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DETERMINANTS OF CONSUMERS' DEMAND OF FOODS IN BULGARIA

The results of an empiric analysis of consumers' behaviour regarding the demand of foods in Bulgaria are presented here. The principles of income distribution in home budgets in respect to food expenditures are established on the basis of a regression- and co-relation analysis. A tree of preferences is outlined which details consumers motivations and describes the cause and effect chain of demand.

JEL: D12; Q11

The determination of total consumers' demand of foodstuffs[1] as a process presupposes a search of constant indices first. That means: if we accept the consumers' income as a basic factor of marketing, a maximum constant dependence should exist[2] principally among it and the other indices describing the cause and effect chain.

A peculiarity of foodstuffs consumption in Bulgaria is the existence of out-of-market share for their supply in households. The part of natural economy is decreasing recently but it remains considerable for some products and basic for others. This causes a special approach in determining the demand indices.

First of all, under "consumer's income" we mean the total income per household member and under "foodstuffs expenses"- the total expenses for foods and non-alcoholic drinks. The national statistics includes the costs of out-market supplied food quantities in the two indices.

Furthermore, these two indexes correspond more directly with energetic measurers of consumed foods, which in addition put them closer to the demand idea, than the indexes of "earnings" and "foods and drinks expenses".

The statistical study of relations between the conditions and effects of demand outlines two basic peculiarities.

The first one is in the lower co-relation between the cost indexes for conditions and quantitative indexes for effects in comparison with the co-relation between the cost indexes for conditions and cost indexes for effects. Such a peculiarity predestines the refusal of foods demand determination through co-

[1] The consumers' demand of foods is presented here as a demand of private households only and does not cover social households- army, prisons, etc. It is thus observed by the National Statistic Institute and is presented in its annual publications "Budgets of households in Republic of Bulgaria" and "Average prices and purchased quantities of basic foodstuffs and non-foodstuffs by households". They are the only Bulgarian sources of regular information, compared by years, which could be used for this subject. The consumption of foodstuffs is presented in these documents in more details and in synonymous and simply comparative lists of products of year 1992.

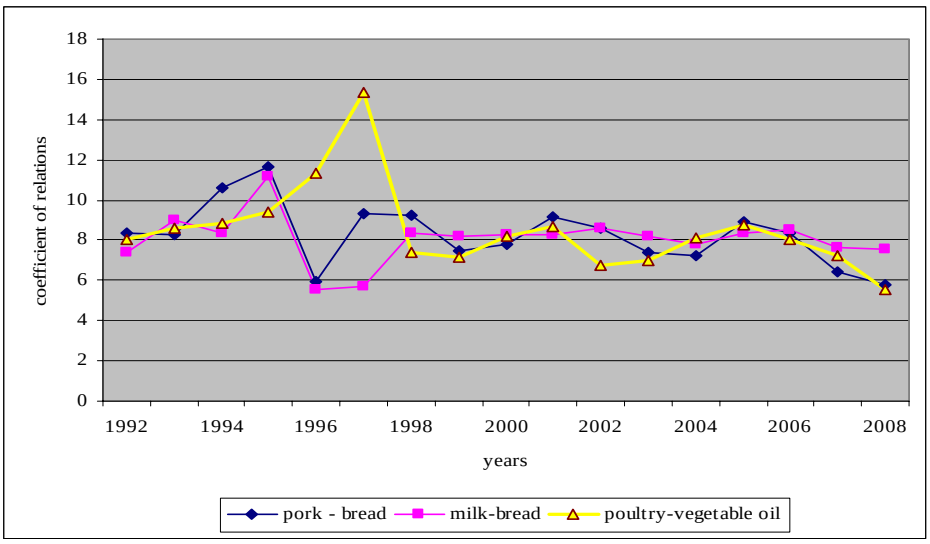
[2] The pretension in this case is for covering a bigger territory of the semantic field of the term "determination", resp. "determinant", both in sense of interdependence and contingence (see Dictionary of Bulgarian language. Vol. 3, Sofia, 1981, p. 755) in comparison with the use of "determinant" recently as a synonym of a factor of demand (see in www.legaltheory-forums.org/phpBB3/viewtopic.php?f=107).

relations between total revenue or foods expenses, on the one side, and quantities of used products, on the other.

