Research Design:

Digital Infrastructure and Environmental Performance: Antagonists or team players?

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# Three modern-day phenomena and their connections

Whilst talking about a few of the most ongoing and interesting social phenomena of the late 20th and the beginning 21st century, digital revolution and climate change, a third societal process does inevitably come up sooner or later: globalization. As globalization is both having a huge impact and being reliable on digital and environmental change, the first two mentioned phenomena are tightly interconnected to the globalization process.

It is well-known that globalization without new ways of digital communication around the globe such as the internet or social media, to just name a few, would not be the society-influencing, daily-life-changing social phenomena by which modern society is deeply formed (Clapp et al. 2011: 21). Maybe the youngest or at least the most recently discussed phenomena is environmental change with its concomitants like climate change or water pollution. But despite the relatively new emergence of environmental change as a worldwide discussed topic, it is still strongly connected to both globalization and digital infrastructure. Nearly all the problems and challenges world society is facing because of the changing environment are globalized problems which can’t be solved by single states and mostly not even by continental groups.

But whilst the connections between globalization and environment and the strings between digital infrastructure and globalized social processes seem to be discussed and examined under a lot of scientific aspects and by different academic approaches, the codependence of digital infrastructure and environmental performance still seems to give room for empirical research and a data-based analysis.

While one advantage of focusing on digital infrastructure and environmental performance is the above described rooms and possibilities for new empirical research, the area and the research topic are both largely extended ones. Therefore, and to live up to the common quality expectations of state-of-the-art empirical studies, this analysis does focus on three aspects of digital infrastructure influencing environmental performance of nations. These three aspects, that can be expected to be clarified and conceptualized during this study, are: Internet access and parcel shipping, internet usage and energy consumption and last, but not least internet access and environmental knowledge. These three branches of digital infrastructure should serve as explaining basics for the following questions: Do countries with a high developed digital infrastructure perform better or worse in environmental aspects? Or is the performance of countries regarding climate change and environmental problems even in some way dependent from its state of digital infrastructure?

In order to lead through the following empirical research, this question is trying to combine all interests and problems from above:

**How does the digital infrastructure of states affect their environmental performance?**

# Literature review

As already mentioned, the connection between digitalization and environment are not as thoroughly discussed and analyzed in the scientific world as the social and economic relationships between globalization and digitalization or globalization and environmental issues. Nevertheless, still a lot of interests and expectations lie on many research areas regarding the interaction of digitalization and environmental sustainability. Many different academic fields have focused on the various possibilities and transformations digitalization could bring in the scientific discussion about sustainability issues. Even if this paper focusses on environmental and ecological problems, when browsing through literature and scientific papers regarding the changes brought by modern digital world, data protection and social justice do inevitably come up as other areas of sustainable development affected by digital change. Therefore scientific, humanistic and economic approaches have been made to discover the potential solutions and discuss the scientific revolution brought by digitalization. Especially geographic papers can be found often, concerning modern urban or suburban life affected through digitalization. Particularly technologies and projects like smart cities or smart homes are hereby discussed and analyzed frequently. Beyond that, another concept seems to become more relevant in academic research: The Internet of Things (IoT). From physicians over sociologists to politicians, a broad spectrum of actors seems to take interest in the development that nearly all common household items, but also many public goods and industry and economic related technologies are connected to the internet by some or another way. But not also this process at its core is monitored, also the possibilities and criteria for sustainable development of the IoT is followed by many groups of interest. In addition an even more recent and relatively unexplored phenomenon can be found in the latest papers concerning digitalization and IoT: the Internet of Everything (Bauer et al., 2014, p. 17; Deckert, 2020, p. 15). But the academic discourse does not only bring up positive changes and expectations brought to world throughout digitalization. Also, the risks and disadvantages of new digital structures traversing our daily life around the globe encourages the scientific community to further research. Hereby, due to its broad approach on the possibilities and risks of the development, a major conference at the Technical University Berlin must be mentioned: “Bits and Trees – the conference for digitalization and sustainability”. Held in November 2018, during this meet-up of experts and scientists of all areas discussed and brought up many ideas and issues that affect and touch or build the background for the chosen hypotheses of this examination. Regardless, most of the reports of the conference do operate on a qualitative level draw conclusions and advices of action based on the research and experience of the renowned experts. And here is where this examination tries to step in and approach the area in different ways of methods. The research question is tried to be answered in a quantitative manner based on international and detailed data from international regimes and organizations as the UN and the OECD. Thus, the core of the analyzed research question is if countries with a higher and better developed digital infrastructure perform better in environmental issues? Is it possible to visualize these theoretical connections by conduct a data-based analysis? A difference in the status-quo of digitalization and environmental performance in the different parts of the world is doubtlessly findable in the scientific discourse.[[1]](#footnote-1) Countless studies and reports show the gaps and disparities in the development of both areas, underlined throughout many data sources (Esty and Porter, 2005; Soumitra et al., 2016)

