Workshop 10 – Sustainable Consumption And Rebound Effect

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Mikko Jalas & Andrius Plepys

Maria Elander

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1. Minutes

Approximately 40 persons attended the workshop and the key issues in the presentations and discussions are summarised in brief below.

1.1 Objective of the Workshop

The objective of the workshop was to review the present use of the concept of Rebound Effects (RE) and to look at and discuss different approaches to the concept in the context of sustainable consumption. The discussion was based on eight case studies, presented in brief below along with key discussion points.

1.2 Presentations and Key Discussion Points

Mathias Binswanger – Technological Progress And Sustainable Development: What About The Rebound Effect?

The concept of RE was initially introduced in the energy sector, but has in recent year also begun to be addressed in other areas related to environment and sustainable consumption. RE has its origin in the general growth tendency of modern economics and behavioural responses, and can simplistically be defined as lost potential efficiency gains, i.e. one percent of increased resource efficiency corresponds to less than one percent decrease of resource use.

Traditionally, the reason for RE has merely focused on monetary aspects. By producing a product or service in a more efficient way, the product or service get cheaper which leads to an increase in demand and thus RE. However, this is only one aspect of RE. Another important aspect is the time perspective. Time saving innovations have, in general, both direct and indirect RE. This is clearly illustrated by the example of faster and more efficient transport. Faster transport leads (in theory) to reduced travel time and related time cost for travel. However, since travel becomes cheaper, people tend to travel more, both in respect to the distance travelled and number of trips. This is a direct RE and is sometimes referred to as the *Time Saving Paradox*.[1] An indirect RE would be that faster transport usually uses more fuel and thus impact more on the environment.

Caroline Gallez – Dematerialisation In Practice: Classification Of Business Concrete Experiences

Dematerialisation is about reducing material flows input in the economic system. Traditionally material and economical flows have gone hand in hand. In order to stop the material flow growth, the material and economical flows must be de-linked.

Dematerialisation processes can be both managerial (measuring material flows, participative management, horizontal coordination etc.) and technical (technical innovations for dematerialisation – Design for Environment).

Dematerialisation does not automatically lead to environmental benefits. Companies like applying dematerialisation, but it is important to remember that dematerialisation does not necessarily mean environmental management. The main barrier for applying dematerialisation at company level is the Life Cycle concept, which is not familiar or not often taken into account at companies. A specially designed management system for implementing dematerialisation at a company might not be necessary but probably speeds up the process.

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[1] *Time Saving Paradox*. When initially introducing faster transports e.g. the car saves time. With time the users adapt to the new system (behavioural adaptation) and might end up spending as much or even more time for travel.

Trudy Rood – A Model Structure For Consistency In Sustainable consumption Scenarios

A model structure for constructing consumption scenarios in order to determine related energy requirements was presented and discussed. The model was applied to the Netherlands, looking at the time span 1995-2030. The starting point of the research has been to fit human behaviour into boundaries, like time, money and available space. Consumption is considered in the model system to be influenced by economic growth, demographic changes, sociocultural developments, technological enhancement and policy measures.

The model combines information on expenditure on consumption components, environmental impact and efficiencies from different sub-models into a consistent overview of consumer spending and related environmental impact. The model handles the consistency between macro-economic income forecasts and micro-economic forecasts of behavioural developments. The consistency reached within the financial conditions is worked out to deal with rebound effects.

The consumer activities and underlying base parameters are integrated into a two-dimensional arrangement with domains of consumption (like food, housing and holidays) placed against means, e.g. products and mobility. Developments in consumption are also related to the direct energy use (such as petrol, electricity) and the embedded energy in goods and services.

As such, the model can be used to combine partial scenarios into more a wider and, in financial terms, more realistic scenario.

