SYSTEM OF SELF-FINANCING STRATEGY FOR THE POLICIES AIMED AT THE ECO-INNOVATION IN THE PRODUCTIVE SECTORS*

Pierpaolo Albertario**

*Italian National Institute for Environmental Protection and Research (ISPRA), Environmental economist, Sector “Economic valuation”

Abstract

The transition from a linear economy to a circular economy requires structural change in production processes, both in the strictly technical sense and in relation to the reorganization. There are many forms of national and European funding aimed at encouraging the shift. All international organizations aim to encourage new financial instruments in order to increase the attractiveness of private capital to sustainable development policies.

The UNEP (United Nations Environmental Programme) on October 2015 launched in Lima the "Global Report of the Inquiry on the Design of a Sustainable Financial System". With which it intends to advance systemic action to align the financial system with sustainable development. In particular, the proposed strategies consist of:

• Mobilization of investment to specific priorities in terms of financial inclusion, funding for infrastructure and funding for eco-innovation;
• Integration of sustainable development factors in the financial decision-making through the inclusion of variables related to market integrity, risk and resilience through even the extent of liability and enhancing reporting processes.

On April 29, 2016 the Conference on the Indian sustainable financial system was held in Mumbai. The report was presented by R. Gandhi whom promoted the Reserve Bank of India in the presence of the Federation of Indian Chambers of Commerce and Industry and the UNEP. This report highlights how India is introducing an innovative approach to attraction of private capital to the green economy. Specifically, it is highlighted that to achieve effective sustainable growth they should aim at a financial contribution for the development of green products, in favor of renewable energy, in favor of safeguarding water matrix and the definition of financial indicators "green" acts evaluation of progress and financial risks.

*Selection and peer-review under responsibility of the ECOMONDO
** Corresponding author: e-mail: pierpaolo.albertario@isprambiente.it; pierpaoloalbertario@hotmail.com
In summary all international organizations are trying to formulate strategies to finance green policies to guide development towards sustainability. This paper discusses a new method of self-financing potential of eco-oriented process system, we can call "Circular Financing". We'll see how through the involvement of the private sector, public sector and financial institutions and banks can turn a financial mechanism through which all stakeholders would benefit thus accelerating the process of innovation of production processes automatically, creating synergies of systems capable of putting the eco innovative production system to finance themselves.

**Keywords:** circular economy, innovative financial instrument, self financing, circular financing, co benefits

1. **Introduction**

For the productive sector the transition from linear economy to a circular type, and /or to the passage generally to forms of echo procedural innovation, requires large investments that often the private sector cannot cover with the self-financing. This is one of the reasons why the state intervenes in certain contexts conceding grant incentives to the private sector. A form of cooperation is also dictated by public-private partnerships (PPP), that is when an activity has repercussions, or there is a common interest, in both the private and public sector are formed dual agreements in which the State may finance, totally or partially, a private project (Garcia-Pozo et al., 2016).

There may be situations in which action brings benefits in both public and private spheres, through *win win* type strategies. Besides the PPP there are forms of cooperation between the private sector and public sector in which you can also enter the banks and lenders pushed by a return on invested capital greater or equal to the opportunity cost. Thus from a given action, project, policy could benefit both the public sector and the private sector, through the economic and environmental benefits, both the financial sector and credit through the financial benefit given by the return on capital (Albertario, 2015a, b, c).

In order to increase competitiveness in the market, the industrial sector reduces production costs, increases the flexibility of processes, reduces the environmental impact to contents. The innovative tools related to sustainability are many and various (eco design, procedural, organizational etc.) and require significant investment (Donida et al., 2015; Milano et al., 2015). Companies often fail to implement innovative eco processes through self-financing, so the lenders and banks may be involved. The methodology by which the lenders and banks agree to finance a project of any kind it, in our context eco innovation, is based more on the assessment of the return on investment and thus on the performance assessment (Sáez-Martínez et al., 2014). Often we use for this reason the calculation of the internal rate of return on investment (IRR).

IRR indicates the profitability of a potential investment, is a discount rate that brings the net present value (NPV) of the cash flows of a specific project to be zero. Banks and lenders decide to grant a loan for a eco-innovation project when the IRR is greater or equal than the opportunity cost of capital, an opportunity cost refers to a benefit that a person could have received, but gave up, to take another course of action. This methodology can be summarized in the following financial mathematics formula (Eq. 1):

\[
NPV = \sum_{t=0}^{T} \left[ \frac{F_{\text{endogenous}} + F_{\text{exogenous}}}{(1 + r)^t} \right] - I_0
\]
System of self-financing strategy for the policies aimed at the eco-innovation in the productive sectors

$I_0$ is the initial capital to invest at time 0 for the implementation of eco-innovation process. Placing the net present value (NPV) of zero and solving the equation you get the discount rate $r$, which is here the internal rate return (IRR) of the investment. This methodology leads to a kind of win-win strategy. The strategy is a *win win* situation of conflict resolution which aims to satisfy all of the contenders. In this context, the contenders are businesses and financial institutions or banks, this process brings benefits to both.

