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Sustainability series (III): Printing bad – internet good?

In the second part of our blog trilogy last week on the subject of sustainability, we discussed the question of what climate change has to do with the graphic arts industry. Now you could continue that line of thought and say: If paper generates so much CO₂ and entire trees are consumed, why print at all? Why do we not use our tablets and smartphones to read and do away with all the nonsense about dead trees? But this line of thought neglects some facts about these alternatives.

Let us consider the life cycle of a book. The first steps of a book mostly start with someone giving old printed material such as magazines or books to the waste paper collection. The majority of all paper grades produced in Germany has a share of recycled paper. The [recycling rate](#) in the European Union is 72 percent.

Trees in the form of fresh fiber are therefore used as little as possible. Not because paper producers feel sorry for them, but because fresh fiber material is expensive and needs to be imported over long routes. And don't forget that paper or wood is a renewable material. If used responsibly, it can also be available to future generations.

Little recycling among the digital alternatives

Smartphones and tablets, by contrast, require rare earths (in particular for magnets in electronic components), which are barely recycled. What's more, they are mostly mined in China and Inner Mongolia in conditions that I would describe as uncomfortable from a European perspective.

The plastic parts are also very rarely recyclable. The quality of recycled plastics is often insufficient for glossy products.

Apple states that only 35 percent of the plastic components in an iPhone 11 are made from recycled materials (remember: paper has a recycling rate of 72 percent). Similar to books, the majority of the emissions is generated when producing the devices – according to a study conducted by the Öko-Institut e.V., about 80 percent. With an e-reader (not a tablet), 8 to 10 kg of CO₂ equivalents are released on average, most of which are made up of sulfur hexafluoride (SF₆), which has an extreme impact on the environment. It is considered to be the strongest known [greenhouse gas](#).

Amazon states that it sets the CO₂ footprint of its devices very precisely and in detail and creates models on that basis to calculate the emissions. However, it does not publish the data – a pity...

Apple, by contrast, states a carbon footprint (i.e. over the entire economic life-time of the product) for its latest generation iPad Pro of 151 kg of CO₂. However, it must be remembered that an iPad has a far greater range of functions than the mere reading of books. The example shows, though, that purchasing an iPad to simply read books is certainly not a [green alternative](#).

The book emits CO₂ only once – during production

However, there is one silver lining to the iPad: its packaging. It is 96 percent fiber, which comes entirely from woods with sustainable forestry. After all, 43 percent of the fiber content comes from [recycled sources](#).

Another difference is quite obvious: the book emits CO₂ only once over its entire life cycle – during production.

Tablets and smartphones, however, require power to work. Added to this is the growing trend not to store books on the device, but in the cloud. Every time the book is opened, all data is freshly transferred, which increases indirect energy consumption by a value that is hard to estimate. Regardless of how energy efficient tablets, smartphones and data centers might become, the book will always come out on top.

65 million tons of electric waste annually

Of course, you also need light to read a book in the dark. But I assume that tablets are also not read in dark rooms. What's more, books are rarely thrown away. The average life cycle of a book is therefore about twelve years, in which time, the book is mostly read by several people. We all know the scenario where we are given grandma's box of books with more than 50 dime novels. After sorting through them, grandma's old books can at least still go to recycling.

The e-reader, however, has an average life expectancy of two years. Another thing we know all too well – especially after the [warranty](#) has expired. Recycling tablets, however, is not so simple. The majority of the electric waste is toxic waste and ends up in landfill sites in developing countries. And the burden of the waste is crushing; just remember Knud Wassermann's blog. Sixty-five million tons of electric waste are created globally every year, and only 16 percent is recycled.

Ever more electronic devices

Added to this is the vast volume of tablets, smartphones and other gadgets. According to

Cisco, one of the world's largest telecom companies, every person in Western Europe will own 2.9 units of [these devices](#) by 2023.

Here, the so-called rebound effect plays a major role. Because semi-conductor, screen and processor technology is becoming ever more energy-efficient, ever greater resolutions (we have now arrived at 16k) and screen sizes are being offered. The question now is whether this increase in performance will offset the reduced power consumption.

There are some indications of this. For instance, the figures of the French Shift Project show that the so-called Koomey's Law is increasingly cooling off, i.e. a plateau has been reached. It says that the energy efficiency of computer capacity has doubled every 1.6 years for 60 years. Since 2000, it has only doubled every 2.7 years. The Shift Project think tank indicates that the efficiency improvements are already no longer sufficient to compensate for the 9 percent annual increase in [energy demand](#).

What can be done?

So what do we make of these figures? We can draw two conclusions from them. First, the main potential for cutting CO₂ emissions in the print industry is in saving paper. Heidelberg and Muller Martini, who both conducted such analyses already some time ago, also come to the same conclusion.