The second peculiarity is that in the period 1996-1997 the stability of basic price relations on the food market has been destroyed. New price relations have been established in the next years. This process goes more quickly for some products and more slowly for others (see Figure 1). The three relations are chosen for illustration only.

Figure 1

Price relations between basic foods (as per Buyer's prices)*



*The price relation milk - bread is multiplied by 9, poultry - vegetable oil – by 4 for visual comparison.

The meanings of co-relations up to year 1996 are also of importance to the above subject, but the results in the further study are mainly on the basis of co-relations in the period of 1997-2008 г.

The first unit in the cause effect chain by demand of foods is the dependence of total expenditure for foods and beverages on the total income[3]. The dependence is in a linear form with equation y = 134.482 + 0.292x, coefficient of co-relation(R) = 0.99 and coefficient of determination (D) = 98.0%, where: y is the cost of total expense, x – the cost of total income.

The co-relation coefficient can be examined as an index of the closeness of dependence between the value of total expenditure for foods and the value of total

[3] All indices in the study are annual values per person of household which could be accepted as per person of population as well.

income, and the determination coefficient – as a measure of dependence between them, in this case - 98% from the change of foods and beverage expenses are due to the change of the total income.

The coefficient before „x" shows, that by increase of income with every 1.00 leva.- 0.29 – 0.30 leva. of it will be used for foods and beverages, respectively: by every decrease of income with 1.00 lev the decrease of expenditures for them will be with the same costs. The positive value of the free member of equation means, that by increase of total income amount its share for foods and beverages decreases, and the opposite – by decrease of total income this share increases. This is a confirmation of Engel's law, but further on we shall examine the part of the free member in the regression equation. Very close to the above is the dependence between the cash income per head of population and the cash expenses for foods and beverages. They are in a linear dependence as well:

$y = 94.762 + 0.296x$, $R = 0.998$, $D = 99.5\%$.

The change of the cash income with 1.00 lev causes almost the same change of its share used for foods and beverages; its share decreases by increase of income but by lower level than in the previous subordination.

The next unit in the cause and effect chain of demand should bind food expenses with the concrete products. The lack of reliable co-relation between the cost index "food expenditure" and the quantities of products has been compensated by the reliable co-relation with their expenses as cost indices. The expenses per products are calculated on the basis of their consumed quantities and the average annual prices per buyer. At this moment of the cause and effect chain we go in the field of consumers' logic, arranging products in groups.

The study ascertained three groups of products at the highest consumer level: vegetable (meatless), greasy (meaty) and sweet. The vegetable group includes bread products, vegetables, rice, other grain products, legumen, mushrooms, vegetable oils; the greasy – meat, meat products, fish, animal oils, milk, milk products, eggs; the sweet - fruits, sugar, sweets, chocolates and confectioneries, flour.

The groups of products are ascertained by optimizing their composition by criteria - maximum co-relation cost between group expenses and total expenses.[4] That means, that each displacement of products between above groups will decrease the value of co-relation. The effect is the same by increase or decrease the number of these groups. Consumers' logic places vegetable oils in the group of meatless and flour in the group of sweets obviously due to the purpose of their use in households.

The three subjections are in a linear form (see Figure 2).

Their equations are:

meatless: $y = 45.709 + 0.242x$; $R = 0.984$; $D = 96.7\%$;

[4] This co-relation could be improved by replacing the foods and beverage costs by foods cost only, but the first is preferred due to the direct correspondence with official data. National statistics does not separate food costs in a different row.

greasy: y = 56.503 + 0.332x; R = 0.988; D = 97.6%;
sweet: y = -5.61 + 0.119x; R = 0.994; D = 98.9%,

where: y is the cost of expenses of current group; x – the value of total expenses.

