



Munich Personal RePEc Archive

Transaction costs, externalities and innovation

Estrada, Fernando

Universidad Externado de Colombia, Facultad de Finanzas,
Gobierno y Relaciones Internacionales

2012

Online at <https://mpra.ub.uni-muenchen.de/35875/>

MPRA Paper No. 35875, posted 12 Jan 2012 05:39 UTC

Transaction costs, externalities and innovation

Fernando Estrada
Natalia Díaz

Universidad Externado de Colombia

Abstract

There is now considerable evidence on the value of using external resources to promote the development of innovative technologies. Furthermore, the ability to experience innovations in business by external links that may help to avoid risk, improve the quality of natural products, which means qualifying business activities and promote companies capable of rationalizing and projecting high yields. This paper provides an approach from the transaction cost theory of Ronald Coase, in particular, provides preconditions to estimate the specific market of biotechnology.

Keywords: Coase theorem, Transactions costs, Biotechnology, Ronald Coase, Innovation, Financial Markets

JEL: B2, B21, B41, D03, D43, D82, N56, O13

January 2012

Transaction costs, externalities and innovation

Fernando Estrada - Natalia Diaz

Universidad Externado de Colombia

2012

Two decades ago (1991), Ronald Coase received the Prize in Economic Sciences in Memory of Alfred Nobel in Stockholm, Sweden. Since then, their assumptions and their approaches have expanded considerably since market issues, business, organizations, stock exchanges and trading systems to the comparative economic history (Coase, 1995). Outside the laws of mechanics bodies found in the markets are too contingent to meet mechanical lawlike principles (Coase, 1998A). The world market is too malleable (Coase, 1937a, 1945, 1947a, 1960, 1961). The attribution of conventional interpretations of transaction costs is more ambiguous now than themselves known (Klaes, 2000). What are the implications of transaction costs? (Dixit, 1996) What are the implications of transaction costs out of the markets? (Groenewegen, 1995) What about transaction costs in volatile markets? These and other questions suggest a broader context of the work of Coase.

Remember that what interests the author is to develop an explanatory framework that helps us understand the difficulties of production in open markets (Coase, 1937b). I.e, to analyze how economic systems from what the author calls "the institutional structure of production" (Coase, 1991a). While some of the problems facing the economy is related to production, the focus is the mechanisms that create better or worse performance of the economy in societies with open markets (Coase, 1988D, 1990).

Coase proposed an explanatory model field located between type Pigou productive theories / Robbins, and the scope for cost problems specific exemplary cases (Coase, 1945, 1946b). Following the evolution of the concept of transaction costs may also be ways to explain why markets do not have a perfect performance (Coase, 1960). Moreover, the nature of transaction costs reflects a domain that is beyond the scope of the term originally used by the author. After its original development, the systematization of the ideas of Ronald Coase found in Oliver Williamson, Harold Demsetz and Steven Cheung, among others.

Beginning the decade of the fifties, the economy responds to problems of industrial organization and corporate matters. Coase exhibits his work in the broader context of economic history. The Wealth of Nations (1776) Adam Smith Coase serves to identify the subordinate role of central planning or government

regulations in the smooth functioning of the economic system (Coase, 1974a), in effect, the economy may be coordinated by a price system (invisible hand) and with beneficial results. It is with respect to the wealth of nations, similar to what Whitehead said about philosophy after Plato, according to Coase's economic theory after Adam Smith, only footnotes wide his great work. Although the factors given after the nineties with technology developments, theories of consumer and securities markets (among others) add new conditions and problems in the markets.

The hypothesis of economists after Adam Smith meets conditions to achieve results or, in another perspective, when the real world seems to have worked according to theory, so much the worse for the world (Coase, 1994). This is what seems to assume the historical reference that makes the reading of Ronald Coase on the economists of his time. So as with physics textbooks, the neoclassical version of the economy suggests that markets forcing changes leave the real world needs. The projection of the market in its most complete exposition resembles a system of extreme decentralization (Coase, 1988a). What does this mean? This is an image projected on the ability to self-sustaining markets and relatively unnecessary role of governments (Coase, 1988c).

Excessive concentration in the price system has been connected with the reductionism of the neoclassical approach to the nature of markets (Coase, 1945). In fact, the impression left by economists is that markets superstructure determines the types of behavior among agents. Above is the price system, below the world of people. That's a position that defends Lionel Robbins. In his Essay on the nature and significance of economic science, Robinson points out the obvious shortcomings of the old treatment of the theory of production with its approach to the property of the peasantry and industrial forms: "From the standpoint of the organization economist provision is a matter of industrial (or agricultural) if domestic international for a particular company, yes for "the" industry-... At the same time tends to leave the regulatory element completely out of the whole organization of production: the reciprocal relationship between prices and costs".

