Research Plan Structure: First-Mover Advantage in Scientific Publications

Introduction:
Among scientific publications, a first-mover advantage is observable. This means that the impact and number of citations of a scientific paper are largely dependent on the time of publication. E.g. the first paper to be released in a specific field is more likely to be cited more often than a paper which is published later, regardless of the quality of these. This could lead to the conclusion that it may be better to publish a mediocre paper at an earlier time rather than an excellent one at a later time. This could result in a long term problem for the future of science.

Available resources:
Basically, two kinds of resources are available, currently, to analyze the problem described above:

1. Scientific papers:
    a. NEWMAN M.E.J., *The first-mover advantage in scientific publication,* 25th June 2009
    b. LIEBERMANN M.B., MONTGOMERY D.B., *First-Mover Advantage,* Strategic Management Journal, Vol. 9, 41-58 (1988)
2. Data sets (will be checked soon)

We will use different resources to implement our model. Additional resources may be used to answer our further research questions.

Modelling and research methods:
The resources mentioned above will be used to implement a simulation of the first-mover advantage in MATLAB. A basic model is already proposed by M.E.J. Newman in his paper (a), which is based on the fact that the probability for a paper to be cited is proportional to the number of citations it already has. This leads to a power law which describes the influence of the time a paper is published on the number of citations it will eventually receive. Thanks to this law we can compare the occurrence of the phenomenon in various scientific fields and research on the reasons a why it may be more prominent in certain ones.

Focus research questions:
Comparing, the data to the theoretical predictions will allow us to determine in which fields the first-mover advantage is more observable than in others. This may have certain causes which can be dependent or independent on the specific field or can be due to general reasons. Basically, our project can be focused on two research questions:

1. In which scientific fields can the first-mover advantage be observed?
2. Why is the first-mover advantage predominant in certain fields as opposed to others?

Considering the second proposed question, we would like to focus on certain fields which are relevant to our degree programs and that are new enough for comprehensive data to be found (e.g. gravitational waves).

<u>Additional research topics:</u>
If time allows, we would like to expand our project to further interesting topics, which can be found below:

- Influence of cross citations in interdisciplinary fields on the first-mover phenomenon
- Can the first-mover advantage be an indicator for the novelty of a specific field?
- Does the phenomenon have an effect on the emergence and decline of scientific paradigms?
- Which problems can the first-mover advantage cause? How can they be solved?