

Event

A longitudinal citation analysis on Agriculture and Agri-Food Canada (AAFC) peer-reviewed canola research papers published 1986–2007 in five-year intervals demonstrates how structural changes to the industrial organization of the financing of canola research and development (R&D) are mirrored in the changes to the citation rates of AAFC papers relative to a global average of 1.0 per paper. Specifically, when AAFC was the primary funder of canola R&D, the AAFC citation rate was greater than the global average. As cutbacks to this funding facilitated a transition to private “fee for service” research, relative AAFC citation rates plummeted in a reflection of the desire for corporate confidentiality. Eventually, over the long-term, the cutbacks in AAFC funding facilitated the requirement of collaborative funding arrangements with producer public-private partnerships (P3s) using innovative financing strategies, in turn generating a discernable increase in relative AAFC citation rates.

Significance

Theory suggests that the production of knowledge has transitioned from a vertically structured process involving homogenous organizations in the pursuit of theoretical knowledge to a horizontally structured process involving heterogeneous partners in a collaborative and problem-focused environment.¹ The Triple Helix Theory suggests that economic growth is dependent upon developing knowledge in an environment characterized by collaboration between the public, private, and university sectors.² Common to both perspectives is the requirement for a structure or process that connects disparate partners.

Analysis

In the interval between 1986 and 1990, a period when AAFC was the primary funder and organizer of canola R&D, (then a one-dimensional process), its relative citation was 1.22. During the 1991–1996 and 1997–2002 intervals the AAFC relative citation rate declined to 0.85 then to 0.66 respectively. The decline reflected changes in structure and process in the funding of AAFC research, ensuing from government cutbacks and simultaneous privatization of the canola R&D process. The fee-for-service research, which had become a two-dimensional process, became the focus. During the 2003–2007 interval, the citation rate increased to 1.11 as result of three inter-related factors: collaborative R&D funding, the use of new funding mechanisms — the AAFC Matching Investment Initiative (MII), a funding mechanism that links private needs and financing with public capabilities and money — and the rise in producer-governed P3s that use crop levies to finance canola R&D, all synonymous with a three-dimensional process. A negative binomial regression logarithmic likelihood model was used to isolate the effects of the three variables of interest. A statistically significant relationship exists between the use of three or four funding partners and increasing citation rates. Specifically, using three, four, or more funding partners doubles the likelihood of a paper being cited.

Conclusion

From a policy perspective, there are four items of interest. First, as suggested by theory, R&D is now a three-dimensional process, as the rise in the use of levy funding from producer governed P3s demonstrates. Second, government has transitioned from being the manager of R&D to a facilitator of such as the use of MII indicates. Third, confirming theory, collaboration does enhance the development of new knowledge as demonstrated by the regression analysis. Fourth, citation analysis provides a robust analytical tool that can compare the relative citation counts of institutions to global averages to identify emerging trends and document the flow of knowledge.

¹ Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., Trow, M. 1994. *The new production of knowledge: The dynamics of science and research in contemporary societies*, Sage, London.

² Etzkowitz, H. 2008. *The Triple Helix: University-Industry-Government Innovation In Action* London: Routledge.