Modeling of the cost of social benefits

Michal Jenčo

Abstract

Based on the development of the economic conditions in the Slovak republic as well as the legislation changes in the provision of the benefits was done the research carried out focused on the evaluation of the real financial situation where people in social need receive help. The current system of the benefits and its real impact on the families and their members were evaluated. Consequently, were verified the possibilities to optimize of the benefits. The research was done by using the modeling method. Suggested model of the benefits was prepared on the computer in the software surroundings of Microsoft Office. This model can perform extensive and time-consuming calculations and provides the graphic outputs.

Key words
Model, modeling, system of benefits, cost of benefits, social need, social aid.

1. Introduction

In the period of transformation process in the economic and social field the state as well as the municipality have their irreplaceable role. They help families and individuals who got into difficult economic situations. Benefits represent the package of the activities which helps the individuals to ensure the basic standard of living, gain the social stability and renew the social independence and sovereignty. Unexpected life events can worsen the financial situation of the families.

When these events happen the state offers the family one or more contributions through the social aid and the state social support. These are benefits, benefit contributions, child benefits, parent benefits, birth benefits, contributions which are given to parents if they have more children or twins repeatedly in the period of two years, funeral contributions, allowances for supporting the substitute parental care of a child and bonuses for the employed parents.

The modeling presented in this article is focused on the field of social aid which uses the form of help called the help in the social need especially on the system of providing the benefits for the people in social need. It was one of the researches we made at my workplace with use of models under my leadership.

2. Analysis of the system of benefits by using the model

We have carried out the research of the system of social need benefits using the modeling method and the principles of the computer simulation. First part of the research was focused on the verification of the real level of the current help to the people in social need. We were interested how and in what proportion this money is distributed for specific people especially children.

---

1 Doc. Ing. Michal Jenčo, PhD., Catholic University in Ruzomberok, Faculty of Education, Department of Management and Marketing, Nábrežie Jána Pavla II. 15, 058 01 Poprad, Slovak republic, e-mail: jenco.michal@gmail.com
A new model for learning the important information about the real situation in the system of help for the people in social need was made. It was prepared on the computer using the Microsoft Office software which performs all the time-consuming calculations. At the same time it also allows to change the figures and input parameters in real time. The input parameters in the application surroundings of the model were set in the tables of the input parameters for different time periods. In this article I present the time period from 1.9.2008 to 31.8.2009 and from 1.9.2009 to 31.8.2010. From time to time this model adds important input data in another prepared sections which appears during the research. The calculation of the benefits themselves is done in 32 calculation objects. The real figures were calculated and put into the results tables after setting up all the necessary input parameters, patterns and equations.

The second part of the research was concentrated on finding the solution to an issue of how to reduce the impact of a decline of the average income per person (especially a child) in the family who is in social need by changing (optimize) of the benefits. The priority was to achieve the improvement without the radical increase of the state expenses in the time period for the people in social need. To optimize the system of benefits it is necessary to use the data valid for the current time period.

We used an information of the Ministry of Labor, Social affairs and Family of the Slovak republic (MPSVR SR). The basic benefits for different categories of people are shown in the following table.

<table>
<thead>
<tr>
<th>Main benefit 2008-9</th>
<th>Individu al (I)</th>
<th>I+1</th>
<th>I+2</th>
<th>I+3</th>
<th>I+4</th>
<th>I+5</th>
<th>I+6</th>
<th>I+7</th>
<th>I+8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original in € /Sk</td>
<td>58,42</td>
<td>109,54</td>
<td>109,54</td>
<td>109,54</td>
<td>109,54</td>
<td>109,54</td>
<td>159,33</td>
<td>159,33</td>
<td>159,33</td>
</tr>
<tr>
<td></td>
<td>1760</td>
<td>3300</td>
<td>3300</td>
<td>3300</td>
<td>3300</td>
<td>3300</td>
<td>4800</td>
<td>4800</td>
<td>4800</td>
</tr>
<tr>
<td>Main benefit</td>
<td>Couple (C)</td>
<td>C+1</td>
<td>C+2</td>
<td>C+3</td>
<td>C+4</td>
<td>C+5</td>
<td>C+6</td>
<td>C+7</td>
<td>C+8</td>
</tr>
<tr>
<td>Original in € /Sk</td>
<td>101,57</td>
<td>150,04</td>
<td>150,04</td>
<td>150,04</td>
<td>150,04</td>
<td>150,04</td>
<td>201,16</td>
<td>201,16</td>
<td>201,16</td>
</tr>
<tr>
<td></td>
<td>3060</td>
<td>4520</td>
<td>4520</td>
<td>4520</td>
<td>4520</td>
<td>4520</td>
<td>6060</td>
<td>6060</td>
<td>6060</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main benefit 2009-10</th>
<th>Individu al (I)</th>
<th>I+1</th>
<th>I+2</th>
<th>I+3</th>
<th>I+4</th>
<th>I+5</th>
<th>I+6</th>
<th>I+7</th>
<th>I+8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original in € /Sk</td>
<td>60,50</td>
<td>115,10</td>
<td>115,10</td>
<td>115,10</td>
<td>115,10</td>
<td>168,20</td>
<td>168,20</td>
<td>168,20</td>
<td>168,20</td>
</tr>
<tr>
<td>Main benefit</td>
<td>Couple (C)</td>
<td>C+1</td>
<td>C+2</td>
<td>C+3</td>
<td>C+4</td>
<td>C+5</td>
<td>C+6</td>
<td>C+7</td>
<td>C+8</td>
</tr>
<tr>
<td>Original</td>
<td>105,20</td>
<td>157,60</td>
<td>157,60</td>
<td>157,60</td>
<td>157,60</td>
<td>212,30</td>
<td>212,30</td>
<td>212,30</td>
<td>212,30</td>
</tr>
</tbody>
</table>

