Evaluation of common projects efficiency in agriculture

Hodnocení efektivnosti veřejných projektů v zemědělství

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Abstract: The quality of economic education is one of the economic growth factors because its increasing leads to a higher level of human resources. The efficiency of education is most often defined as the relation between outputs (effects, utilities) of education and costs invested into this education (input). For increasing of the education quality, it is necessary to increase public funds up to 6% of GDP to achieve the level of developed market economies.

Key words: human capital, education, quantity and quality of education, technological competency, competitive advantage

Abstrakt: Kvalita ekonomického vzdělávání je jedním z faktorů zvyšování hospodářského růstu, neboť vede k vyšší úrovni lidských zdrojů. Efektivnost vzdělání lze nejčastěji vymezit jako vztah mezi výstupy (účinky, užitky) ze vzdělání a náklady vynaloženými na získání tohoto vzdělání. Pro zvyšování kvality vzdělání je nezbytné zvýšení veřejných prostředků určených na vzdělávání na 6 % HDP, abychom se přizpůsobili úrovni vyspělých zemí.

Klíčová slova: lidský kapitál, vzdělání, kvantita a kvalita vzdělání, technická kompetence, konkurenční výhoda

Concept of education projects efficiency

Capital is based on the fact that it is production factor which itself is produced. Human capital is the accumulation of investments into labour force. The most important sort of human capital is education. As all forms of capital, education means expenditures of resources in a specific moment which should increase future productivity. Education investments are connected with a specific person and this connection gives the characteristic features to human capital in contrast to investments into other kinds of capital.

Education efficiency can be expressed, on the most general level, as a relation between education effects and effort and means connected with its reaching. This relation should be formed according to the volume and structure of society needs.

Determining education efficiency according to this depends on evaluation of education effects on one side, and means used to their achieving on the other side.

Use of input – output methods in evaluation of education economic efficiency and education programmes in agriculture

The first group of methods used in evaluating of the education economic efficiency are the one-criterion decision methods. These methods are also known as input – output methods because they use the input – output relation. These methods presuppose using of one dominant criterion to which other criteria can be transformed both in ordinal way (classification from the best to the worst ones) and in cardinal way (computing of the utility function).

We can distinguish among the following one-criterion methods (Ochrana 2001):
– analysis of costs minimising (CMA)
– analysis of costs and benefits /or utilities/(CBA)
– analysis of costs efficiency (CEA)
– analysis of costs utility (CUA)

The attribute of all these methods is costs analysis. Costs are measured in value units in case of all methods but they are compared to differently quantified outputs. In case of CMA method, outputs are not measured, in case of CBA, outputs are measured in value units, in case of CEA in natural units and in case of CUA in utility form.

One – criterion methods of education efficiency

- *Analysis of costs minimising* is a relatively simple method, which can be used in the public sector including education. In efficiency analysing, we will not evaluate results of educational process but we will look for a variant with minimum costs. It will be used if the only input (costs) point of view is taken as the choice criterion and outputs are supposed to be quantitatively and qualitatively homogenous and relatively the same. A wrong choice could be achieved in the opposite case.
- *Analysis of costs and benefits (utility).* This method is characteristic by evaluating of the process results in monetary units so that they can be compared with costs.

In the education process, this method presupposes for instance evaluation of the reached education level in money so as education could be compared with invested costs into it.

- *Analysis of costs and benefits (utility),* as a basic method of expressing education efficiency can be defined as a sum of practical methods of optimum choice in the education sphere in respecting the criterion of maximum net social profitability, while all costs and utilities are expressed in money both in direct and indirect way.
- *Costs* are the sum of monetary expenditures and non-monetary elements necessary to utilisation of various resources to gain a specific product (education). Among non-monetary elements, there could be included limits following from governmental regulation but also opportunity costs which express advantages issuing from another use of the same resource etc.
- *Benefits* express the sum of welfare (utilities) of the individuals or group of individuals generated by the education programme in the form of gaining a specific kind of education and its practical utilisation. They could be expressed in monetary or non-monetary form.

In practice, this method can be used as a very suitable tool of economic decision-making when any increase in utility is regarded as a benefit and any decrease in utility is regarded as a cost. Decrease in utility is measured by opportunity costs of the evaluated project, it can be understood as a value of alternative action (opportunity costs). Opportunity costs have the value of the best accessible alternative.