Carmen Alavarado – Quantifying The Effects Of Dematerialisation

Dematerialisation is generally considered to reduce environmental impact, but the environmental potential of dematerialisation is difficult to estimate. In the workshop, a method for quantitative analysis of this was therefore presented and discussed. The method is divided into two steps, Sector Analysis and Following of Material Flows, and relates environmental load to unit of added value.

The methodology was applied to a wide range of industries in the Netherlands and showed that not all forms of dematerialisation are effective and that international coordination is needed.

The model considers environmental load not environmental costs. However, incorporation of the cost concept in the model could be something to consider in the future.

Stephen Potter – Cutting CO_2 Emissions from Personal Transport: a consumption systems approach

By using a very simple equation, seen below, an interesting discussion can be held on how to reach sustainability goals such as Factor 10.

$$Population \cdot Consumption \cdot Technology = Environmental\ impact$$

In the discussion, the example of personal transportation in a British context was used and the discussion concerned how to reach Factor 10 efficiency by 2020. The population in Great Britain is not expected to change significantly, so the remaining question is how consumption and technology can improve efficiency with a factor of 10. The studies made show that neither changing consumption patterns nor technology innovations individually can reach Factor 10 and that a multiple approach is necessary.

The model shows that it is possible to reach Factor 10. However, technology innovations are in general much faster than behavioural changes and in order to reach the goals major efforts must be made to change consumption patterns immediately. One of the weaknesses in the simple model used

as the foundation for the discussion is that consumption and technology are, in fact, highly dependent on each other and can thus lead to significant rebound effects.

The main concern the author raised was that the necessary short-term technological improvements, such as improved fuel mileage of cars, may obscure the long-term needs of changes in consumption patterns and lifestyles, for example, by shifting to using public transport and ultimately addressing the mobility needs of consumers.

Mikko Jalas – A Time-Use Perspective On The Materials Intensity Of Consumption

The presentation addressed service orientation in consumption and the key dematerialisation possibilities of services. It claimed that the discussion maintains a functional view on consumption, which does not take into account the versatile and individual needs of consumers. Such an approach with limited scope for the subjectivity of consumption is open to rebound effects. The author proposed a time-use perspective as a complementing way to approach eco-efficiency while still allowing the subjectivity of needs and preferences. As empirical materials, the paper presented the energy requirements of Finnish household activities.

In the discussion about the model it was concluded that not all needs can be used for efficiency engineering, that the model assumes that consumption is limited by time not money and finally that this and similar models call for a better understanding of the structure and inertia of the time use of the consumers. Future work with the model could include adding material consumption/flows to the existing energy and time perspectives.

Andrius Plepys – Information And Communication Technologies' Role In Productivity Changes, Rebound Effect And Sustainable Consumption

Rebound Effects (RE) can be divided into three different categories; Direct/First order RE in forms of price effects (price elasticity), Indirect/Secondary RE in forms of substitution and income effects and finally Economy-wide/Transformational effects.

Traditionally the economists use the concept of rebound effect in a very narrow sense, when, for example, discussing the demand of single commodity such as energy. For ICT sector this type of rebound effects are negligible, while consumers do not by more computers because they become cheaper. However, the effects on higher order are probably rather substantial. Thus, it is necessary to expand the traditional notion of rebound effects when addressing the negative consumption effects from such complex systems as ICT sector.

The secondary and tertiary effects take place in the other economic sectors creating 'structural changes'. In addition, many other, often qualitative changes can be attributed to category of rebound-effects of a higher order (when referring to ICT sector). Such effects are in essence changing life styles and quality of lives. While making many processes more efficient ICT can have negative consequences for consumption of many commodities (both the physical and non-physical, such as time, for example).

The problem of the rebound-like effect of wider systems are important to keep in mind for policy makers, who can prioritise investments and policy support actions directed to the ICT and other sectors. The higher order effects are extremely poorly researched for this moment and therefore require serious attention from the research community. We still need historic empirical data from the relatively new sector, and the issue must be addressed by multidisciplinary research approaches.

