Relating Centrality and Research Performance in Co-authorship Networks

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ABSTRACT

We advance the understanding of co-authorship networks by investigating the relationship between an author's centrality in an author network with his/her publishing performance. It can be argued that high network centrality causes high research performance; but it can also be argued that high research performance causes authors to be central. Preceding research studies do not provide insight into the direction of causality in this relationship.

We extend the previous research into co-authorship networks by focusing on a domestic co-authorship network of researchers publishing in Chemistry and it's sub-fields from a developing country (Pakistan). We test whether network centrality (degree, closeness and betweenness) causes high research performance (aggregate impact factor) and/or whether high research performance causes authors to be central.

Moreover a dearth of studies on co-authorship networks in countries with lower levels of science and technology capacity can be highlighted. Most studies concentrate on productivity gains from co-authorships for researchers from scientifically-developed countries. Hence, it is not clear whether being embedded in a domestic co-authorship is as beneficial for performance out comes for researchers in the context of scientifically-developing, lagging, and non-proficient countries. Therefore these networks in these alternate contexts may provide potentially interesting cases.

We collected bibliometric data by performing an ISI Web of Science (SCI) search from 2002-2009, including only articles in the document type field and entering Pakistan in the address field. The search was refined to exclude all countries except Pakistan and further refined to include only Chemistry and its sub-fields to yield a "domestic" co-authorship network i.e. Pakistani authors co-authoring with Pakistani authors in Chemistry and its sub-fields only. Research performance of individual researchers was measured by weighting each publication of an author by the journal's five year impact factor. In addition, normalized versions of centrality (degree, closeness, betweenness) were measured.

The findings demonstrate the positive association of initial degree and closeness centrality on subsequent research performance, and positive association of initial research performance on subsequent, other measures of network centrality, i.e., degree, closeness and betweenness.

Keywords: Domestic co-authorship network, Research performance, Network centrality, Causality.