At CBA, costs and benefits are calculated for the whole life-span of the project or investment action. The following general rule must be valid:

$$\sum_{t=0}^{T} \frac{B_t - C_t}{(1+r)^t} > 0$$

t – given time period
T – final time horizon in which the project is finished
B_t – benefit in the period t
C_t – cost in the period t
r – social discount rate

Due to the mentioned relation, the investment action is economically efficient only if the discounted value of benefits is higher than the discounted costs. According to monetary evaluation of costs and benefits, the resulting effect of our investment action is quantified by the following equation:

$$E = \frac{B}{C}$$

E – resulting effect
B – benefit of public project for the total life-span
C – costs of project implementation for the total life-span

The highest evaluation is given to the alternative with the highest effect per unit of costs. It is often impossible to quantify exactly benefits and costs in monetary units but their structural enumeration gives the policy decision-makers a more complex point of view for the final alternative choice. Taken exactly, costs and benefits should be evaluated in shadow prices. If it can be done only with difficulties, there are created models of the so-called imitation markets which make it possible to derive shadow prices. If we analyse costs, it is necessary to distinguish between direct costs (mostly expressed by market prices) and indirect costs which are usually evaluated as opportunity costs.

Use of investment productivity method

Another method which could be used for choice of investment alternatives is i*nvestment productivity method* (Ochrana 2001). For the use of this method, we need to determine the given project costs and benefits. Opportunity costs are also included into costs. After determining costs and social benefits, there will be determined net present value of the given (for example educational) project in the final step.

The basis of the method of investment return rate determination is comparing of prices and utilities from the investment action, while such an interest rate is searched when the present value of monetary returns from realised project is equal to capital expenditures on its realisation. Therefore, we determine the internal return percent (return rate of the investment activity), i.e. we solve the following equation with regard to interest rate as unknown variable:

$$C = \sum_{n=1}^{T} \frac{B_n}{(1+r)^n} \qquad n = 1, 2, 3, \ldots T$$

C – total costs on educational project (purchase investment costs)
B_n – benefit B in year n
r – (unknown) interest rate when the present value of monetary returns from the realised projects is equal to capital expenditure on its realisation
T – life-span of educational project

For example, if we propose various educational projects and want to determine the return rate, we include into C the total costs of the person education including opportunity costs (for instance the amount of lost wages which the student could have earned during his/her study at school). Utilities B are then given by the difference between the person's estimated income after the realisation of the educational project and the income he/she would earn if the project was not realised. Utilities are related to the productive age.

If we use this method, we need to distinguish between the social return rate, used in evaluation of public projects, that is planned activities (analysis ex ante), and individual return rate which expresses individual costs and utilities. We use it in construction of education demand curve.

– *Analysis of costs efficiency*. It is suitable especially for monitoring efficiency in the public sector where institu-

tions work on the basis of mass services system, for example *educational institutions*, financial institutions, if evaluation of the given institutions effects in monetary units is complicated. Basic criterial question is how the given goal could be achieved. Institutions outputs can be quantified in non-monetary units, for example education effects are measured in case of educational programmes in natural units (for example number of students), various quantities of outputs are compared (various numbers of students) but of the same quality. These outputs are taken as desirable.

– *Analysis of costs utility.* For efficiency analysis in public sector, there can be also used CUA method based on comparing inputs (incremental project costs) and outputs. It could be used for instance for evaluation of health and environmental programmes efficiency. Benefits are measured in so-called life expectancy units (corrected by the quality of life).

  This method is used in health services but its principle could be applied in education, too. Alternative results are measured in corrected natural units. This concept enables to respect that the same output units do not always express the same utility rate for person and society. Qualitative side of output is also taken into consideration by this method.

CONCLUSIONS

After the revolution in economics in the 60ieth, which introduced the term human capital into economics, it is not a taboo to speak about economic value of education. Casual observations and statistical data show that people with higher education have relatively higher wages than people with lower education. People create their human capital partly by investing into school (formal) education and these costs have the form of paymentes and opportunity costs in time of study. The main role of economists who are interested in education is to determine whether investments return rate is high enough to justify these expenditures in comparison with other possibilities of the given resources utilisation.

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