 4) inferentially evaluate the relationship of the means variables in explaining the proposed end indicator.

When dealing with equality, or inequity, it is required to first consider which equality is being discussed, since when a variable is selected a set of others is excluded (SEN, 2001). This is a limitation that this study incurs by choosing income, patrimony, education, migration, social assets and health as end variables, despite this limitation the analysis is relevant, as it allows the discussion of certain aspects in the expansion of well-being and development through Id_{af}.

Based on this study in a municipality in the Southwest of Paraná, we seek to find variables consistent with the theory of capabilities, using a method that can be replicated in other locations and regions to broaden the vision concerning the means and ends that promote social and economic development. By creating dialogue through interdisciplinarity, in the explaining of development, the study is aligned with the journal's scope and focus. From the point of view of the interfaces of development, an analytical environment is created to promote not only rural development, but also regional development. Therefore, the references for this analysis, the methodological procedures, results, discussions and final considerations are presented below.

THEORETICAL REFERENCE

The research, when looking at the theoretical richness of the debate on development, incurs a limitation due to the nature of this material, as it is not possible to deepen in a profound way all of the literature. A portion of the principal theoretical perceptions is portrayed in this brief reference, another part is in the methodological stages, with the construction of the means indices and the end indicator of development, and another part in the joint discussion of the results.

The central point of the literature understands that income cannot be considered as the only means to achieve well-being, it is necessary to look at the set of assets and the location during any discussion of development. Sen (1999), Sen (2000), Sen (2001) and Kuhn et al. (2006) indicate that a location, with its social, environmental, cultural, and market structure, can produce, even in situations of equality of assets, privations that differ from one context to another.

Income is one of the means to development, and alongside the expansion of health conditions, education, nutrition standards, environmental access, etc., it can lead to the expansion of liberties and quality of life, making people more complete. It is necessary, according to Furtado (1980), to look at human necessities such as housing, alimentation, life expectancy, valuing what is fundamental for one group, but considered wasteful to another.

When dealing with equality, it is always worth clarifying what equality is being discussed, since given diversity, an asset can both reflect equality in one space and inequality in another, the great challenge is to aggregate diversity into a single general indicator that creates a numerical risk regarding what is considered development. It is not always necessary to have equality in all spaces, since humans are different and live in natural and social spaces with multiple singularities, which produces divergent results for assets depending on the set of situations that affect people (SEN, 1999; SEN, 2000; SEN, 2001; KUHN et al., 200

The response of an asset depends on the set of focal variables, which both generate equality and inequality depending on the space in which they are inserted, creating, from human diversity, great differences (SEN, 2001). Rankings portray relative positions that depend on the focal variables, for example, when considering income as the focus a person may be poorly ranked in terms of inequality, but the same individual could be better positioned when considering a social, natural or another indicator.

Highlighting which inequality is discussed (focal variables) is fundamental for Sen (2001) in the debate on development, especially in a context of pluralities that already limit, alone, comparisons between regions and people with culture, ethnicity, gender, and others that are divergent, where equality in one field generates inequality in another. Metrics do not always express the real privations and their extensions, a well-nourished person with education and other attributes may suffer deprivation of their liberties not measured by the metric. Even with the limitation of the metric, it is necessary, according to Sen (1999), to establish a minimum subsistence parameter that involves biological, social and market factors, and that respects habits and cultures, thus approaching a classification of inequality.

Development should consider the expansion of liberties ranging from the simple fact of knowing how to read and write, to conditions not measured by the metric, such as the feelings and desires of what is sought, or the social constructs that create consumption patterns according to customs, cultures and regions, making measuring these privations complex. A privation that occurs even in times of plenty, as is the case of hunger, which occurs in scenarios of vast food production, where the individual, even having some assets, is prevented from accessing food, demonstrates that resources and goods are imperfect for expressing liberties and providing what the person really wants to enjoy (SEN, 1999; SEN, 2000; SEN, 2001).

In addition, assets vary from one place to another and do not always enable individuals to acquire everything, the example is health, as wealth does not always allow immortality or full health, on the other hand, some assets generate permissions that promote ease of access (SEN, 2000; ELLIS, 2000). The rationality existing for these assets is treated by Sen (2000) in three dimensions, namely: entitlements, functioning and capabilities, and requires individuals to possess a set of these three dimensions, since only one of them would create misery and privation, for example, land for agrarian reform, owning the land (title) without the functionalities (knowledge), and without the capabilities (living of the land), or possessing the capabilities without owning the land, only the complete set would overcoming the privations.

Expanding assets allows moving towards the fullness of development, but the base must be founded on a minimum level of subsistence that allows survival and basic alimentation, only then will

any other search for desires, aspirations and other liberties be considered. A subsistence influenced by markets, which dictate limitations and poverty even in environments of economic prosperity, since assets are valued by markets, creates permissions for their bearer to access basic foodstuffs, as well as health, education and other liberties (SEN, 1999; RICARDO, 1985; KUHN et al., 2006).

A social scenario surrounded by markets that produce, according to Sen (2000), both beneficial effects, in which to deny them would be to deny liberties, as well as negative effects that deny traditions, knowledge and cultures. A vision also discussed by Dussel (2005), Escobar (2015), Porto-Gonçalves (2006) and Grosfoguel (2016), who see in the markets, the fruit of modernity, forces that destroy knowledge, cultures, autonomies, reciprocities and ways of life.

Schultz (1965) considers that markets appropriate traditional forms and then label those who use this knowledge as irrational, an example being traditional farmers, who, via the promise of productivity, left their knowledge in favour of a techno-science package that consumes a higher percentage of their income and takes away their autonomy and liberties. Markets enter spaces and promote adversity, which requires a look at other rationales, such as reciprocity and redistribution that are not based on profit, but expand liberties beyond the domain of markets (POLANYI, 1980).

