

MOOC ENVIRONMENTAL IMPACTS OF DIGITAL TECHNOLOGIES

4.3 How to anticipate the impacts of a new technology?

Auteurs :

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Activité 09 : How to anticipate the impacts of a new technology?

The arrival of new technologies generates complex debates linked to uncertainties about their promises and impacts. Indeed, a technology can make it possible to improve efficiency, i.e. to provide an equivalent or better service for less consumption. From this point of view, it is thus presented as being better for the environment. At the same time, the gain in efficiency will lead to the creation of new uses and new services. These are the rebound effects.

Capsule slide	Related text
<p>The environmental effects of teleworking</p> <p>Knowledge of direct impacts alone is not enough to provide a realistic picture of the impacts of a technology. Indirect, positive or negative effects, including rebound effects, must also be magnified.</p> <p>We take as an example teleworking, which is enabled by the massification of digital technologies, but the principle of global understanding of the impacts on which we are going to work applies more widely everywhere.</p>	<p>The environmental effects of teleworking</p> <p>Knowledge of direct impacts alone is not enough to provide a realistic picture of the impacts of a technology. Indirect, positive or negative effects, including rebound effects, must also be checked.</p> <p>We take as an example teleworking, which is enabled by the massification of digital technologies, but the principle of global understanding of the impacts on which we are going to work applies more widely everywhere.</p>

Capsule slide**Related text****Information****Positive or negative?**

Nine direct or indirect effects of telework are proposed. Place each of them in one of the two columns, according to its positive or negative impact on the environment.

1. Reduction in total office space
2. Reduction of traffic congestion
3. Limitation of business travel
4. Increasing the distance to work
5. Moving to a larger house
6. Purchase of additional equipment
7. Increasing of personal travel
8. Increasing energy costs in the home
9. Increasing purchasing power

Positive impacts**Negative impacts**

Capsule slide	Related text
<p>A mitigated summary!</p> <p>Intuitively, the impact of teleworking seems to be largely positive at the environmental level by reducing road traffic. Yet the other effects induced to take into account significantly nuance the balance sheet...</p>	<p>A mitigated summary!</p> <p>Intuitively, the impact of teleworking seems to be largely positive at the environmental level by reducing road traffic. Yet the other effects induced to take into account significantly nuance the balance sheet...</p>
<p>Indirect positive impact</p> <p>Some companies that practice teleworking regularly (even outside of health crises) have reduced the total office space to move towards flexible occupancy of available space. This reduces greenhouse gas emissions from office manufacturing.</p>	<p>Reduction in total office space</p> <p>Indirect positive impact</p> <p>Some companies that practice teleworking regularly (even outside of health crises) have reduced the total office space to move towards flexible occupancy of available space. This reduces greenhouse gas emissions from office manufacturing.</p>

Capsule slide	Related text
<p>Indirect positive impact</p> <p>As there are fewer vehicles on the roads, there is less congestion and therefore vehicles that drive less fuel. In addition to the flexibility of the hours introduced by teleworking and the fact that public transport is less crowded, people who are mobile may be encouraged to use public transport instead of their vehicles.</p> <p>This contributes to the reduction of greenhouse gases.</p>	<p>Reduction of traffic congestion</p> <p>Indirect positive impact</p> <p>As there are fewer vehicles on the roads, there is less congestion and therefore vehicles that drive less fuel. In addition to the flexibility of the hours introduced by teleworking and the fact that public transport is less crowded, people may be encouraged to use public transport instead of their vehicles.</p> <p>This contributes to the reduction of greenhouse gases.</p>
<p>Indirect positive impact</p> <p>Teleworking reduces business travel, which mainly uses fossil fuels. This reduces overall greenhouse gas emissions.</p>	<p>Limitation of business travel</p> <p>Indirect positive impact</p> <p>Teleworking reduces business travel, which mainly uses fossil fuels. This reduces overall greenhouse gas emissions.</p>
<p>Indirect negative impact</p> <p>In the longer term, teleworkers are tempted to find housing further away, to be in the countryside, in more pleasant living conditions. Unfortunately, the commuting to work that will still have to be done 1 or 2 or 3 days a week will emit more greenhouse gases.</p>	<p>Increasing the distance to work</p> <p>Indirect negative impact</p> <p>In the longer term, teleworkers are tempted to find housing further away, to be in the countryside, in more pleasant living conditions. Unfortunately, the commuting to work that will still have to be done 1 or 2 or 3 days a week will emit more greenhouse gases.</p>