In particular, the saving of start-up waste and the avoidance of machine stops can help to make book production as climate friendly as possible. The maximum use of a format for collective forms can also reduce CO₂ emissions, of course. By comparison, in my sample calculation, for 5,000 books, about 166 kg of CO₂ are made up by production waste alone.

To make better use of the format, Muller Martini offers, for example, the option of replacing traditional barcodes with specific image elements using the Asir 3 barcode identification system. The additional white area, the "quiet zone" with the barcode printed on it, is not used at all.

Although print finishing is responsible for only a small share of CO₂ emissions in the print process, there are nevertheless efforts in this production area to reduce the footprint. In Muller Martini's latest machines, servo motors in the IE3 efficiency class are used. They use an energy feedback system for the dynamic movement of heavy parts, which return part of the energy used back to the grid.

Potential savings with perfect binders

Muller Martini has identified potential savings, in particular, with [perfect binders](#). For instance, instead of the traditional application rollers, glue nozzles can be used. Only small amounts of glue need to be used for them and no longer entire pots pre-melted.

Producing books locally can reduce transport via truck, ship or even plane, thereby also protecting the environment. Muller Martini also offers corresponding solutions to this end with the combination of the Vareo perfect binder/InfiniTrim three-knife trimmer.

A workflow management system is also a vantage point for saving resources. Digital job sheets, with the JDF format, prevent errors that may have resulted in production waste, waste sheets or even faulty copies.

Such a system also makes a life cycle analysis for print products possible. If I know my energy consumption and the details on the resources used, a precise analysis of the life cycle of each print product becomes possible.

Conclusion

What are our findings from this whole subject? What have we learned from this three-part blog series?

1. First (and this is my most important concern): the global pandemic has not made climate change any less topical. Quite the opposite. We are running out of time. The figures are not looking good for mankind.
2. Yes, we can scapegoat other countries and say that they should finally do something about it. But we must be clear that our consumption behavior means that we are also responsible for these emissions. I am including myself here, because I, too, have a smartphone and it comes from China.
3. The majority of greenhouse gas emissions comes from our increasingly rising hunger for energy. Energy that is not only used by industrial production, but also by the increasing volume of flashing plastic waste that we use day to day in order to watch Netflix series or share images from our vacation in the Caribbean.
4. The pulp, paper and print industry accounts for around 1 percent of global CO₂ emissions. The majority is created by the pulp industry, which makes up about 80 to 90 percent. The remaining energy use generates some 10 to 20 percent of the emissions. Of them, in turn, about 10 to 15 percent are caused by print finishing. The total share of print finishing in the product is therefore about 2 percent.
5. Despite this being only a small share, there are innovative printing companies that are becoming active in the area of sustainability and creating ecological benefits with smart automation or by recovering energy. Digital transformation is making the analysis of product life cycles as easy as never before, considering that today's objective is to track every product.
6. Not all digital alternatives are as green as we always think. Digital infrastructure already emits 4 percent of global greenhouse gases. According to forecasts, the CO₂ emissions of the IT sector are set to double to 8 percent by 2025.
7. The resources of our blue planet are limited. If we want to continue to generate wealth, we will have to think about how we use resources that will also need to be available in the future. Given the right framework conditions, paper can be such a raw material.
8. Print products such as books emit only about one tenth of carbon dioxide compared to the digital alternative during production. Subsequently, they emit zero emissions as opposed to tablets and e-readers. And books have a superior economic life-time, are mostly lent on to other people, and can be nearly 100 percent recycled.
9. Book-of-one production can cause shorter transport routes and less excess copies, but slightly increases the CO₂ emissions per copy.

Sustainability means more than mere ecological aspects

During my research for this blog, I came across a statement that I deem highly relevant for the entire climate debate: "Don't think ecologically, but comprehensively."

This might sound provocative, and that is the intention. But there is also a lot of truth in this statement. After all, sustainability means more than mere ecological aspects. Economic and

social aspects are equal to such objectives. They ensure that objectives remain viable and fair.

If you buy a tablet for environmental reasons so that no more trees are felled in the future, this initially makes sense from an ecological perspective. Obviously: fewer destroyed trees. But if you buy the latest iPad model every other year and additionally replace the battery every year, this approach no longer works.

Raise awareness and improve consumer behavior

The climate issue has been emotionally strongly charged by the media and campaigns such as Fridays for Future. I don't think this is the right approach. It is certainly important to highlight the problem and to raise awareness and improve consumer behavior. But it is also important not to resort to collective thinking patterns.

Plastic is bad, felling trees is bad, online is always greener are but a few of the industry-relevant prejudices.

If, for example, a plastic film around a cucumber ensures that it remains fresh for twice as long, it certainly makes sense, even if it does not seem ecological at first glance. However, it is also sustainable for other reasons.

Climate change is a problem and the problem is real.

Now this problem needs to be solved – and that is best achieved with logic and thinking. Going to school also helps by the way...

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