The greater or lesser vulnerability created by markets depends on which path is taken, which for Sen (1999) is due to the simple fact of how food is accessed. This leads to a reflection on the right to the access of food in family farming, for example, integrated pig and poultry farmers who formally cannot access the animal they raise (in the form of food, since they are treated as a *commodity*), access from the purchase in the industrialised form, is different from the subsistence farmer, with a more direct access to their produced food, it is also different for those who are more vulnerable, such as producers of a single *commodity* (soybeans), who depend on the valuation of this by the market in order to guarantee symbolic tokens (money) to purchase their food from the same market.

Commoditisation and specialisation are contrary to development, since greater liberty, even when respecting traditionality, increases liberties and advances towards development (FURTADO, 1982; SCHULTZ, 1965). The *commoditisation*, in addition to exposing farmers to the risks of price variations and subjecting them to the use of input packages, interferes, according to Escobar (2007), in the knowledge and social relations of traditional communities, labelling those who do not accept

the knowledge of modernity as ignorant.

Markets value assets, including work seen as goods, which generate greater or lesser privations for their holders. One way to expand liberties is to strengthen capabilities and assets that do not depend solely on markets, but are the result of simply belonging to a social class, ethnicity or gender, issues not measured by the metric, and which make the debate on equality complex (SEN, 1999; KUHN et al., 2006). For Sen (2001, p. 45) "ser igualitário [...] não é [...] uma característica 'unificadora'", equality in one space may create anti-equality in another space or another asset.

By reducing privation and providing basic conditions such as nutrition, well-being, and literacy creates greater liberties, advancing to a higher level of development, but it is necessary to consider the heterogeneity of the place in order to contemplate people's liberty and the multiple perceptions of development (KUHN et al., 2006; SEN, 2000). Allied to this, one should not only look at the economic, but also address social issues and the reduction of deficiencies, to include all life forms, experiences and affections that go beyond materialism (FURTADO, 1980; GUDYNAS, 2011)

Beyond this debate, there exists the critique of development itself, a critique of the current model that is based on a fuller understanding of what development is, and considers that the world is full of epistemes based on ontologies, perceptions, understandings and worldviews. Different ways of interpreting, which depart from the logic presented by modernity, and deny, according to Dussel (2005), the diversity of visions, peoples and cultures.

The hegemonic and unique form of the world classifies regions as underdeveloped and developed, and denies the diversity of thinking, seeing, acting, culture and knowledge, which already disqualifies this model in terms of full development. It forces mass movement of peoples, generating massacres and appropriations of territories in the name of development and progress, which is questionable for the simple fact of denying other forms of life that could also express development conditions (DUSSEL, 2005; ESCOBAR, 2015).

The initial step to think about development requires the valuing of the different forms of life with respect to knowledge and differences, breaking with single thought. It must go beyond the economic and involve good living, respect for cultures, peoples, traditions, knowledge and other attributes of the place, in addition to removing duality and the right of domination over another,

created from the path of universality of development, local and not global thinking (PORTO-GONÇALVES, 2006; ESCOBAR, 2015; GROSFOGUEL, 2016).

The development model does not fulfil its promise to reduce poverty and inequality, and has even elevated these problems since many spaces have not develop (ARGUETA, 2015; QUIJANO, 2014). The criticism reflects the need to value the territory, the pluriverse, worldviews and ontologies, encompassing the multiple territorialities of biophysical, epistemic, multicultural spaces and for globality not globalisation.

Perceiving the alternatives and not limiting oneself only to the given model is respecting other perceptions of the world and epistemes that recognise the "otherness", this acknowledgment of various worlds makes it possible to construct a deeper form of what development would actually be. A perception that appears at this moment, for this research, as the main shortcoming, since it will not be possible to advance all the points raised by the critique.

METHODOLOGICAL PROCEDURES

The methodological step seeks to approximate means variables around an end variable of development, and from Sen (2001) to question about the "igualdade de que?". Focal variables produce divergent results, for example, greater patrimony reflects both greater well-being, the result of a lifetime of work by the farmer, as it represents sadness, when their children leave in search of opportunities, leaving everything that was built, the same applies to the years of study, that not only brings new knowledge to the service of the family nucleus, but also leads to the departure of members of the establishment in search of work relocation.

The scenario is diverse and even with these response limitations of the variables, an index of development of family farming is proposed – the Id_{af} (end variable) and, a set of mean variables (17 in total) for development. The data form a bank of 95 cases for the years 2005, 2010, and 2015 in the municipality of Itapejara d'Oeste/PR (panel data), are part of research projects, namely: in 2005, "Mercantilização e modos de vida rural no Sudoeste do Paraná" funded by the Municipality of Itapejara d'Oeste/PR; "Estratégias de diversificação dos meios de vida dos agricultores familiares do Município de Itapejara d'Oeste (PR) entre 2005 e 2010", funded by universal public call 14/2011 of

the National Council for Scientific and Technological Development – CNPq; and, in 2015, "Agricultura familiar, desenvolvimento local e pluriatividade: a emergência de uma nova ruralidade no Brasil", financed by the Federal Technological University of Paraná – UTFPR and the Institute of Rural Development of Paraná (IDR-Paraná). The Id_{af}, equation 1, was proposed by considering what would be valuable and what would expand the farmer's liberties.

$$Id_{af} = \frac{(\sum N_p + N_{rt} + N_e + S_s + Is + N_S)}{6} \quad (1)$$

Where:

Id_{af}, = Family farming development indicator; N_p = level of family wealth; N_{rt} = total income level of the family establishment; N_e = education index; S_s = succession index; Is = social index; Ns = level of health.