Table no. 1: The amount of benefit in the time period 2008/2009 and 2009/2010
Source: Records of the MPSVR SR.

Key: I – individual, I+1 – individual with one child, C – couple, C+1 – couple with one child.

The calculations for the different categories of the households in social need showed that the benefits (Table no. 1, first column) slowly falls yet it does not represent the real situation of the income in the family. The total family income (the second and third column) increases with the growing number of children. We have to add alimony as well as other sources of income from the social system towards the approved benefit. The increase of the total income could be higher considering how many family members there are. It would be adequate to give more support to the families of up to 4 children considering demographic trend in Slovak republic.
It would be better to increase the total income of the families (linear increase) and direct it towards the current level of the income of the families with 5 children. With the growing number of the family members the amount of support to provide the standard living conditions of each family member (the children and also the adults) decreases.

The situation in the family of an unemployed individual with the children who are in social need is shown in the Figure no. 2. The figures in this graph are final. We added the benefits and alimony or orphan allowance altogether to the total income. It all confirms the fact that the average total income per an individual in the family decreases.

It is important to point out the phenomenon that an adult person has always their own real life requirements. We deducted the amount of the benefit of an unemployed individual without children 175,6 € (5290 Sk) from the total income of the family. We received a real view of how much money is left to satisfy the needs of the children in this type of household. Similar principle was used in case of the families that are formed of a couple of adults and
children. 100 € (3060 Sk) is left to satisfy the needs of each of these adults as well as in case of a couple without children.

*Figure no. 3: The average value of resources (in €) per each child in the family of an unemployed individual*

![Graph showing the average total income per child in the family - U](image)

*Figure no. 4: The average value of financial resources (in €) per each child in the social need family of a couple of adults – previous period*

![Graph showing income per child in the social need family without 2 adults](image)

This situation is not ideal for certain groups of citizens (especially individuals with three, four, six, seven and eight children) as we can see from the Figure no. 3. Compared with the other mentioned groups, the individuals with one child are more advantaged.

These conclusions can be confirmed by the Figure no. 4. It shows what the financial situation is like in the families formed of a couple of the adults and what support they receive for their child. Better conditions are in the complete family where at least one of the parents is employed. It is logical and also shown in the graph.
3. Experiments with the model

We tried to optimize the settings of the system of benefits by using the experiments on the model. We used the above mentioned findings. We used an information of the MPSVR SR for the real figures for each single group of people receiving the benefits.

<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total amount</td>
<td>178621</td>
<td>175746</td>
<td>181200</td>
<td>197206</td>
<td>170033</td>
<td>188028</td>
</tr>
<tr>
<td>Individual without children</td>
<td>104209</td>
<td>100928</td>
<td>105051</td>
<td>122415</td>
<td>107675</td>
<td>113195</td>
</tr>
<tr>
<td>Individual with 1 up to 4 children</td>
<td>22598</td>
<td>22327</td>
<td>21602</td>
<td>19130</td>
<td>16419</td>
<td>19500</td>
</tr>
<tr>
<td>Individual with 5 or more children</td>
<td>437</td>
<td>388</td>
<td>378</td>
<td>384</td>
<td>354</td>
<td>432</td>
</tr>
<tr>
<td>Couple without children</td>
<td>8662</td>
<td>10381</td>
<td>14178</td>
<td>19908</td>
<td>16389</td>
<td>18602</td>
</tr>
<tr>
<td>Couple with 1 up to 4 children</td>
<td>37350</td>
<td>35889</td>
<td>34427</td>
<td>30259</td>
<td>24676</td>
<td>30311</td>
</tr>
<tr>
<td>Couple with 5 and more children</td>
<td>5884</td>
<td>5710</td>
<td>5566</td>
<td>5110</td>
<td>4527</td>
<td>5988</td>
</tr>
</tbody>
</table>

*Table no. 2: The number of the benefits recipients in SR in the time period 2004 - 2009
Source: Statistical records of MPSVR SR*

Provided information was used for the input settings in our model. By doing that our outputs were very close to the real situation.

This information does not completely express division into different groups, employment of the adults and eventually some other added details. The model is set very exactly. The results allow the basic analysis and synthesis of the system of benefits. If the exact details were available (more exact division of the people in social need) the results from the model would be even more detailed. This model can accept any specification of the input information immediately.