Francois Schneider – ECO-INFO-SOCIETY – Strategies For An Ecological Information Society

Eco efficiency and Human sufficiency go hand in hand. This means that human needs limit the consumption, which lead us to a difficult question: How much is enough? The first important step to sufficiency is to be conscious of our limits due to cost, time, danger, effort, health etc. Product innovation seems to overcome these limits, making things cheaper, faster, safer etc. This leads to that the overall use of "improved" products increase and thus RE. The improvements of the products concerns in general only one (or a few) aspects while some other aspects might get worse. Furthermore, Schneider pointed out that the actions and choices of consumers are limited in many senses. First of all, technology and products as they are developed are not neutral, but affect the decisions of the everyday life. Secondly, consumers are also affected by social processes, such as fashion.

Sufficiency is actually being challenged by the efficiency innovations that make products cheaper, faster, safer, easier, lighter, smaller, *because* these innovations make it possible to increase consumption further: a *rebound effect* is created. Thus, even though products and service are more and more efficient per unit, especially with the development of the information technology, the total consumption of material and energy (and the impacts associated) are increasing due to the increase of number of units consumed.

In general, the *Rebound Effect* could be defined as *the increase of consumption linked to the reduction of limits to use a technology*. These limits might be e.g. monetary, temporal, social, physical, linked to efforts, spatial or organisational. However, the rebound effect is not inevitable and the nature of the rebound can be a subject for both science and policy. Considering its importance, rebound effect information associated with different products and service should be available within impact inventories. This includes data on the energy and material inputs *per Euro* of materials, products and services to deal with the transfer of money savings to consume other goods (the income effect). However the data inventories should also include information on the economy-wide and transformational effects at least qualitatively. Also data linked to non-economic type of rebound effect, linked to other types of consumption limits (like the energy or material input per hour of activity) would be important to further develop. The goal would be to supplement product and service innovation by *lifestyle innovation* toward lower consumption.

1.3 Wrapping Up Discussion

Many of the papers and presentations shared a common aim in their attempt to span the boundary of the concept of rebound effects. The authors saw the traditional notion of price effects as too narrow. Furthermore, it was suggested even considering the income effects might be too limited. It was argued that consumption might be limited by such factors as free time that cannot be returned to the monetary effects. Thus, they can neither be completely taken into account by the traditional notion of the rebound effects.

It was further noted that it is possible to gains more knowledge of the various forms of rebound effects and to incorporate this knowledge into the debate of sustainable consumption. However, such an effort requires dedicated efforts from both the research community and the policymaking. ICT was mentioned as a sector that is rapidly transforming both production and consumption and which therefore might also be of special relevance concerning the discussion of the rebound effects.

In the discussion, there were slightly contradictory opinions on the use of the specific concept of rebound-effects. Some called, in the name of conceptual clarity, for a limited use, which is limited to first and second order impacts. However, other discussants remarked that also the wider system effects must be addressed and included within the discussion of rebound effects.

The time for the wrapping up discussion was unfortunately rather short, yet the discussion touched upon some interesting issues. Key issues in the wrapping up discussion were:

- Rebound effect is an empirical phenomenon, which depends on the preferences of consumers. It is hard to quantify Rebound Effects, since they tend to vary from individual to individual. This is particularly true for the time perspective of RE.

- When you raise the comfort you in almost all cases increases consumption. It is possible to try to optimise consumption and work for sufficiency but people will always want more – The needs are growing. This shows that it is necessary to establish a culture that is aware of the problems and try to influence behaviour in that way.

- Factor 10/20 debate etc. often focuses on technological improvements. These are, in reality, limited incremental changes and by far not enough to reach the goals – Behavioural changes are needed. Thus also the notion of rebound effects should expand to take into account the potential radical changes in consumption patterns.

- We can change structures and organisations but not cultures. Therefore, let us change what we can and see what happens to the things we cannot change.