The Id_{af} was measured using the arithmetic mean of the six dimensions obtained from the families, on a scale from 0 (zero) to 1 (one). Closer to 1 (one) indicates families with a higher level of development, due to the availability of attributes of wealth, total income, education, succession, social aspects and health, and the closer to 0 (zero) indicates those with a lesser level of these attributes. It is conceded, according to Kuhn et al. (2006), that the simple mean may not evaluate the balance of values, and it is preferable to use the harmonic mean, however, the existence of null values (zero) in some establishments for some of the dimensions, made the calculation of the harmonic mean unfeasible.

One of the components of the index is N_p, which records the level of family patrimony, its calculation is given by: $N_p = \left\{1 - \left[\frac{ValorSuperior - ValorBase}{ValorSuperior - ValorInferior}\right]\right\}$. The calculation makes the relationship between the highest and lowest value in terms of the value presented by an establishment *x*, therefore, the highest value will be scored with 1 and the lowest value with 0, this choice seeks to contemplate the heterogeneity of each context, perceiving the patrimony structure of the region, a method that is consistent with Sen's (2000) theory, since it considers local aspects.

Many farmers build patrimony as a life goal, while others dispose of it, which leads to the belief that not all attribute patrimony as an end goal, while selling and moving closer to the city and children (in a smaller establishment), becomes the motivation that generates happiness and well-

being. To balance this, the total income indicator (N_{rt}) varying between 0 and 1 was contemplated, with the same calculation methodology given for N_p.

In a third way, Sen (2000) and Sen (2001) deal with the simple fact that people have the ability to read and write. In this regard, an education dimension (N_e) was proposed, the calculation involves the sum of the proportion of people over 18 years of age who have completed high school (weight 25%), and the average number of years of education for residents aged over 14 years old (weight 75%), both expressed on a scale from 0 to 1 with the same calculation criteria used for N_p.

Another dilemma faced in agriculture is the lack of successors to take over the establishment when the patriarchs reach an advanced age, having a successor represents to the patriarch the continuity of everything they have built. Therefore, a succession variable (S_s) is proposed that varies between 0 and 1, where: 1 is for completed succession; 0.66667 is for definite succession; 0.33333 is for cases where the succession is undefined; and 0 where there is no successor.

Social relationships form the fifth dimension of the Id_{af}, reflecting what Escobar (2007) treats as feelings of belonging that maintain identities and create social ties, whereas Sen (2001) sees the opportunities that open up when belonging to a social group. The social index - I_s, was measured in the respondents' responses about participation in associations, clubs, cooperatives, unions, and other such establishments in the community, it is given on a scale of 0 to 1 and calculated by: $I_s = \left\{1 - \left[\frac{7-ValorBase}{7}\right]\right\}$, the base value being the score received, which can reach 7 points.

Finally, the sixth dimension contemplates the minimum conditions for access to health, as discussed in Kuhn et al. (2006), Sen (2000) and Sen (2001). Although the research instrument did not collect enhanced information, it was possible to identify vectors that generate diseases, such as: type of toilet; forms of disposal of human waste; and forms of access to water, which were scaled according to the level of health (Ns) ranging from 0 to 1. Dealing with the calculation of the Id_{af} the second step identified possible means that lead to development, 17 variables were accepted.

Three of these mean variables are attributed to public funding, discussed in Sen (2000) as a mechanism for improving quality of life. The first one is the $Prop_{Rtrs}$ given as the proportion of income from social transfers in terms of total income. Two others reflect resources (mostly from Pronaf) for agricultural funding (P_{Cust}) and investment (P_{Inv}) credit, both on a scale of 0 to 1, with a

calculation similar to that already presented for N_p.

The next six variables are based on Sen (1999) who, when dealing with poverty, considered aspects ranging from the external environment (climate and economic issues), to the measurement of poverty, where the author proposes the poverty indicator *P*. With the understanding that in agriculture climatic factors are important for prosperity, the mean variable lnI_{plu} was used, which consists of the Napierian logarithm of rainfall in Itapejara d'Oeste/PR, measured by SEMA (2020), for the agricultural harvests of 2004/2005; 2009/2010 and 2014/2015.

Regarding the economic aspects, Sen (1999) understands that prosperity and/or recession can leave entire populations at the mercy of a lack of food, since goods flow to areas with greater capital. The exchange rate ($lnCamb$) extracted from Bacen (2020) was expressed in the Naperian logarithm of the average exchange rate (buying and selling) of the dollar during the agricultural harvest (winter to autumn), it was considered due to the commodification of agriculture and the dependence on inputs quoted in US dollars.

The dynamism of the economy of Itapejara d'Oeste/PR in terms of its GDP was expressed both by $VM_{PIB_{agro}}$, which expresses the positive and negative variations in agricultural wealth in the period before and after the years 2005, 2010 and 2015, as well as the scalar variable E_C that measures the scenarios of economic dynamism of the municipality, where: 1 is for years of economic crisis; 2 is for mixed periods between recession and growth; and 3 is for years with economic growth. Data on economic activity were obtained from IBGE (2019a) and inflated for 2015 (last year of the series) using the IPCA (IBGE, 2019b).

In proposing the *P* indicator, Sen (1999) states that the guarantee of basic elements of survival, combined with the reduction of inequalities and poverty, can generate well-being. Thus, two mean variables were calculated, these being: P_{per} as the proportion of total per capita income in relation to the average total per capita income of the group; and *P* as the poverty indicator. The *P* indicator corresponds to a single indicator for the entire group in that agricultural season, therefore, the P_{per} is a proxy for the poverty proportion of the establishment.