We were given some more important input information from the Central office of Labor, Social affairs and Family (ÚPSVAR). The total monthly expenses of the state to secure the system of benefits in the previous period were in average 15 789 085,84 € (475 662 000 Sk). By using the available information altogether with the model we performed many experiments. Four of them are presented in the following part.

In the first experiment an attempt to modify the level of the benefit which is given to an individual with one, two, three and four children so that the family income will grow linearly up to the level of the benefit which is given to an individual with five children. The benefit for an individual without children was the sum of 57,76 € (1760 Sk) and 60,5 € is now. This group of people represents 60 % of the total number of the recipients of the benefits allowance.

By doing the experiment no. 1 was confirmed that it is possible to reach this state provided that the benefits will be increased by the sum of 68819,27 €,(1662774,40 Sk). This represents
the rise of the financial expenses of 0.349% compared with the actual situation. This increase
does not represent the enormous increase of the expenses in the social system.

The total income of the family will be evident if we add the alimony to the income of the
family. Adequate increase caused by the optimizing intervention logically responds to the
increasing number of the family members.

It was clearly possible to see the decrease of an income for a child in the family with higher
number of children. One child who lives with one adult has constantly the highest subsidy
from the social system.

Moreover, we evaluated the situation in the family of an employed individual with
children. As the parent works, the conditions in the family are partially better compared with
the family of an unemployed person. Financial resources for children who live with an
employed individual (E) are in average higher of 56.60 € (1705.28 Sk) which represents 58.84
% more compared to the average value in the family of an unemployed (U) which is 35.64 €
(1073.59 Sk). The difference between the average figure in the family E and family U per a
child without an adult is on the average 20.97 € (631.69 Sk). Yet the extreme difference in the
allowance per a child for example in the family of an individual with one child is 58.17 €
(1752.50 Sk).

<table>
<thead>
<tr>
<th>Number of children per one child in €</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58.17</td>
<td>29.08</td>
<td>19.39</td>
<td>14.54</td>
<td>11.63</td>
<td>10.02</td>
<td>11.79</td>
<td>13.12</td>
</tr>
</tbody>
</table>

*Table no. 3: The difference between the average financial resources per each child in the family U and E*

In the second experiment we tried to find out how many resources are left to meet the
needs of a child in different types of the families in social need. Presented fragment from the
2nd experiment points out the remarkable differences in each single type of the family.

In the following Figure no. 5 is present detected and visible difference in the average
allowance per each child. Simulation was executed in four basic variants of the families with
one child where the parents (adults) are:

1. unemployed individual,
2. employed individual,
3. couple where one of the parents is employed,
4. couple where both parents are unemployed.
As you can see from the previous Figure this situation is unbalanced and the specific sum per each child is very different.

In the third extreme experiment the basic benefits we set up so that the average total income per each child in the family (of an unemployed individual) was the same as for the child who lives in the family of one adult and one child 84,30 € (2540 Sk).

At the beginning we assumed that the final solution will be very costly. Regarding the economic possibilities of the state especially at the current period of the economic crisis, we can see that the solution will not be suitable for the use in the real world. The aim of the experiment is to point out the economical seriousness of the ideal solution.

In this experiment for the group of individuals in the social need we calculated the state expenses into the benefits system. The amount of resources represent 13 260 552 € (399 487 476 Sk) per year.

This solution would be more expensive – the costs would be 6,99 % higher comparing to the current situation. If we have tried this extreme principle also for the families of the unemployed couples with children – which would represent 84,30 € (2540 Sk) per each child, the state social system expenses would increase of 65 % which represents 123,76 mil. € per year. This solution is considered as unrealistic.

In the fourth experiment we monitored the state expenses in case the income per each child is optimalized to an average value for the third child in the current system of the benefits which represents the amount of 29,43 € (887 Sk) per month. Based on the outputs of this experiment, we can say that the state expenses in the social system in case of optimalization into the average value for the third child will be 3,68 % lower. This model situation focuses on the families of the individuals with the children. In comparison with the current state it is 582836 € (17.558.526 Sk) cheaper. Including the optimized amount for the category of the couples with children the total costs of the social system will increase by 6,1 %. It is not a problem to adapt the system to zero-solution. The authorities creating the conception of help for the following period should help in this situation.

4. Conclusion

The aim of the experiments presented in this article was to find the solution where we can ease the decline of the average income per person especially the child in the family which is in
social need. We will do it by optimalization of the system of the benefits. The state expenses will stay the same or there will be only a small increase.

Through the experiments with the model was possible to check the state expenses in case the income per each child is optimalized to certain specified level influenced by real possibilities of the state. Small changes in the system of the benefits while the current expenses stay the same or with the small increase will contribute to better support of the families with children especially with three or more children. Important result of the research is also the verification of the knowledge. The model solution is suitable and very effective for the problem-solving process.

**Literature**


**Summary**

**Modelovanie nákladov na sociálne dávky**