The idea was that the economist Robbins should not be interested in what happens to the domestic laws of the organizations, but only what happens in the market, buying inputs and selling goods produced by these factors (Coase, 1994). As Coase observed: "It totally ignores what happens between the factors of production and sale of such goods" (Coase 1960). To increase the flow of arguments in this direction neoclassical theory posits a micro that is largely a study of the pricing and production, "in fact, this part of the economy often is called theory of prices "(Coase, 1945).

With this review, Coase prepared his arguments on the theory of transaction costs (Coase, 1960). The neglect of other aspects of the system has been enhanced by another feature of neoclassical theory: the increasing abstraction of the analysis does not seem interested in the detailed knowledge of the

economic system in context. At least not for public policy issues or developments in technology or biotechnology appeal to you. After Coase others have corroborated some of the prejudices, Holmstrom and Tirole, for example, in "The Theory of the Firm" (Handbook of Industrial Organization) conclude that "the proportion between evidence and theory is now ... very low in this field." However, according to Coase, the authors still moves around within a theoretical level (Schmalensee, 1989).

The theoretical device with which neoclassical economics has played a similar role to the principle of inertia in classical mechanics of Newton particles contributes to expand the speculation about the behavior of "markets" in the void left on their own motion or rest. The bodies 'natural' markets transactions include, however, serious flaws on a surface enough information problem (Coase, 1960, 1990, 1991a, 1998a). Coase's expression to relate the work of neoclassical economists is "blackboard economics" (Coase, 1991a). After two decades of theoretical advances proposed by Ronald Coase, allow simulation developments in the economy that are amazing, however, remains a matter of principle applied force. We have come to the blackboard to digital media, but the models built are still limited (Dhalman, 1979).

In mainstream economic theory the market analogy recursive device relates as a "black box". One way surprising, according to Coase, because a majority of resources are used in modern economic systems are used within the company, and the decision of how to use these resources depends more on administrative decisions directly from the operation of the market (Coase, 1994). The resulting paradox is a dual purpose, according to Coase (1988a). The economic system depends largely on how these organizations bring their issues, specifically, the modern corporation (Coase, 1972). Moreover, it is surprising that the economists who show interest in the price system, manifest disregard for the context of markets. Specifically, for the institutional arrangements that determine relative exchange processes (Coase, 1991). The conventional theory then, in the opinion of Ronald Coase, is "a very incomplete theory" (1981a).

In *The Nature of Firm* (1937), Coase responds more directly to the errors of conventional wisdom. Remember that some standard wisdom quoted Arthur Salter expression: "The normal economic system works itself." Then explained that a competitive economic system coordinated by prices would lead to the production of goods and services valued by consumers. Approaches of this nature were intended to streamline the "invisible hand" of Adam Smith (Coase, 1977).

This early work of Coase is key to understanding the elegant insight of the theorem. The existence of transaction costs explains the nature of the company, although its scope is irrelevant for the rest of the economy (Coase, 1937a, 1945, 1960, 1965, 1972). The investments or risks of founding a company depends on transaction costs, so much information, the seriousness

of the contracts, compliance and prevailing legal order can also affect the goods and services produced (Coase, 1988a) . The chain of processes that generates a spontaneous market order depends on transaction costs. In other words, without the transaction costs would remain unexplained many important phenomena in the economy. Coase raises its argument to see that in essential terms of transaction costs can affirmatively act as barriers to monopoly and, negatively, to protect the interests of the market in cases where governments seek to impose unlimited. In summary, the strong assumption of the Coase theorem rests on the advantages for society to reduce transaction costs, while the other to impose barriers to prevent the violation of economic rights of the market (Coase, 1988B).

Market with (and without) transaction costs

As shown, the Coase theorem is related to the analysis of transactions that operate under different circumstances and determined by the existence (or absence) of transaction costs. Some misinterpretations of his theorem describes "a world of zero" as the world Coaseano ... what can not be further from reality as this was the world that the author wanted to leave that economists "(Butler, 2003, p. 136), are derived from studies of the same, limited to a single level. The results of the analysis conducted Coase, in the case of the farmer and the farmer, leading to important implications. Coase concludes that in the absence of transaction costs, the parties are able to solve problems and find the production level that maximizes the social benefit for themselves (Coase, 1935, 1965, 1988a). This result can be used interchangeably with pre-allocation of property rights (Coase, 1994). This suggests then that the law and court decisions have no effect on the result (Coase, 1994). From that perspective, it follows at once that the correction of market inefficiencies is possible when there is effective coordination between market actors.