The calculation of the poverty indicator *P* is given by $P = H\{I + (1 - I)G\}$, where *H* is the proportion of people in privation relative to the poverty line; *I* is the absolute proportion of earnings

in relation to this threshold; and *G* is the Gini index (SEN, 1999). The value of USD $ 3.20 per day, given by The Word Bank (2018) for countries with lower middle income, was considered as the poverty threshold. The exchange rate was obtained from Bacen (2020) for the period from June 7, 2015 to September 8, 2015 – period of application of the survey in 2015, since the data for the 2005 and 2010 harvests had already been corrected by the IPCA. The Gini index (G) considered was that of Itapejara d'Oeste/PR and obtained from DataSus (2020).

For Sen (2000), Sen (1999), Polanyi (1980) and Granovetter (2007), family relationships with the market create vulnerabilities and even influence the way of life of individuals. The dependence of agriculture on the market occurs both in the production of commodities, quoted on the stock exchange, and in the use of inputs, both remove liberties and condition the farmer to market logic, on the other hand, self-consumption strategies allow expanding independence, at least with food for subsistence. In this aspect, the mean variables are: the proportion of technological package expenses (P_{CI}) compared with the total gross product; and P_{AC} as the proportion of self-consumption to the establishment's per capita subsistence level. The subsistence level is given by The Word Bank (2018) as USD$1.90/day, and a higher P_{AC} reflects the ability to provide basic food, strengthening wellness strategies.

The next mean variable is based on Kuhn et al. (2006) and seeks to deal with the autonomy of cases in terms of income obtained from work. The P_A is considered the proportion of income from work compared to total income. In another dimension of means, Sen (2001) understands that the exodus both approaches and distances from a broader development. In rural areas, emigration occurs both by survival and by accumulation, which leads to two variables, which are: M_S emigration *dummy* variable in the sense of survival, with 1 for cases that recorded the departure of individuals who did not have at least high school education; and M_{AC} as a dummy being 1 for cases that recorded exits where individuals had completed high school. An inverse relationship is expected between the indicator and the M_S, and a positive relationship with the M_{AC}.

Finally, from Lima et al. (1995) and of the INCRA/FAO Agreement (2011) three mean variables were treated, where: $lnSAU$, is the Napierian logarithm of the useful agricultural area, that is, the amount of land useful for agriculture and/or livestock; E_{chf} is the education in years of the head of

the family; and UTH_T (human work unit), which is assigned 1 for every 300 working days, respecting the proportions of age and full-time or part-time work.

Data were initially analysed descriptively, in which the exposition separated the Id_{af} into groups and subgroups based on the use of Markov processes, which measure or estimate the changes from one state to another in time. They allow, through the Markov chain, to propose a probability tree to follow a sequence of trajectories from the initial position (2005) of the indicator (BOLDRINI et al., 1980; SIMON; BLUME, 2004; CHIANG; WAINWRIGHT, 2006).

The trajectories identified in the Markov chain, point to two macro groups: the first in which the Id_{af} closes with growth the period from 2005 to 2015, formed by three trajectories, namely: the Id_{af} increases from 2005 to 2010, and increases from 2010 to 2015; another with increase (2005/10) and reduction (2010/15); and reduction (2005/10) and increase (2010/15). The second macro group reflects a reduction in the Id_{af} from 2005 to 2015, also with three trajectories, where: reduction (2005/10) and reduction (2010/15); reduction (2005/10) and increase (2010/15); and increase (2005/10) and decrease (2010/15). Each group and subgroup was analysed via descriptive statistics, describing the variables, in a panel, in terms of rates, percentages and tables.

Next employed was the econometric model, equation 2, which allowed inferences to be made that identify the means that lead to development (Id_{af}).

$$Id_{af_{it}} = \alpha_0 + \beta_1 Prop_{Rtrs_{it}} + \beta_2 P_{Cust_{it}} + \beta_3 P_{v_{it}} + \beta_4 P_{per_{it}} + \beta_5 P_{A_{it}} + \beta_6 M_{Ac_{it}} + \beta_7 lnSAU_{it} + \beta_8 E_{chf_{it}} + \beta_9 UTH_{T_{it}} + \mu_{i,t} \quad (2)$$

Where:

Id_{af} = Explained variable, index of development of family agriculture, encompassing patrimony, total income, education, succession, social relations and health;

α = Constant or intercept, fraction of the Id_{af} that is not explained by the independents;

$\beta_1; \beta_2 \dots \beta_n$ = Parameters relating to the weight exerted by the explanatory variable on the explained variable;

P_{Cust} = Level of access to agricultural funding credit, with 0 for cases without access and 1 for the highest volume of funds obtained among the 95 cases in that year;

P_{Inv} = Level of access to agricultural investment credit, with 0 for cases without access and 1 for the highest volume of funds obtained among the 95 cases in that year;

P_{per} = Proportion of the establishment's per capita income in relation to the average of the

total per capita income of the 95 cases;

P_A = Proportion of the establishments autonomy in terms of labour income in relation to total income;

M_{Ac} = Dummy variable, being 1 (one) for establishments that registered migration of members with at least high school education, and 0 (zero) for other cases;

$lnSAU$ = Napierian logarithm of the useful agricultural area – SAU;

E_{chf} = Education in years of the declared head of the family;

UTH_T = Total human work unit - UTH of the establishment, one UTH for every 300 days worked at the establishment;

i = Corresponds to the *i-th* cross-sectional unit, in this case, the 95 families;

t = indicates the *t-th* period of time, related to the observations of 2005, 2010 and 2015;

$\mu_{i,t}$ = Error term (residual).

The Id_{af}, by definition of equation 1, is a composite indicator that represents development, and, by itself, is sufficient to treat development as an "end". As the objective of the study also proposes to identify the "means" that generate development, equation 2 is expected to identify the positive/negative relationship of each explanatory "means" variable over the explained "end".

