![ELEPHANT IN THE LAB]

Transdisciplinary research: Pain or Gain?

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Long title	Transdisciplinary research: Pain or Gain?
Author	Katrin Martens [1]
Author affiliation	[1] Leibniz Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany
Author bios	Katrin Martens is a research fellow in the working group "Co-Design of Change and Innovation" at the Leibniz-Centre for Agricultural Landscape Research (ZALF). She is doing her PhD on innovation governance and knowledge transfer in rural areas at the Berlin Institute of Cooperative Studies (BICS) at Humboldt-University zu Berlin. Katrin Martens studied Applied Geography at the RWTH Aachen and Resource Analysis and Management at the Georg August University of Göttingen. She gained international experience during her research fellowship at the James Hutton Institute in Scotland and during a field study in Sumatra, Indonesia.
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Introduction

As a young researcher, I have already worked in three large collaborative projects dealing with innovation governance in land use contexts. Transdisciplinarity was always a topic in my past work, but for me each of these projects had a different flavor of transdisciplinarity and brought me different insights. This article is not a guide to a perfectly flavored dish, but should facilitate access to the subject and provide an argumentation basis. I will start with a brief introduction to

my field of study and work experience to date, as this article is structured along this path and the lessons I have learned along the way.

Why studying innovation governance in land use contexts?

Innovation is a simple yet abstract concept. Its basic meaning has not changed since Schumpeter (1934) defined it as "doing new things or doing old things in a different way." What has changed, however, are the circumstances in which we live, and thus the conditions and demand for innovation in different disciplines (Rammert et al. 2016). While innovation research has long been dominated by economics and focused on economic growth, the field has broadened at least since the publication of the Brundtland Report in 1980, and innovation has become of interest to a variety of disciplines aimed at sustainability, such as land use science. With this shift and the emergence of new areas of innovation, new concepts and theories have evolved that attempt to explain how innovation works and how people adopt or develop new innovations (Moulaert, Sekia 2003, Bock 2012, 2016). Let me take three examples from the projects I've worked on to show you the abstract but important side of managing innovation in a land use context.

As a master's student, I had the opportunity to participate in a large research project that investigated the impact of oil palm production on the environment in Indonesia. As I was very interested in policy instruments at the time, I wondered how the palm oil value chain worked and how it could become more sustainable. During my research and thanks to my supervisor, I came across the topic of sustainable certification: Certification as a tool to manage innovation towards sustainable development. In the context of Indonesian palm oil, I was interested in two certification schemes: one developed by European retailers that was supposed to be voluntary for farmers, and a mandatory certification system set up by the Indonesian government. I wanted to know how the two processes worked in practice for small-scale farmers. I thought about conducting a survey, but decided to take a more open-ended research approach (Martens et al. 2020), which turned out to be a really good idea. Why? I'll get to that later.

After completing my master's thesis, I got a job in a collaborative research project that looked at how knowledge transfer works between rural and urban areas. In my department, I investigated how and under what circumstances cooperatives form to maintain or build infrastructure in rural communities. Since innovation theories and concepts were mainly from urban areas and focused on economic growth, I had a hard time finding theoretical concepts that fit my context (Shearmur 2012). I was aware that what people were doing in rural areas was innovative (Martens et al. 2020). However, for me the questions remained:

- At what point do we talk about an innovation?
- Once the cooperative was found or once the projects were successfully developed?
- Are we talking about a process where different innovations are embedded?

These questions illustrate that innovation theory is not simple and it is important to find a concept that fits your research question.

While my project ended after three years. I got a 6-month part-time contract from another institute. There, my task was to help the research group finalize a 5-year research project. In total, 9 innovation groups were established, consisting of practitioners and research partners. Topics ranged from creating prototypes for agro-forestry and agro-photovoltaics to studying mechanisms that help areas with energy transition and identity building. In addition to coordination of this project, my research group had the task of conducting transdisciplinary research. So here I was: Forced to actually deal with the topic of transdisciplinary research.

These insights show that innovations cannot simply be steered from a different cultural and geographic space and that they cannot be thrown into one bowl. With this in mind, you have the background knowledge you need to follow the next parts of my transdisciplinary journey.

Transdisciplinary research as pain.

The old battle between quantitative and qualitative research. There were over 20 research groups involved in the oil palm project. As a master's student, I didn't get to know all of them because I was only there for one year. However, I was able to observe that there were far more groups working on natural science topics, i.e. determining soil qualities, counting plants and insects, taking care of climate measurement tools, than social science groups. Moreover, of the 8 groups that worked on social science topics, most were economists who used surveys or experiments to collect data, while only one group used qualitative methods. This group was the only one that could not express its significance level in numbers. As you may have guessed, I was part of this cohort. My experience was that what we did was difficult for the others to understand. I remember people saying - that's the group that just talks to people.

