

THE ASSESSMENT OF ECONOMIC RESULTS OF ICT IMPACT ON ENVIRONMENT

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Information and communication technologies (ICT) application, supporting the economic development, provides also positive and negative environmental effects. Therefore the problem of taking into account economic results of ICT impact on environment is rather topical.

The integrated social-ecological-economic effect of ICT implementation and use can be presented by (1).

$$E_{ICT} = \sum_{t=0}^T (R_{ICT,t}^{econ} + R_{ICT,t}^{soc-econ} + R_{ICT,t}^{eco-econ} - C_{ICT,t}) \cdot (1+r)^{t-T}, \quad (1)$$

where $R_{ICT,t}^{econ}$, $R_{ICT,t}^{soc-econ}$, $R_{ICT,t}^{eco-econ}$ – economic, social-economic and ecological-economic results of ICT implementation and use in t^{th} year, monetary units; $C_{ICT,t}$ – ICT implementation and use costs in t^{th} year, monetary units; r – discount rate; T – period of social-ecological-economic effect of ICT implementation and use appearance, years.

The ecological-economic result of ICT use is a part of ecological result, that appears when using ICT, consists in reducing environmental pressure and can be presented in economic activities.

The annual ecological-economic result of ICT use, in our opinion, can be calculated by (2).

$$R_{ICT,t}^{eco-econ} = D_{prev,t}^{ICT} - D_{caus,t}^{ICT}, \quad (2)$$

where $D_{prev,t}^{ICT}$ — economic damage of environment pollution, that can be prevented by ICT use in t^{th} year, monetary units; $D_{caus,t}^{ICT}$ — economic damage of environment pollution, that is caused by production, operation and disposal of ICT equipment in t^{th} year, monetary units.

In our opinion, the main components of economic damage of environment pollution that is caused by production, operation and disposal of ICT equipment are:

- 1) the economic damage of environment pollution that is caused by production of ICT equipment, accompanying resources and means of production;
- 2) the economic damage of electromagnetic environment pollution (health impairment);
- 3) the economic damage of environment pollution caused by production of electricity, that is used by ICT equipment;
- 4) the economic damage of environment pollution that is caused by ICT waste;
- 5) other economic damage of environment pollution that is caused by production, operation and disposal of ICT equipment.

In our opinion, the main components of economic damage of environment pollution that can be prevented by ICT use are:

- 1) the economic damage of environment pollution that can be prevented by resource saving (dematerialization, moving from products to services etc);
- 2) the economic damage of environment pollution that can be prevented by travel replacement (telework, video- and audioconferences, e-commerce);
- 3) the economic damage of environment pollution that can be prevented by using ICT for disaster monitoring;
- 4) other economic damage of environment pollution that can be prevented by resource saving, dematerialization etc.

The table 1 shows the results of calculations of the ecological-economic result of ICT use in Ukraine. We calculated the prediction of these indicators taking into account the growth rate of ICT users as at the present time ICT use is low in Ukraine. Table 1 shows that the growth rate of prevented economic damage is much higher than the growth rate of caused economic damage, so that positive ecological-economic result of ICT use in Ukraine can be achieved in 2016. In this case

the annual prevented economic damage will be higher than economic damage of environment pollution caused by production, operation and disposal of ICT equipment.

The research results shows that efficient ICT use can be a driving force in the achievement of sustainable ecological development.

Table 1 — The ecological and economic results of ICT use in Ukraine, million USD (prediction)

Indicators	2010	2011	2012	2013	2014
Caused economic damage	799,56	800,87	802,37	804,07	806,02
Prevented economic damage	81,42	122,13	183,19	274,79	412,18
The ecological-economic result	-718,14	-678,75	-619,18	-529,29	-393,84

The proposed approach for taking into account economic results of ICT impact on environment can be used during forming the directions of ICT sector development, measures of environmental policies, preparation of regional and national environmental programs.