A first test ran the model of the dependent Id_{af} as explained by all the variables described in the methodological step. After identifying the significant variables at the 5% level, the model was run again – equation 2 that excludes variables without significance and with perfect collinearity as indicated by the gretl software, seeking a brief presentation of the data necessary in a study of this nature. Perfect collinearity stems from the limitation of the database, some variables have the same values for all cases, such as the exchange rate, rainfall and GDP (economic dynamism).

The database forms a data panel, which combines the characteristics of time series data and cutoff data according to Gujarati (2006), a characteristic present in the database, with 95 cases followed for three time periods (2005, 2010 and 2015). Wooldridge (2016) admits three possible results in panel models, which are: Fixed Effects, Random Effects and Pooled, depending on the Chow, Hausman and Breuch-Pagan tests. The tests indicated the Pooled result with constant angular coefficients and intercept over time and between individuals. The model was run with corrected heteroscedasticity.

RESULT AND DISCUSSION

For a long time societies turned only to the idea of progress, without reflecting on the well-being of the population, it is necessary to take a closer look at what is really important to human beings. A discussion of equality, which according to Sen (2000), should consider which equality is being discussed, and no matter how large the number of variables the choice will always involve arbitrariness. The equality considered is the Id_{af}, which includes patrimony, income, health and social indicators, succession and education, Table 1 summarises the descriptive statistics of these means variables and the Id_{af} as the end of the development.

The behaviour of the Id_{af} indicates a 5.56% reduction of the index between 2005 and 2015, it is noted that among its dimensions the level of patrimony and health regressed by 0.8% during the period, as succession and the social indicator remained stable. The most pronounced fall was in the proportion of total income, which regressed by 42.2% indicating a greater concentration of income over time, education was the only dimension that grew (7.6%).

Regarding the mean variables to development, social transfers increased 2.73% in the average proportion in relation to total income, a fact that reflects population aging, which is even visible on the national scene, the IBGE (2018) projected an increase in seniors of 18% between 2012 and 2017. Another fact is the emigration of young people and the lack of succession, which compromises other incomes and emphasises the participation of social transfers. In 25.27% of the cases there was no successor, in 12.63% a successor was yet to be defined, in 42.10% a successor had already been defined, and in only 20% of succession had already occurred.

Table 1 | Descriptive statistics of the contemplated variables

Year	2005			2010			2015			Δ% 2005/2015
Variable	Média	Standard deviation	CV	Mean	Standard deviation	CV	Mean	Standard deviation	CV	
Id_{af}	0,451	0,099	0,221	0,421	0,117	0,278	0,426	0,128	0,302	-0,056
$Prop_{Rtrs}$	0,058	1,712	29,698	0,278	0,589	2,119	0,215	0,237	1,104	2,729
P_{Cust}	0,086	0,202	2,351	0,044	0,138	3,139	0,027	0,128	4,658	-0,681
P_{Inv}	0,064	0,135	2,107	0,097	0,175	1,808	0,112	0,197	1,769	0,740
lnI_{piu}	7,536	0,000	0,000	7,821	0,000	0,000	7,845	0,000	0,000	0,041
$lnCamb$	1,013	0,000	0,000	0,591	0,000	0,000	0,976	0,000	0,000	-0,036
$VM_{PIB_{agro}}$	-0,285	0,000	0,000	0,145	0,000	0,000	-0,007	0,000	0,000	-0,974
E_C	1,000	0,000	0,000	3,000	0,000	0,000	2,000	0,000	0,000	1,000
P_{per}	1,000	2,035	2,035	1,000	1,127	1,127	1,000	0,910	0,910	0,000
P	0,191	0,000	0,000	0,062	0,000	0,000	0,010	0,000	0,000	-0,946
P_{CI}	0,824	0,632	0,768	0,572	0,716	1,252	0,410	0,230	0,561	-0,502
P_{AC}	0,122	0,119	0,977	0,070	0,084	1,214	0,187	0,191	1,022	0,533
P_A	0,922	1,746	1,894	0,655	0,609	0,930	0,717	0,290	0,404	-0,222
M_S	0,095	0,294	3,108	0,211	0,410	1,947	0,347	0,479	1,378	2,667
M_{AC}	0,084	0,279	3,315	0,200	0,402	2,011	0,316	0,467	1,480	2,750
$lnSAU$	2,663	1,152	0,433	2,312	1,257	0,544	2,313	1,383	0,598	-0,131
E_{chf}	4,779	2,787	0,583	5,263	3,078	0,585	5,895	3,532	0,599	0,233
UTH_T	3,532	1,410	0,399	2,502	1,235	0,494	2,411	1,220	0,506	-0,317

Source: Research Data

Regarding emigration, in 2005 there were nine establishments with records of people leaving with incomplete secondary education, increasing to 33 cases in 2015 (variation of 266.7%), whereas the number of people with completed secondary education who left before 2005 was eight cases, jumping to 30 in 2015 (275% increase). The scenario of succession, social transfers and emigration affects labour income - P_A (ownership autonomy), which led to a 22.2% reduction in P_A, from 84.96% in 2005 to 78.58% in 2015, a fact that naturally raised the average proportion of $Prop_{Rtrs}$, which went from 13.28% in 2005 to 15.95% in 2015.

For public policies, two contrasting scenarios were found, in which, on the one hand, there was a 6.81% reduction in the proportion of agricultural funding credit, and on the other, a 7.4% increase in the proportion of investments. Although the financial volume increased from 2005 to 2015 (111.55% in funding and 100.29% in investments), there was a reduction in beneficiaries, the percentage of establishments without access to funding rose from 30.52% to 46.31%, and for investment, access that was 40% in 2005 fell to 17.89% in 2015.