Speaking different languages. After my experience in the first project, my next research project dealt with the question of how to increase knowledge transfer between rural and urban areas. I was not involved in the proposal writing because I was writing my master's thesis in another city at that time. I found myself in a project that had already started three months earlier, with five different institutes working together, approaching the topic with completely different innovation angles and theories. The name of the project was "Changing Perspectives, Broadening Horizons." Frankly, I didn't understand that the title was about who we were. Until the end of the project, I thought it was about the context we were approaching. We usually had two joint meetings a year, but especially at the beginning it felt like nice people sitting around a table speaking completely different languages, while in between those meetings each partner was working individually on their research agenda. At the time, transdisciplinarity seemed trendy, so we had to do it, but at least I did not know why or how. The coordinating partner introduced us to a person in charge of transdisciplinarity who conducted phone interviews with each partner after these joint meetings, but other than that there was little interaction. I remember in the beginning feeling like I was

being watched or even judged at the meetings. Moreover, I couldn't really see the need for such a person either, because I thought, well, what we all do is more or less social science. I came from a different background where qualitative approaches still had to justify being real science, but that wasn't necessary in this project. I felt we were one discipline. And so I didn't listen carefully and I didn't learn much about what the other programs were doing.

Stop pretending. Science sometimes has its own pace, as does everyone's life. Since I didn't finish my PhD in three years, I was lucky to get this part-time contract that also had the theme of innovation in land use contexts. Zscheischler and Rogga (2015) and Pohl (2008) noted, the topic of sustainable land use is a diverse and complex topic, which requires the integration of different disciplines as well as local knowledge sources in order to capture these diverse societal needs. I was asked to evaluate interviews that were conducted with the project coordinators of the 9 innovation groups. I found myself in some of the responses from those interviews: scientists who had to learn to work with different disciplines, scientists who didn't really know what to expect from transdisciplinary researchers. I also found something else that got me thinking. Let me try to explain: When applying for research funding, researchers are sometimes required to be experts in areas they are not familiar with. So, being an expert in a particular technology that could improve sustainable land use does not necessarily mean being an expert in innovation research. However, both areas must be addressed for a successful application. On the one hand, portraying this as a discovery may sound strange, since it is, after all, the job of research to touch on these areas of uncertainty. To become an expert in a certain field requires a lot of time. It is certainly our job to acquire and link new knowledge in our field, but it usually doesn't make sense to start with a new area of research. In addition, as one's career advances, responsibility increases and therefore the time to learn new soft skills, research areas, methods and theories decreases. When you see how much "pain" in terms of the time and conflicts it cost researchers to find a suitable theoretical framework to study their innovation and to reflect on their actions on a meta-level, the questions arise:

- Whether this time could not have been better spent on something else?
- Whether it would not be more efficient and meaningful if the funders discussed these requirements with the researchers together, instead of forcing every applicant to pretend to be an expert in everything?

Although pain is a harsh word in this context, this title was chosen in part because of the rhyme to the word gain, and in part because my experience so far with the topic of transdisciplinarity cannot be described as great. Diving into the literature, I found that many scientists have probably had experiences similar to mine. Specifically in the field of land use science, Zscheischler and Rogga (2015) mention that the topic of transdisciplinarity is fairly new. And as we know, humans rarely want to cuddle with the unknown. Jakobsen et al. (2004) identified some reasons why transdisciplinarity causes pain, such as, that transdisciplinary is time consuming, people's lack of skills, different terminology between disciplines, geographic separation, different methods, power hierarchies between disciplines, and stereotypes that still exist. While these

points were almost all also mentioned by Tress et al. (2007), he added the difficulty in agreeing on common problem formulations, the unwillingness to try something new, and the lack of personal chemistry. Lang et al. (2017) point out the urgent need to overcome these barriers. They note that in sustainability science in particular, transdisciplinarity should be a central practice and should no longer be perceived as a burden.

Transdisciplinary research as gain

So let's focus on the positive side and start with a definition of transdisciplinary, finally. Scholz (2000) defined transdisciplinarity as "a principle for organising processes of mutual learning and problem solving between science and society." I wouldn't claim to be an expert in transdisciplinary research. Questions I ask myself, for example, are:

- Where does transdisciplinarity begin and where does it end?
- Do we always need at least two different actors, or can the fact that scientists, like all people, are shaped by society and are therefore constantly in danger of violating good scientific practice already be described as a transdisciplinary debate?