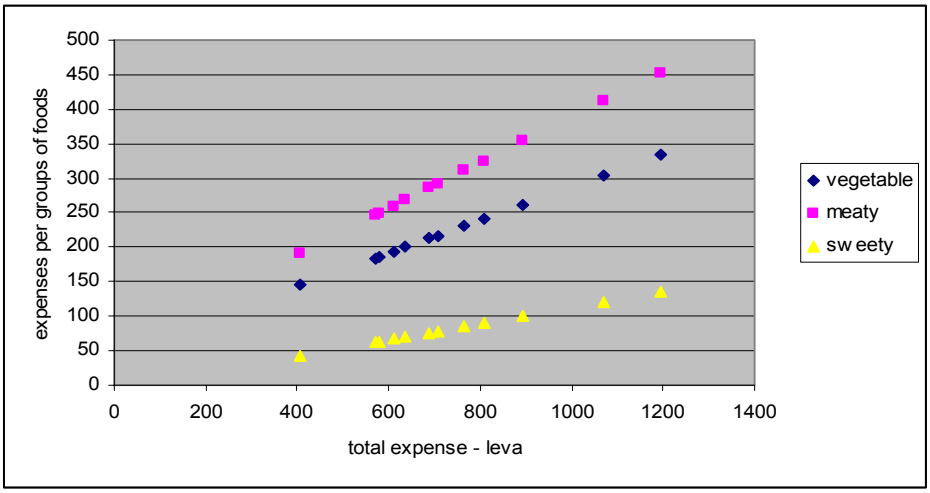
The results show that every increase of food and beverage costs by 1.00 lev corresponds to: increase of vegetable foods costs by 0.24-0.25 levs; for greasy – by 0.33-0.34 levs and for sweets – about 0.12 levs. It is evident, that the higher the coefficient before "x" in the regression equation, i.e. the steeper the slope of the regression line, more considerable will be the change of the value of the corresponding effect, in this case the expenses of the group of products, in relation to one and the same change of the common condition, total expenses in this case.

The exclusion and addition of data from one separate year to the range of years 1997-2008 changes these values with a part of stotinka. According to the value of co-relation this index is most constant for the sweet foods and least constant for meatless foods. The value of the free member of the equation shows a tendency to decrease the relative shares of meaty and vegetable foods in the total expenditures – stronger for meaty and weaker for vegetable foods. For sweets a tendency of increase of their share exists but to considerably lower degree than the other two groups.

The difference between the cost of increase of total expenses and the amount of increase of the three groups appears from the cost of increase of drinks, fruit and vegetable cans and the products received by processing of fruits and vegetables–jams, pickles, etc., which are mainly home made products in the studied period (1997-2008 г.) and are not included in the calculations, as well as some non-basic foods as coffee, salt, vinegar.

Figure 2

Dependencies between expenses for basic food groups and total expenditure



The next stage of consumers' logic outlines the level of working out in details within the three groups of products and the criteria for arranging the products in sub-groups is the same- the value of co-relation. Each dislocation of products or multiplication of sub-groups results in decrease of its value.

The sub-groups of vegetable foods are: 1) bread, pastries and vegetable oils, 2) vegetables, legumen, other cereals and vegetable oils. The dependence form is linear here as well and the following equations are its analytic expression:

$y = 16.721 + 0.494x$; $R = 0.979$; $D = 95.9\%$;

$y = - 20.41 + 0.645x$; $R = 0.992$; $D = 98.4\%$,

Where: y is the cost of expenditure of the corresponding sub-group; x – the cost of expenditure for meatless foods.

From here on in our study "x" and "y" in the regression equations should be accepted accordingly as the cost of expenses for a group of products and the cost of expenses for its part and a co-relation occurs between these two costs.

The tendency in the first sub-group is to decrease their share in the cost for meatless foods, and in the second sub-group – the opposite. The next working out in details of these groups is:

●bread, pastries, vegetable oils is divided into: 1) bread and pastries and 2) vegetable oils;

●vegetables, legumen, other cereals, vegetable oils is divided into: 1) vegetables, legumen and other cereals and 2) vegetable oils;

●vegetables, legumen and other cereals is divided into: 1) vegetables and 2) legumen and other cereals (rice is included in legumen).

In the meaty sub-groups the dependencies are linear again and the analytic equations are:

1) milk, milk products and eggs: $y = 0.676 + 0.399x$, $R = 0.994$, $D = 98.7\%$;

2) meat, meat products, fish and animal fats: $y = -0.676 + 0.601x$, $R = 0.997$, $D = 99.4\%$.

Working out the first subgroup in detail is done according to following scheme: 1) milk and eggs and 2) milk products and eggs. These two branches are divided accordingly into: milk and eggs and milk products and eggs. Further on milk is branching out in types –milk and yoghourt, milk products – as well.

Working out the second subgroup in detail: 1) meat and 2) meat products, fish and animal fats. These two branches are further divided in specific products.