Regarding the external variables, the rainfall index increased from 144.19mm rainfall per monthly in 2005, to 191.65 in 2010 and 196.4 in 2015 (growth of 32.9% from 2005-2010 and 0.5% from 2010- 2015). The exchange rate that influences the price formation of inputs and agricultural commodities, went from R$ 2.75 to R$ 1.80 and then to R$ 2.65 in 2005, 2010 and 2015, a reduction of 34.43% between 2005-2010, and an increase of 47.06% from 2010-2015.

Regarding the wealth of Itapejara d'Oeste, both the agricultural and total GDP presented a strong negative variation between 2004-2005 and 2005-2006, indicating a period of crisis. For 2009-2010 and 2010-2011 there was a positive variation in the agricultural GDP, but the total GDP suffered a negative variation between 2009-2010, however it closed 2009-2011 with a positive balance, marking the period as one of growth. Between 2013-2014 and 2014-2015 there was a small negative variation in agricultural and total GDP, and due to its proportion it was labelled as in recovery.

The next two indicators measured family poverty, through the proportion of total per capita income P_{per} and the poverty indicator *P*. It was evident that there was no variation in the average proportion of per capita income P_{per}, but in terms of the poverty indicator *P* there was a significant improvement of 94.6% between 2005 and 2015, which indicates that a greater percentage of establishments now have income above the poverty line of USD $ 3.20.

As for inputs, the period recorded a negative variation of 50.2% between the average of 2005 and 2015. In 2005, of the total gross production, 46.62% was destined for intermediate consumption, rising to 49.59 % in 2015. The proportion of self-consumption in relation to the subsistence threshold (USD $ 1.90) showed an increase of 53.3% when comparing the average between 2005 and 2015, but the total volume, in financial terms of self-consumption, decreased by 20%.

Finally, the useful area reduced between 2005-2015, from 2,485.17 hectares (ha) to 2,186.97, indicating the possibility that areas were sold, a scenario that may reflect the unit of human work that fell from 335.55 UTH in 2005 (100,665 days) to 229.02 UTH (68,704.75 days) in 2015. On the other hand, the education of the head of the family increased by an average of 23.35%, where the average number of years of study increased from 4.78 years in 2005 to 5.89 years in 2015. The descriptive data highlighted two large groups and six subgroups of Id_{af}, see Table 2.

For 75.79% of the cases the Id_{af} regressed over the period, and for 24.21% there was an expansion. Regarding the subgroups, the index reduced for all years in 28 cases; in 38 cases there was a reduction followed by an increase, closing the period as negative; in six cases there was an increase followed by a decrease, closing the period negative; 10 cases were there was only positive variations for Id_{af}; six cases started with an increase followed by a reduction and ended with a positive variation; and there were seven cases with a reduction in the indicator from 2005 to 2010, but this was reversed with growth from 2010 to 2015, closing with a positive variation. The diversity of Id_{af} behaviour requires the understanding of the behaviour of each variable within each subgroup, as detailed in Tables 3 and 4.

Table 2 | Grouping of cases in relation to variations in the Id_{af}between 2005, 2010 and 2015

GROUP	SUBGROUP	% CASES	2005/2010	2010/2015	BALANCE
01	01	29,47%	Reduction	Reduction	Negative
	02	40,00%	Reduction	Increase	Negative
	03	6,32%	Increase	Reduction	Negative
02	04	10,53%	Increase	Increase	Positive
	05	6,32%	Increase	Reduction	Positive
	06	7,37%	Reduction	Increase	Positive

Note: The groups and subgroups were identified from the Markov chains with the probability tree that allows the following of sequence trajectories from the initial position of the index, as highlighted in the methodological stage.
Source: Research Data

Tables 3 and 4 show the mean and percentage variation of the subgroups already shown in Table 1. Data in red indicate that the variation in the subgroup was lower than the general mean, in blue the variation was higher and in black the value was equal to the general mean. Due to the limitations of the extent of this material, the analysis was performed for the variation of the period (2005-2015), with no partial analysis for the periods (2005-2010 and 2010-2015).

Table 3 | Mean behaviour of variables in each subgroup, period from 2005 to 2015

Year	2005						2015					
Subgroup	1	2	3	4	5	6	1	2	3	4	5	6
Id_{af}	0,437	0,444	0,406	0,542	0,456	0,443	0,373	0,402	0,381	0,632	0,466	0,477
$Prop_{Rtrs}$	0,183	0,445	-1,037	-1,385	-0,020	0,518	0,269	0,252	0,264	0,027	0,082	0,142
P_{Cust}	0,007	0,055	0,229	0,368	0,120	0,016	0,007	0,007	0,026	0,173	0,014	0,026
P_{Inv}	0,035	0,037	0,116	0,245	0,045	0,040	0,045	0,077	0,117	0,423	0,178	0,058
lnI_{piu}	7,536	7,536	7,536	7,536	7,536	7,536	7,845	7,845	7,845	7,845	7,845	7,845
$lnCamb$	1,013	1,013	1,013	1,013	1,013	1,013	0,976	0,976	0,976	0,976	0,976	0,976
$VM_{PIB_{agro}}$	-0,285	-0,285	-0,285	-0,285	-0,285	-0,285	-0,007	-0,007	-0,007	-0,007	-0,007	-0,007
E_C	1,000	1,000	1,000	1,000	1,000	1,000	2,000	2,000	2,000	2,000	2,000	2,000
P_{per}	1,523	1,175	1,178	-0,527	0,363	0,537	0,699	0,730	0,949	2,592	0,979	1,459
P	0,191	0,191	0,191	0,191	0,191	0,191	0,010	0,010	0,010	0,010	0,010	0,010
P_{CI}	0,891	0,718	0,818	0,948	0,877	0,910	0,398	0,464	0,250	0,407	0,377	0,340
P_{AC}	0,096	0,147	0,116	0,094	0,070	0,182	0,165	0,166	0,208	0,274	0,181	0,253
P_A	0,738	0,537	2,017	2,385	1,216	0,470	0,632	0,691	0,587	0,944	0,885	0,845
M_S	0,143	0,105	0,000	0,100	0,000	0,000	0,357	0,368	0,500	0,300	0,500	0,000
M_{AC}	0,071	0,053	0,000	0,200	0,167	0,143	0,250	0,289	0,333	0,400	0,333	0,571
$lnSAU$	2,264	2,555	3,199	3,793	3,356	2,171	1,938	2,118	1,689	3,954	3,160	2,331
E_{chf}	4,821	4,368	4,500	6,000	5,833	4,429	5,000	5,632	6,667	8,700	5,333	6,714
UTH_T	3,139	3,614	3,180	4,032	4,700	3,247	2,263	2,190	1,724	2,901	3,961	2,758

