



Review

Core elements in the process of citing publications: Conceptual overview of the literature



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ABSTRACT

This study provides a conceptual overview of the literature dealing with the process of citing documents (focusing on the literature from the recent decade). It presents theories, which have been proposed for explaining the citation process, and studies having empirically analyzed this process. The overview is referred to as conceptual, because it is structured based on core elements in the citation process: the context of the *cited document*, processes *from selection to citation of documents*, and the context of the *citing document*. The core elements are presented in a schematic representation. The overview can be used to find answers on basic questions about the practice of citing documents. Besides understanding of the process of citing, it delivers basic information for the proper application of citations in research evaluation.

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1. Introduction

Citations in scholarly publications are used in very different contexts of research evaluation, which focuses on measurements of research performance, scholarly quality, influence, or impact (Moed, 2017; Moed, 2005). Citations are used to compare the performance of universities worldwide (e.g. Waltman et al., 2012), to analyze the impact of documents published by single scientists (e.g. Bornmann & Marx, 2014), to reveal citation classics and landmark papers in a field (see www.creplorer.net), and to study collaborations between institutions worldwide (Bornmann, Stefaner, De Moya Anegón, & Mutz, 2016). The use of citations in these and similar contexts has its roots in citation theories, which have been proposed in the past (see an overview in Cronin, 1984; Nicolaisen, 2007; Davis, 2009; Moed, 2005). The first and most prominent theory is the normative citation theory (proposed by Merton) where documents are cited if they have influenced the author of the citing document (Merton, 1973). Merton (1973) provides a theoretical basis for scientometrics, in which citations indicate peer recognition through mechanisms such as awards. His view on citations serves as a basis for the use of citations in performance measurements: more citations mean more recognition. According to Merton (1973), scientists are motivated to cite their peers, by their belief in the justice of giving credit, and the hope of increasing the likelihood of receiving credit through peer recognition.

The theory has been heavily criticized because it explains only a subset of citation decisions (or nothing at all). Many other factors besides cognitive influence and peer recognition have been identified in the past. These other factors are mostly regarded as confirmation of the social-constructivist theory of citing. In social-constructivist theory, citations are seen as rhetorical devices which are not related to the theory of Merton (1973). The social-constructivist theory questions the validity of the normative assumption of the use of citations as reward. Citations are seen as complex processes which cannot be captured by cognitive influence alone. A typical and highly cited paper in this context is Gilbert (1977) who regards citations as tools for persuasion. According to Gilbert (1977), an author selects documents for citing which were published by reputable authors in the field. Thus, the cited documents have not been selected because of their content, but in order to influence the reader as to the claims of the citing author.

Nicolaisen (2004) has critiqued the normative and constructivist theory of citing and proposed another citation theory (also see Nicolaisen & Frandsen, 2007; Nicolaisen, 2007) which is rooted in the so-called handicap principle, developed by Zahavi and Zahavi (1999). Nicolaisen (2004) claims that (human) citation behavior can be explained by theories of honesty and deception in animal communication. He argues that references may be seen as threat signals similar to those in nature such as approaching a rival. The potential cost of dishonest referencing, specifically when the citing references are made public, would make authors reconsider their deceiving behavior. A skilled author detects the false reference and then know where to criticize. Authors would usually not make the risk of losing their reputation by using weak or dishonest references. Nicolaisen (2007, p. 629) suggests that “the handicap principle ensures that citing authors honestly credit their inspirations and sources to a tolerable degree-enough to save the scientific communication system from collapsing”. He also notes that the level of honesty and deceit varies across scientific communities. A higher level of deceit might be seen in young and immature fields with a less attack by skilled authors (Nicolaisen, 2004). Nicolaisen’s theory has not been formally tested. Yet, it has attracted attention from other researchers, such as Small (2010). Small (2010, p. 192) discusses Nicolaisen’s theory, and agrees that a citation theory based on evolutionary theory is “a fruitful topic for further research”.

The current study is intended to synthesize the empirical literature on citations, which is mostly rooted in the normative or social-constructivist theories. The study has not planned to be a complete review of the extensive literature, but focusses on historical landmark papers and the literature published in recent years (since 2008). Similar overviews of studies dealing with factors influencing citations and important elements in the citation process have been published a decade ago (Bornmann & Daniel, 2008b; Nicolaisen, 2007). The current overview can be used in the evaluative practice to know the various elements, which are relevant in the citation process. It helps to understand and interpret the results of citation analyses in the context of research evaluations.

This study is designed as a conceptual overview which is structured according to three core elements in the process of citation: the context of the *cited document*, processes *from selection to citation of documents*, and the context of the *citing document*. The core elements are presented in a schematic representation. Many empirical studies focusing on the process of citing have been published to identify factors influencing the number of citations. For example, it has been shown in several studies that the importance of the journal in a field has an influence on the citation impact of the papers published in the journal (Tahamtan, Afshar, & Ahamdzadeh, 2016). Another group of studies (mostly from recent years) have investigated the context of citations (see, e.g., Boyack, Small, & Klavans, 2013; Zhao & Strotmann, 2014; Jha, Jbara, Qazvinian, & Radev, 2016). In these studies, the words and sentences around citations are analyzed to get to know information about characteristics of the cited work, reasons to cite, and decision rules of the citing authors (Halevi & Moed, 2013). In a very recent study, for example, Small et al. (2017) investigated the context of a set of citations to find words which characterize the cited research as discoveries in science. An overview of the different approaches for undertaking context-based citation analysis can be found in Ding et al. (2014).

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