The cash flows may be endogenous to the production system or exogenous. The development of an innovative industrial eco project has repercussions on the territory system that can also influence the economic variables of the public sector. The exogenous cash flows are economic externalities of the private sector. For example innovation of circular economy leading to the re-use of industrial waste and urban waste, has positive effects both on the environment due to the lower soil used as a landfill, both economically and in terms of the relatively slaughter state budget of environmental management costs "of the landfill management expenses", item recognized in the State Budget. So the smaller the state outputs for the management of landfills in the short and long term, lead to future cash flows with a positive sign that should be included for a proper assessment of the IRR of the project financed (EPA, 2015).

An efficient management policy by the state, may be to consider that an industrial eco-innovation process can then:

- decrease the environmental management expenses in public accounting;
- increase the income derived and original, due to greater persistence of firms in the market and a consequent employment held (EPA, 2015).

From the point of view of costs, as mentioned, an eco-efficient industrial policy can lead to less chance of environmental damage and major accidents, lower waste management costs (e.g. landfill management and others). From the point of view of revenue, a more eco innovative industrial tools in the long run leads to greater persistence of enterprises, greater employment held, to greater investment attractiveness even by individuals outside the territory. Fig. 1 shows how an innovative eco industrial process could generate positive externalities on the public sector.

![Fig. 1. Positive externalities generated by the private sector in public sector](image-url)
2. Methodology

Evaluating more government revenues and higher potential output thus generated by the sum of eco-innovative industrial processes, the state with the lenders and banks may establish the agreements, thus creating system, as regards the granting of funds to finance the projects of eco-innovative investment self-powered by the sum of financial and economic benefits of the system.

An eco-innovation process can generate cash positive flows in the industrial system (cash flows endogenous) and external considering all the territory system in which the industry operates (cash flows exogenous) (Albertario, 2015, a, b, c)

For example Fig. 2 shows how, assuming a constant eco industrial innovation in the long term, going to evaluate the economic benefits over time on the General State Budget, we can suggest an intervention policy which transfers these benefits to businesses in the form of incentives also through the help of lenders and banks simultaneously (win win strategies) on one side anticipating cash flows exogenous eco innovation products national wide system by speeding up the process of national industrial innovation. Financial sector may grant loans in a manner advantageous driven by an internal rate of reasonable return on investment, greater than or equal to the opportunity cost. An opportunity cost refers to a benefit that a person could have received, but gave up, to take another course of action: \( IRR \geq \text{C opportunity} \).

![Fig. 2. Circular financial innovative system](image)

So, watching Fig. 3 we can see how the Circular Financing mechanism works through the banks and lenders. These organizations aim at a return on invested capital, whose value must be greater than or equal to opportunity cost, anticipating the capital appreciation of reduced future expenses of state environmental eco-innovation management results, can accelerate the process of industrial modernization (UNEP, 2016a, b).

For example through this approach private sector implementing circular economy eco innovation tools can generate a reduction of costs for municipal waste management. In the State budget the positive cash flows discounted originating from the eco innovation in the years can be advanced (incentives) by lenders and Banks to private sector to accelerate the industrial eco innovation process. This methodology is shown in the Fig. 4.

We can represent what is described recovering the assessment generic formula of net present value and inserting the potential cash flows exogenous, will be expressed by Eq. (1). By solving the equation with a rate \( r \) higher return on opportunity cost that makes me NPV (net present value) of zero, a necessary condition, as explained previously. So that the lenders have a "fair" return on capital and can anticipate the capital needed to finance the environmentally innovative investments. \( I_0 \) is the initial investment for the private sector.
System of self-financing strategy for the policies aimed at the eco-innovation in the productive sectors

Fig. 3. Private finance increased public funding

Fig. 4. Circular Financing methodology

Placing NPV zero the equation will be given by Eq. (2):

$$I_0 = \sum_{t=1}^{T} \left( \frac{F_{\text{endogenous}}}{(1+r)^t} + F_{\text{exogenous}} \right)$$  \hspace{1cm} (2)

So cash flows exogenous can be paid advance by credit sector to the State, so State can be transferred to the private industrial sector (incentives) accelerating the eco innovation process (Pisano et al., 2015).

3. Concluding remarks
So we get to the situation, in some contexts, where the positive cash flows state budget (minor environmental management expenses, lower landfill management expenses due to a lower contribution of waste) paid in advance by lenders (driven by a fair return on capital) should finance the private sector by providing innovative eco tools.

In this way the State without additional statements can contribute substantially to eco innovation of the country. This leads in the medium and long term the industry to be more competitive, to substantially bring down the business risk, to have a more persistent employment rate, for a more attractive international (capital) in the strict sense and human capital thus leading to an increase in the medium and long term state revenue original and derived. The latter should further fuel to eco-innovation by implementing an automatic process of sustainable growth.

So the methodology exposed if implemented would lead to an innovative eco-intensive economic growth that would bring the European manufacturing sector (for example) to be more competitive in the long run because the innovative production process would be implemented in advance of an international (system) that does not adopt this financial strategy.

References

Albertario P., (2015a), Scenari di impatto ambientale relative alle attività produttive e strumenti economici volti all’autosostenibilità di sistema, Italian National Institute for Environmental Protection and Research, Ispra, Italy.

Albertario P., (2015b), Strumenti di gestione ecoefficiente nell’industria e in agricoltura, Seconda giornata di cultura ambientale, Italian National Institute for Environmental Protection and Research, Ispra, Italy.

Albertario P., (2015c), Strumenti di sostenibilità industriale volti alla salvaguardia della componente suolo e all’autoregolamentazione di settore, Italian National Institute for Environmental Protection and Research, Ispra, Italy.