By sweet subgroups dependencies are also linear and the concrete equations are:

1) fruits: $y = 0.187 + 0.429x$, $R = 0.997$, $D = 99.4\%$;

2) confectionery, flour and sugar: $y = 1.158 + 0.413x$, $R = 0.995$, $D = 99.0\%$;

3) sugar and chocolate products: $y = -1.345 + 0.158x$, $R = 0.991$, $D = 98.2\%$.

Further working out in detail of sweet products goes as per following scheme:

1) fruits are branched in specific products;

2) the subgroup of confectionery, flour and sugar is divided into: a) confectionery and flour, b) confectionery and sugar, c) confectionery;

3) the subgroup of sugar and chocolate products– to sugar and chocolate products.

Here are two examples for branching of preferences to a specific product by total annual income of 3 600 leva per person:

1. The share of the total income, used for foods and non-alcohol drinks is equal to: 134.482 + 0.292 * 3 600 (as per the above dependence), which makes 1 185.68 leva. The part of the income for foods and non-alcohol drinks, which is allocated for meaty foods is equal to 56.503 + 0.332 * 1 185.68 (this dependence was also established before), this makes 450.15 leva. The part of the income for meaty foods, which is allocated for milk, milk products and eggs is equal to 0.676 + 0.399 * 450.15, which makes 180.28 leva. The part of the income for milk, milk products and eggs, which is allocated for milk products and eggs, is equal to: 0.384 + 0.614 * 180.28, which makes 111.08 leva. The part of the income for milk products and eggs, which is allocated for milk products, is equal to -7.362 + 0.835 * 111.08, which makes 85.39 leva. The part of the income for milk products, which is allocated for cheese, is equal to 6.164 + 0.459 * 85.39, which makes 45.36 leva.

2. The part of the income for meaty products, which is allocated for meat, meat products, fish and animal fats, is equal to -0.676 + 0.601 * 450.15, which makes 269.86 leva. The part of income for meat, meat products, fish and animal fats, which is allocated for meat products, fish and animal fats, is equal to -11.892 + 0.481 * 269.86, which makes 117.91 leva. The part of income for meat products, fish and animal fats, which is distributed for meat products and fish, is equal to – 3.0 + 0.996 * 117.91, which makes 114.44 leva. The part of income for meat products and fish, which is distributed for non-perishable sausages, is equal to 2.736 + 0.374 * 114.44, which makes 45.54 leva.

Thus an aggregate consumer would spend from his total annual income of 3 600 leva - 45.36 leva for cheese and 45.54 leva for non-perishable sausages.

The calculation of this result by the regression equation of dependences of cheese and non-perishable sausages directly as per total income results in 42.72 leva and 47.02 leva. The deviations from these values are respectively 5.83 and 3.26% and probably some of them are due to calculation problems.[5] But it is obvious that it couldn't be the only reason for almost 6% deviation from results. The problem here is due to the lack of determination. By direct dependence between total income and a specific product determination is in principle lower than by dependencies of corresponding final branching of preference tree, as well as determinations on separate stages of distribution of income before it. The direct cause and-effect chain between income and expenditure for specific product is weaker.

The aggregate consumer is willing to spend 45.36 leva for cheese and 45.54 leva for non-perishable sausages from those 3600 leva by the existing price relations, taste dominants, consumer' fashion and all other similar factors of

[5] Statistics calculations are made through computer programs SPSS.16.

demand. He is only willing and that willingness is not absolute. The described dependencies are based on comparatively short statistical lines. The prolongation of these lines will improve the quality of results.

Well determined as a cause and-effect link is the relation between the price of the consumed food energy (the price of 1000 kilocalories) and the total expenses for food and non-alcoholic drinks. Their dependence is of a linear type:

$y = -0.034 + 0.001x$, $R = 0.997$, $D = 99.4\%$.

The equation shows that the price of energy grows more quickly than the cost for it. That means that demand reacts to revision of income by alteration of range of consumed foods. Tendency is: by increase of income and respectively the expenses for foods the share of more expensive foods to grow in the food range and visa versa.

The linear form of the studied subordinations and the very high values of co-relation and determination back with arguments the following basic hypotheses with a high degree of reliability:

1. The aggregate foods demand is inclined to keep constant proportions in expenses for them which gives a background to the idea that there exists a gradual distribution of income per levels of the cause and effect chain. On micro-level – in the budget of a concrete household - it doesn't happen by plan. A stable subordination appears on macro-level only – in the aggregation of household budgets.