Altogether many several items touched by this examination are discussed and analyzed in the academic discourse meanwhile the big link between digitalization and environmental performance is not analyzed completely, not for now after all. And naturally this paper does not claim to even begin with logicalizing and thoroughly explaining this connection, at least the goal is to try to start with searching and lightly connecting a few of the many pieces the big puzzle of sustainable and ecological digitalization provides.

# Theory and hypotheses

As explained in the previous chapters, both digitalization and ecological issues as themselves and the connection between them are broad and differing phenomena, which can not be explained or simplified by one theory or theoretical idea. Therefore, a different method of theoretical groundwork is used. At first one main hypothesis is built up by a broadly held theoretical approach but more importantly, grounded by three specific sub-hypotheses. Each of these will then be undercoated by different theoretical approaches from particularly research areas.

## Main Hypothesis (DI 🡪 EP)

The fact that there must be somewhat of a connection between digital infrastructure and environmental performance seems to be implied. But before talking about the connection between digital infrastructure and environmental performance a few words on both phenomena alone seem appropriate.

### The development of digital infrastructure (vllt. Auch nicht)

- eig denkt man zuerst an Computer etc. und Datenübertragung

- Datenübertragung aber bedeutet nur eine Umgebung für den Fluss von Informationen, jetzt eben als Bits und 1n und 0n

- startete mit Buchdruck (Silver), vllt auch mit der Erfindung der Schrift

- diese Umgebung brauchte und braucht immer eine Arte von Ressourcen. Auch der exponentielle Buchdruck und die analoge Informationsstruktur der letzten Jahrhunderte brauchte dies 🡪 also liegt der Schritt nahe das auch die Entwicklung der digitalen Infrastruktur (bzw. Datenflussumgebung) neue aber auch grundsätzlich Ressourcen braucht 🡪 Ressourcen haben natürlich allein schon vom Sprachgebrauch unserer Zeit etwas mit Umwelt zutun 🡪 Alarmglocken schrillen 🡪 Ressourcen sind Voraussetzungen unserer Umwelt

- aber wie auch Silver betonte, brahcte der Buchdruck als neuer Datenfluss positives und möglichkeiten 🡪 insofern scheint es sinnvoll dass auch der neue digitale Datenfluss selbiges bringt

- drei von werden als subhypothesen untersucht

## Sub-Hypo 1 (DI-PC)

H1 🡪 economical

## Sub-Hypo 2 (DI-EC)

H2 🡪 technical

## (Sub-Hypo 3 (DI-EK))

H3 🡪 social

- gestiegene Datenmenge Silver reinbringen

-„Perfection is achieved, not when there is nothing more to add, but when there is

nothing left to take away“. (Antoine de Saint-Exupéry) 🡪 vllt. Erst in 3

- sufficient, but efficient digitalization (Lange et al.)

- serverfarmen/ IKT 🡪 23 Konsum 4.0

# Empirical Design

# References

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# Confirmation

I hereby confirm that this paper is entirely my own work and that I have not used any additional assistance or resources other than indicated. All quotations, paraphrases, information and ideas that have been taken from other sources (including the Internet as well as other electronic sources) and other persons’ work have been cited appropriately and provided with the corresponding bibliographical references. The same is true of all drawings, sketches, pictures and other illustrations that appear in the text.

I am aware that the neglect to indicate the used sources is considered as fraud and plagiarism in which case sanctions are imposed that can lead to the suspension or permanent expulsion of students in serious cases.

Regensburg, 7/27/2020 Berg Jakob

Place/ Date Name Signature

1. Hereby is not, different than before, the connection between the two issues meant, but the academic discourse focusing on each of both areas. [↑](#footnote-ref-1)