Source: Research Data

For 2005, when considering the group where the Id_{af} receded, 44.44% of the variables presented values below the general mean and 27.77% above, whereas in the group in which the indicator grew it was more frequent that the variables presented higher values to the general mean (42.59% against 29.63%). In the 2015 scenario, the trend intensifies, and the group with a reduction in the Id_{af} had a higher frequency of values below the general mean, 51.85%, compared with 20.37% of cases above, and in the group where the indicator evolved, there was a frequency of 50% of the mean variables presenting a mean higher than the general mean, against 22.22% of those that were below this mean.

The descriptive analysis indicates a higher frequency of values below the general mean in the subgroups where the index had a regression, whereas in the subgroups where the Id_{af} grew it was more frequent that the means of the mean variables were above the general mean, something that denotes the relationship between the mean variables and the end variable. However, it is only a descriptive perception that considers the subgroup mean in relation to the total mean, bearing in mind that some mean variables of development presented means higher than the general mean even in subgroups where the Id_{af} receded over the period. Table 4 complements the changes for the period.

Table 4 | Variation between the period from 2005 to 2015 in the mean values of the variables

Year	Δ% between 2005 and 2015					
Subgroup	1	2	3	4	5	6
Id_{af}	-14,73%	-9,61%	-6,13%	16,46%	2,30%	7,69%
$Prop_{Rtrs}$	46,93%	-43,53%	-125,47%	-101,94%	-501,82%	-72,56%
P_{Cust}	-8,16%	-86,85%	-88,82%	-53,11%	-88,31%	68,66%
P_{Inv}	28,33%	108,16%	0,70%	72,78%	294,08%	43,53%
lnI_{plu}	4,10%	4,10%	4,10%	4,10%	4,10%	4,10%
$lnCamb$	-3,59%	-3,59%	-3,59%	-3,59%	-3,59%	-3,59%
$VM_{PIB_{agro}}$	-97,39%	-97,39%	-97,39%	-97,39%	-97,39%	-97,39%
E_C	100,00%	100,00%	100,00%	100,00%	100,00%	100,00%
P_{per}	-54,08%	-37,89%	-19,40%	-591,46%	169,42%	171,74%
P	-94,55%	-94,55%	-94,55%	-94,55%	-94,55%	-94,55%
P_{CI}	-55,38%	-35,35%	-69,40%	-57,10%	-57,05%	-62,59%
P_{AC}	72,08%	13,06%	79,33%	192,40%	158,66%	39,08%
P_A	-14,30%	28,81%	-70,92%	-60,42%	-27,19%	79,90%
M_S	150,00%	250,00%	--	200,00%	--	--
M_{AC}	250,00%	450,00%	--	100,00%	100,00%	300,00%
$lnSAU$	-14,40%	-17,10%	-47,21%	4,26%	-5,84%	7,36%
E_{chf}	3,70%	28,92%	48,15%	45,00%	-8,57%	51,61%
UTH_T	-27,92%	-39,39%	-45,80%	-28,04%	-15,73%	-15,05%

Source: Research Data

The data in Table 4 indicate that between 2005 and 2015, in the subgroups where the Id_{af} receded, only 29.63% of the frequencies had a variation higher than the average aggregate variation, and a lower percentage compared with the subgroups where Id_{af} had evolved (31.48% of the frequencies above the aggregated mean in these subgroups). This indicates the need to test, from the model described in equation 2 above, the inferential relationship between the mean variables for the development with the Id_{af}, see Table 5.

Table 5 shows only the variables significant at 5%, indicating that not all means treated in the methodological stage explained the Id_{af} in the investigated scenario. Some variables such as the $VM_{PIB_{agro}}$, the E_C, and the poverty indicator *P* were excluded by the gretl software because they presented perfect collinearity. Variables such as the rainfall index; the exchange rate; the proportion of intermediate consumption; the proportion of self-consumption in relation to the poverty line, and migration related to education below high school were not significant at the 5% minimum error level, although the direction of the relationship was as expected.

These are important variables for Sen (1999), Sen (2000), Polanyi (1980) and Granovetter (2007) in the expansion of well-being and development. Sen (1999) points out that factors such as climatic, macroeconomic (inflation and policies), microeconomic (restrictions), in addition to speculative aspects contribute to the analysis of development, as they may represent restrictions and expose populations to vulnerabilities. Markets should also be investigated further, as they generate risks, dependencies and reduce liberties.