However, I have learned some things in this field I would like to highlight.

The research process. Starting with the example of quantitative versus qualitative research. Two completely different approaches to research, each with its own purpose and not worth the controversy that still exists (Jakobsen et al. 2004, Tress et al. 2007). I'll never forget my professor's delight when he told us that he was asked to share some background knowledge, because some economist couldn't understand their survey data. Another example from my own work, had I gone into the field with a detailed questionnaire designed to measure the differences in the two certificates, all my preparation would have been wasted as the group of oil-palm farmers I was studying were in the process of obtaining the voluntary certificate, but had never heard of their own government's already established mandatory certificate. This is probably not news to you, but both quantitative and qualitative research is important. While we need qualitative research to approach new research fields, develop hypotheses, elaborate case studies and learn from them, quantitative research is needed to test those hypotheses. Thus, the two approaches are interrelated, interdependent and constitute a research process. Another interesting insight to this topic comes from Lund (2014) saying: *"This does not mean that social science does not produce knowledge, but it is historical and not unequivocal. Yet, the epistemological ethos of natural sciences has managed to dominate as an ideal of all scientific activity. This is unfortunate as it may lead to conjecture that social science is science of a lower quality. It need not be. But it is a different science."*

Language learning. The next stage and step in my discovery journey was to learn how scientists research similar topics. I have learned that different research questions and units of analysis require different theoretical frameworks, even if these approaches all come from the social

sciences. So it was really about changing perspectives and broadening horizons by learning to speak other languages. In this case, it was about learning that different theoretical approaches can yield new insights that benefit the entire project. As Lund (2014) would frame it: "*There are many concepts, which will make only modest sense in a given case, but there is usually more than one set of concepts that will make a lot of sense.*" In the fifth joint project session, something changed. I can't say whether it was because we had spent a two-day workshop together looking at how innovation processes work in rural areas, whether it was because we had all gained in confidence and arguments because we had all evaluated our first empirical data by then, or simply because we sat together in a bar and drank beer for the first time on the first evening of the workshop. After the workshop, we understood each other's language better, understood what each other's purpose was in the project, and ended up producing a joint booklet and a conference together. Different context, same project, similar problem. Apart from working among academics, there was another lesson I learned from my field studies. When I was analyzing innovation processes in rural areas, I met a lot of people from civil society, public and private sectors who were engaged in these processes. What I learned is that innovation processes are not just about creating an innovation, but also about growing as a community and learning from each other by changing your perspective. It's not just about knowing each other's barriers, innovation occurs when barriers are overcome.

Knowledge broker. Being aware of the purpose of each other's methods, theories, and perspectives has definitely helped me become a better researcher. However, in my current project, I am learning a different perspective of transdisciplinarity. I realized that some topics require a knowledge broker and that transdisciplinary researchers, once given the trust (Foley et al. 2017), can act as such. Similar to the example of qualitative research supporting quantitative research with knowledge to understand their data. In the context of the innovation group project, it seemed difficult for the researchers to find their innovation concept because there are still hardly any suitable innovation frameworks for their context and they mostly had no innovation theory background. You can't just apply a concept you picked up once, because it might lead you to not understanding your results, or draw wrong conclusions. A knowledge broker can help with this task. It can be worked out together where the focus and goal of the innovation group is and thus what the appropriate concept might be. Also from a meta-level, transdisciplinary researchers can analyze and compare processes and thus try to advance the field of innovation studies in the land use context.Being aware of the purpose of each other's methods, theories, and perspectives has definitely helped me become a better researcher. However, in my current project, I am learning a different perspective of transdisciplinarity. I realized that some topics require a knowledge broker and that transdisciplinary researchers, once given the trust (Foley et al. 2017), can act as such. Similar to the example of qualitative research supporting quantitative research with knowledge to understand their data. In the context of the innovation group project, it seemed difficult for the researchers to find their innovation concept because there are still hardly any suitable innovation frameworks for their context and they mostly had no innovation theory background. You can't just apply a concept

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Final thoughts

Finally, when I read through the work package of my current project to understand what is expected of Transdisciplinary Research, our goals were defined as follows:

- Support the research processes of all research groups
- Establish a communication structure
- Initiate networking activities between the innovation groups
- Gather meta-knowledge to discuss the topic of sustainable land management with a transdisciplinary perspective.

Based on what I have "suffered" and experienced so far, I believe doing transdisciplinary research is incredibly smart. I suspect, however, that its acceptance and application requires constant reminding and practice. This can be challenging and uncomfortable, but being reminded and challenged is perhaps the most important task of transdisciplinarity. To return to the title of this article: Transdisciplinary research causes us pain so that we gain.

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