Capsule slide	Related text
<p>Indirect negative impact</p> <p>In the longer term, if they need to acquire new housing, teleworkers who do not currently have an office will be tempted to acquire a somewhat larger house. Teleworking on the kitchen table or in the living room in the middle of children has indeed limits!</p> <p>This increase in the housing area will involve greater energy expenditure.</p>	<p>Moving to a larger house</p> <p>Indirect negative impact</p> <p>In the longer term, if they need to acquire new housing, teleworkers who do not currently have an office will be tempted to acquire a somewhat larger house. Teleworking on the kitchen table or in the living room in the middle of children has indeed limits!</p> <p>This increase in the housing area will involve greater energy expenditure.</p>
<p>Indirect negative impact</p> <p>Teleworkers need to acquire additional equipment (computer, printer, screen, etc.) leading to an increase in greenhouse gases, in particular due to the manufacture of such equipment.</p>	<p>Purchase of additional equipment</p> <p>Indirect negative impact</p> <p>Teleworkers need to acquire additional equipment (computer, printer, screen, etc.) leading to an increase in greenhouse gases, in particular due to the manufacture of such equipment.</p>
<p>Indirect negative impact</p> <p>The personal travel of teleworkers (buy bread, take children to school, stop at the sports club) that were previously associated with commuting to work are now made specifically: this reduces the expected gains.</p>	<p>Increasing of personal travel</p> <p>Indirect negative impact</p> <p>The personal travel of teleworkers (buy bread, take children to school, stop at the sports club) that were previously associated with commuting to work are now made specifically: this reduces the expected gains.</p>

Capsule slide	Related text
<p>Indirect negative impact</p> <p>The house or apartment that was previously not heated in the day must now be heated because it is difficult to work without moving at 16 or 17 °C! This further contributes to reducing the expected gains.</p>	<p>Increasing energy costs in the home</p> <p>Indirect negative impact</p> <p>The house or apartment that was previously not heated in the day must now be heated because it is difficult to work without moving at 16 or 17 °C! This further contributes to reducing the expected gains.</p>
<p>Indirect negative impact</p> <p>If the <u>teleworker</u> has not made any new investments in housing and the gains in travel to work result in an increase in purchasing power, it is likely that the <u>teleworker</u> will use the money to consume something else: this will most likely result in greenhouse gas emissions.</p>	<p>Increasing purchasing power</p> <p>Indirect negative impact</p> <p>If the teleworker has not made any new investments in housing and the gains in travel to work result in an increase in purchasing power, it is likely that the teleworker will use the money to consume something else: this will most likely result in greenhouse gas emissions.</p>

Capsule slide	Related text
<p>Summary</p> <p>A recent study by Ademe, seeking an overall assessment of the effects of teleworking on the environment, finally shows a mixed result.</p> <p>Indirect effects are in fact very difficult to anticipate and quantify, especially since the data are either non-existent or subject to doubt, as most often provided by the industry themselves. In any event, this example shows that there is no magic benefit introduced by digital. This depends on the uses, behaviours and policies that accompany the deployment of a technique.</p> <p>Source : Caractérisation des effets rebond induits par le télétravail, Ademe 2020</p> <p>[Accessed on: 03/01/2022]</p>	<p>Summary</p> <p>A recent study by Ademe, seeking an overall assessment of the effects of teleworking on the environment, finally shows a mixed result.</p> <p>Indirect effects are in fact very difficult to anticipate and quantify, especially since the data are either non-existent or subject to doubt, as most often provided by the industry themselves. In any event, this example shows that there is no magic benefit introduced by digital. This depends on the uses, behaviours and policies that accompany the deployment of a technique.</p> <p>Source : Caractérisation des effets rebond induits par le télétravail, Ademe 2020 [accessed on : 03/01/2022]</p>

If you wish to go deeper into certain concepts

[The rebound effect](#) explains what the rebound effect is and why technical improvement is not the answer.