The economic ethno-psychology registers the action "put aside money for" concerning rare and irregular expenses in household. Special savings of money for foods are not made, it "goes" every day. Probably this phenomenon will be clarified aside from the line „spontaneous behaviour – reasonable behaviour". That seems to fit better into "the links between what people do and what creates them a feeling for well-being", by Joseph Stiglitz' words and we cite him again: "that people act consecutively but in ways which are considerably different from the standard method of rationality"[6].

We could accept that the total expenses for foods divided in such a way are shared out in expenses for meatless foods, for meaty foods and sweet products. The income shared out for each group is dispensed for subgroups, etc. up to the share for the concrete product. This hypothesis allows almost sure prediction of structure of divided for food income according revisions of total income of households.

2. The division of income for foods is made in a tree form. A tree of preferences is established which follows the consumer's logic – the aggregate consumer prefers to spend his money in a certain way. The tree is not established by simple branching. Some basic products do not have a synonymous (simple) place – they are not placed on a separate branch, or do not form clearly a limited branch, for example animal fats, vegetable oils, sugar, eggs. Their determination in

[6] *Stiglitz, J.* Freefall. Sofia, 2010, p. 346.

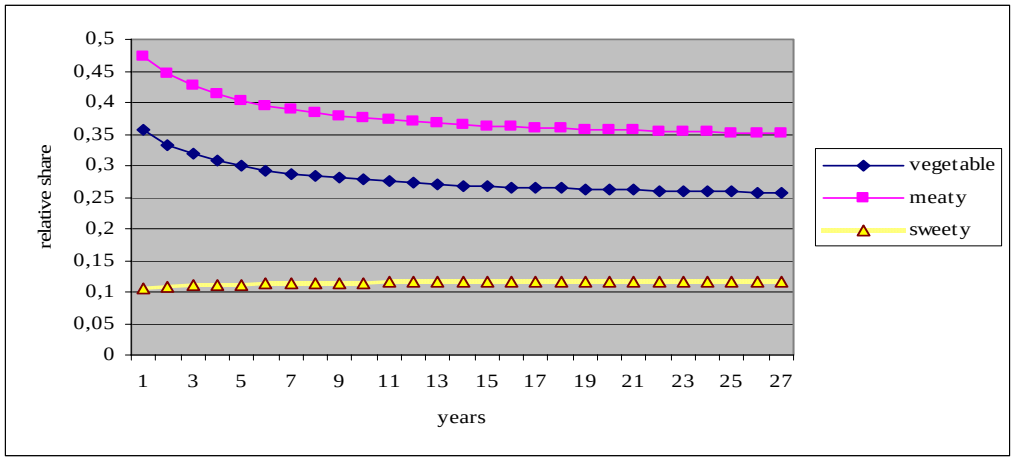
these dependences is usually by 10% weaker than the prevailing one. The presence of a certain product or a group of products on a definite branch means that these products are supplied within a definite divided income, that their demand is motivated within its limits.

3. The share of the divided income on each level of the preference tree is not constant in the divided income of the previous level. The change tendency of this share is determined by the free member of the regression equation. The positive value of that member presupposes decrease of share and negative– increase. The relative share would remain constant if the regression line crosses the beginning of co-ordinates, i.e. if the free member of the regression equation is equal to zero. Such a group of products or a separate product were not found by this study. The higher positive value of the free member presupposes quicker decrease of relative share, and the lower – more slowly; the same dependence exists by its negative values too.

This tendency is illustrated on a Figure 3. The relative shares of distributed incomes for vegetable foods, meaty and sweet foods in the total income for foods and alcohol-free drinks are calculated by steady increase of total income per years and per regression equations. It is obvious that the changes of relative shares of vegetable and meaty foods tend to decrease by increase of total divided income and the sweet foods – to increase. This tendency looked over the dependence of total income for foods and non-alcoholic drinks on the volume of total income shows that in the near future at least the part of expenses for foods and non-alcoholic drinks will not shrink below 0.31 in case some radical changes of price relations do not occur by foods as well as by other objects of market demand.