Table 5 | Parameters of the explanatory effect between the dependent variable Id_{af} and the mean variables of development

Results of the Model				
Variable	**Coeficiente**	**Standard error**	**t-ratio**	**p-value**
α	0,26987	0,02769	9,74470	0,00000
$Prop_{Rtrs}$	-0,06829	0,02974	-2,29616	0,02242
P_{Cust}	0,10706	0,03792	2,82341	0,00510
P_{Inv}	0,13430	0,02861	4,69433	0,00000
P_{per}	0,01821	0,00335	5,42952	0,00000
P_A	-0,06747	0,02915	-2,31468	0,02137
M_{Ac}	0,02889	0,00877	3,29342	0,00112
$lnSAU$	0,02319	0,00461	5,02698	0,00000
E_{chf}	0,00816	0,00146	5,57943	0,00000
UTH_T	0,03064	0,00363	8,44998	0,00000
R^2: 0,61911			F (9, 274): 49,48536	
R^2 adjusted: 0,60660			p-value (F): 0,00000	

Note: The parameters presented in the Table derive from equation 2, presented earlier, which identified and excluded non-significant variables in a first regression containing all the variables indicated in the methodological stage. The results expressed here derive from the model run only for the variables with a minimum significance of 5%.

Source: Research Data

Of the variables that influence the Id_{af}, the effect of social transfers indicates that an increase of 0.1 points in the proportion (10%) leads to a reduction of 0.069 points to the development indicator (5% significance). This fact is in line with expectations, since properties that are more dependent on social transfers reflect families whose expectations and income from work are increasingly limited, together with a lack of successors.

Regarding the credit that reflects public policies, both the P_{Cust} and the P_{Inv} were highly significant at 1%, therefore, for each increase of 0.1 points in the proportion of agricultural funding, the P_{Inv} increased by 0.107 points, however, for each variation of 0.1 points in the proportion of investment credit, there is a variation of 0.134 points in the proposed indicator.

In terms of poverty, Sen (1999) proposes the poverty indicator *P*, which presented perfect collinearity as it is a single indicator for all cases. A proxy for this indicator for each establishment was calculated using the P_{per}, and the data indicate, at the 1% level, that for every 0.1 point of variation in the proportion of per capita income in terms of mean total per capita income, for a variation of 0.018 in Id_{af}.

The proportion of income from work in terms of total income P_A showed a divergent effect from what was expected, since Kuhn et al. (2006) related this autonomy with development. The results (5% significance) indicate that an increase of 0.1 points in P_A leads to a reduction (inverse effect) of 0.067 points in the proposed index, in that greater independence of labour income does not increase the development index. A finding that is still in line with Sen (2001) who recognises for the various means that lead to a certain end, where income cannot be treated as the only means for development, because different characteristics of each being, (age, intellectual capacities, physical strength, gender, ethnicity, etc.) are issues that open or close doors and make beings the way they are.

As for the exodus, this can either approach or distance from a level of expansion of development (SEN, 2001). Thus, emigration was separated in terms of survival – migrants without secondary education (not significant in the study), and in terms of enhancing their capacities – individual with at least secondary education where the chances of being placed in the job market outside the rural areas are more positive. In this case, the results (1% significance) indicate that properties that have rural emigration of members with at least high school education have reflected in their development indicator an increase of 0.029 points.

Finally, the logarithm of the useful agricultural area demonstrates a positive relationship, and for each variation of 1% there is a variation of 0.0002319 points in the index, indicating that the increase in the SAU contributes to the expansion of the Id_{af}. The level of schooling of the head of the family shows that with each additional year of education there is an increase of 0.00816 in the development index. Further to this, from the aspect of the availability of the workforce of the establishments, it was noted that every additional unit of work the Id_{af} increases by 0.03064, all three were significant at 1%.

FINAL CONSIDERATIONS

The debate translates the multiplicity of characteristics that surround societies and individuals, specificities that are reflected in well-being and happiness that often go beyond a numerical context of analysis. The simple fact of trying to measure happiness is complex, given the diversity of reasons that people consider to be happy.

Above all, it reaffirms that income is not the only means of development, other means lead to well-being, it is necessary, due to diversity, to always question what equality is being discussed, when establishing criteria for scaling development, as individuals can be labelled as undeveloped in terms of a certain variable, but highly capable and with liberties in others.

This is the main limitation of the study, since by establishing the Id_{af} as a development indicator that brought together patrimony, income, education, succession, health and social relationships (focal variables) it left aside important aspects considered by groups or individuals in their stages of development. Nevertheless, an initial step was taken, seeking to understand how the analysed cases behave in terms of the end indicator (Id_{af}).

The explanation of an end indicator can be given from numerous aspects, including a variable, for example, emigration, can represent both the expansion of quality of life and greater well-being for some farmers, but, at the same time, it may represent a survival option that will not always reflect an improvement in the quality of life for others. Once again, Sen (2001) warns about scenario heterogeneity.

Not all the proposed variables explained the end variable, which demands new analysis scenarios that may reaffirm or oppose the results, for examples the rainfall index, the poverty index *P*, the effects of policies, the scenario of economic and markets, important variables in the literature, but in this study did not show an effect. Allied to this, it is understood there is a need to relate the mean variables to each of the dimensions of the Id_{af}.

On the other hand, the effect of some mean variables that expand the levels of patrimony, income, education, succession, health and social relations is evident, a set that can represent to farmers the expansion of their well-being and quality of life. In terms of effect on the proposed indicator, credit for agricultural funding and investment stood out, followed by the human labour unit, the migration of members with at least high school education, the per capita proportion of total income, followed by the

head of the family's education and finally the useful agricultural area. Two variables lead to reductions in the indicator, namely, the proportion of income from social transfers, and the proportion of autonomy from work income.

The relevance of this study in the microeconomic discrimination of family farmers in Itapejara d'Oeste/PR is highlighted, with means attributes that promote the expansion of the well-being of these families being found. It is indispensable that new studies be promoted in other regions, and for more than one period, to demonstrate the heterogeneity or grammar of the development of these groups.

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