Conclusion

It is very difficult to take into account all the rebound effects, but some studies try to do so. In the case of energy, Lange et al (2020) created a model to take into account systemic rebound effects [1]. They concluded that digital technology causes a rebound effect beyond 100%. This is referred to as a "backlash", where the initial benefit is more than fully offset.

Digital technology as a whole has thus far caused an increase, not a decrease, in global energy consumption. These results are completely at odds with the claims of digital lobbies such as GeSI and Accenture (2017), who greatly underestimate rebound effects in their analyses [2].

Another attempt to account for systemic rebound effects was made by Magee and Devezas (2017) [3]. They created an economic model including potential rebound effects. They used data from the last fifty years and found that technological progress had not led to a decrease but to an increase in the total amount of energy used. According to them, the rebound effect in terms of energy would be greater than 100%.

But rebound effects are not necessarily immutable and are also the consequence of political and societal decisions. Research is underway to determine under which circumstances rebound effects occur, and how to reduce them (van den Bergh 2011 [4]; Santarius et al. 2018 [5]).

Ways forward include slowing down the construction of new infrastructure that causes rebound risks, reducing power inequalities, and reducing competition at all levels (Wallenborn 2018) [6]. Policies leading to more sober and responsible consumption could also have a positive effect (Gossart 2015 [7]; Hilty 2008, p.72 [8]; Bordage 2019b [9]).

Thus, it should not be assumed that technologies are necessarily bad for the environment (Hilty and Aebischer 2015) [10]. It is up to states, communities, international organisations, companies and individuals to make choices leading to the use (or non-use) of technologies that reduce environmental impact. However, without a change in societal, political and economic direction, it is likely that digital technology will continue to be a hindrance rather than an asset in building sustainable societies.

So what kind of society do we want?

Sources

[1] Steffen Lange, Johanna Pohl, Tilman Santarius. Digitalization and energy consumption. Does ICT reduce energy demand? Ecological Economics, 2020, 176. Available online from the [publisher](#) by subscription [21/06/2021]

[2] GeSI (Global e-Sustainability Initiative) and Accenture. #SystemTransformation: How digital solutions will drive progress towards the sustainable development goals [online]. Brussels. GeSI [online], 2017. Available at [Gesi](#) [28/06/2021]

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[4] S. Van der Ryn, VS. Cowan. Ecological Design. 10th Anniversary. Island Edition, 2011

[5] Tilman Santarius, Hans Jakob Walnum, Carlo Aall. From Unidisciplinary to Multidisciplinary Rebound Research: Lessons Learned for Comprehensive Climate and Energy Policies [online]. Frontiers in Energy Research, 2018, 6. Available from [publisher](#) [07/10/2021]

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- [7] C. Gossart. Rebound Effects and ICT: A Review of the Literature. In: L. Hilty and B. Aebischer, (eds). *ICT Innovations for Sustainability*. Springer, 2015, pp.435-448
- [8] L. Hilty. *Information Technology and Sustainability: Essays on the Relationship between Information Technology and Sustainable Development*. Books on Demand, 2008, p. 72
- [9] Frédéric Bordage. *Empreinte environnementale du numérique mondial*. GreenIT.fr, 2019
- [10] L. Hilty, B. Aebischer. ICT for Sustainability: An Emerging Research Field. In: L. Hilty, B. Aebischer (eds). *ICT Innovations for Sustainability*. Springer, 2015, p.3-36

Crédits :

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