Figure 3

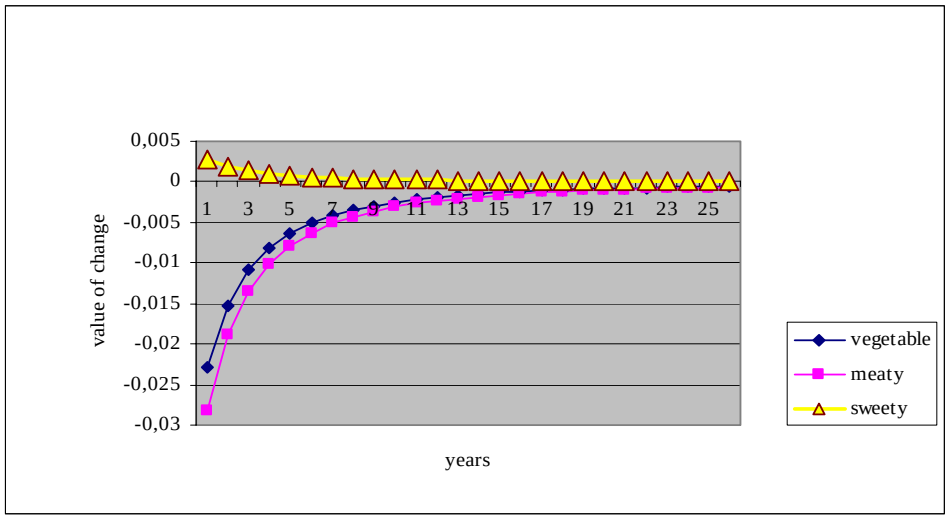
Relative shares of distributed incomes for vegetable, meaty and sweet foods in divided total income for foods and non-alcoholic drinks



The tendency is clearer by following up changes in relative shares (see Figure 4). They are calculated as differences between values of relative shares for each year (every consecutive change of total expenses) to previous year. It is obvious that these alterations tend to zero by increase of total distributed income and this tendency is synchronic – the lines go closer to zero cost simultaneously – according to alterations of total income.

Figure 4

Changes in relative shares of distributed incomes for vegetable, meaty and sweet foods in the divided total income for foods and non-alcoholic drinks



This mechanism has been illustrated by following picture in figures:

Total expenses for foods, leva	400	500	600	700	800
Expenses for: Vegetable foods, leva	142.51	166.71	190.91	215.11	239.31
Relative share	0.356	0.333	0.318	0.307	0.299
Differences		-0.023	-0.015	-0.011	-0.008

The row “expenses for vegetable foods” is calculated as per the already cited equation: expenses for vegetable foods = 45.709 + 0.242 x total expenses.

The conversion of logics in the cause and-effect chain concretely with the example on the same branch of preference tree could be interpreted in the following sense: The distribution of total expenditures for foods and non-alcoholic drinks tends to the proportion (in relative shares): vegetable foods – 0.26-0.27; meaty foods– 0.35-0.36; sweet foods – 0.11-0.12. If we go back to Stiglitz’s words, this proportion should “cause a feeling of prosperity”.It is a target of consumer’s behavior, an economic motivation. As at 2008 the proportion is: vegetable foods – 0.295; meaty foods– 0.39; sweet foods – 0.114. If we accept

that it corresponds to the inclination to decrease the share of total expenses for foods and non-alcoholic drinks in total income to the constant 31-32%, we should accept that "the feeling of prosperity" is about the level of 5500-6000 leva total income per person yearly. For the year 2008 this index is 3502 leva, which doesn't mean that if we reach 5500-6000 leva average annual income per person, it will put the full stop in the above relations. The feeling of prosperity will have other parameters then.

The described tendencies refer to consumer's behaviour based on a market with considerably constant or tending to relief price relations. The demand reactions by ruptures in basic price relations, as in years 1996-1998, are not less important, but their research presupposes data accumulation by enough repeats of phenomenon.

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Consumers' demand for foods in Bulgaria is well determined in a chain of cause and effect bonds. They are better presented through a chain of relations in a tree form with multi-layered (multistage) branching than in one-layered branching. The last presupposes some bonds between one cause – consumer's income in this case and great number of effects – expenses for concrete products. A multi-layered branching outlines the stages (levels) of income distribution to foods and other expenditure, the foods share – to groups of foods, etc. – till definite product expense.

The established linear form of dependencies in the cause and effect chain presupposes that income distribution for foods supply by stages occurs in definite stable proportions which allows their comparatively sure prognostication. The form of cause and effect chain and these proportions outline the preference tree of aggregate consumer in relation to foods demand and it makes visible consumer's logics in this process.

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