However, the fundamental assumption that this is possible is the absence of additional costs involved in carrying out the transaction. Further analysis of the case puts into consideration the costs of activities in reality and face: 1 - the search for an agent who wants to negotiate, 2 - the process of informing you want to negotiate with him, 3 - to determine and report the terms to be negotiated, 4 - to conduct the negotiation of such terms, 5 - to pursue the development of the contract containing these conditions, 6 - to carry out inspections to ensure compliance with commitments leads to a different outcome Coase . Coase determines that the value of the costs for such actions can be so high that it is feasible that prevents profitable transactions and therefore, are carried out (Coase, 1994, p.134). The transaction in this regard will be made only if the benefits outweigh the costs of achieving this (Coase, 1994, p.135).

In relation to costs incurred during the completion of a transaction, further developments carried out by Becker Williamson and transaction costs

associated with different aspects that contribute to the development of the theory (Williamson, Winter, 1991). This is linked with problems related to the internal organization of firms, the costs of collection, processing and communicating information, trade flows in decision-making, the goals and organizational behavior, the nature of relationships contract, the impact of information, opportunism, moral hazard and avoidance: the process of negotiation, bounded rationality, information asymmetries, uncertainty, adverse selection, costs of drafting, for payment enforceability contracts, sequential bargaining processes on the distribution of the benefits associated with fixed investment, and the internal structure of the organization, among others. In a specialized field such as biotechnology, this research explores the obstacles and limits to access information from quality imported equipment, contractual, legal system and administrative inefficiency in government agencies.

The above factors and Coase's analysis indicate the feasibility of individuals lack the ability to negotiate for transactions that maximize the social value of production. Similarly, it is known that the greater number of parties involved in the transaction, the lower the possibility of reaching a voluntary agreement (McEachern, 2000). Situations for which the government can play a role through legislation to reduce coordination costs, assign responsibilities, reduce uncertainty and transaction risk. In addition to systematizing the process that will streamline contractual arrangements with interests in investment companies and universities. Thus, the legal system becomes relevant to the scope of the optimal production level that maximizes social product with a higher level of efficiency (Coase, 1994), in order to avoid obstacles to transactions that lead to optimal results.

The effect generated by the law in this regard stems from its ability to affect private marginal costs (Betlan, 2003). He believes that "if trading is costly and imperfect information exists, then the rules help to reach the spot" (p.140). However, the benefit from the legal system must be considered within a framework of relativity in as "property rights may affect the economic efficiency for better or worse" (p.139). In that sense, "an incorrect allocation of property rights can lead to greater social marginal cost, and lower social solution" (p.140). Reason suggests caution in the implementation of measures arising from government action to correct market failures (Betlan, 2003, p.141). In this respect, Coase suggested not to make generalizations about the benevolence of government intervention and promotes a study of the peculiarities of each case to determine the mechanism of convenience in order to promote greater efficiency in the value of production (Coase, 1994).

Transaction costs, externalities and innovation

There is now considerable evidence on the value of using external resources to promote the development of innovative technologies. Furthermore, the ability to experience innovations in business by external links that may help to avoid risk,

improve the quality of natural products, which means qualifying business activities (Powell, 1998), indeed, promote businesses with the ability to streamline and projecting high yields (Gemser and Wijnberg, 1995).

For the company, however, the potential for developing new products involves important strategic challenges. In many cases it requires developments in marketing, sales or production joint ventures (complementarity of competence, honesty, quality of the partners, etc.), yet the problems are more complex when it comes to developing new technology products, due to the uncertainty of the contracts, administrative procedures for imports, property rights and the fulfillment of the agreement between the parties. Some researchers maintain that openness to external resources, talent out of the same organization, innovation and sensitivity to external partners, contributes to significant savings in costs by offering new products. Also it can help minimize the risks (Quinn, 2000), Rubenstein, 1994). Others argue that the benefits from outsourcing generation technology products have been exaggerated also strategically can be a barrier to long term to run the talent and capabilities of the company (Chesbrough and Teece, 1996).

The relevance of this debate is that the projects to develop innovative products (biotech, for example), with transaction costs, in a broad sense, can mean significant ingredients of the total set of costs that may be companies or firms with results more predictable. Paradoxically, it is possible to estimate that transaction costs, at least in the perspective discovered by Coase and Williamson, significant fissures have yet to assess these issues in detail (Groenewegen, 1995). This is due to appear in the original formulation of the Coase theorem and further development of theory in Williamson (1991), there were a business model static type that does not reflect (actually) the dynamics of change, learning errors discovered by empirical experience.

This weakness, however, undermines the epistemological value that has the original theory on transaction costs. While new product development in biotechnology is dynamic and uncertain, it is also important to recognize that the process involves a lot of steps that are carried out separately, at least some processes can be considered as part of habits and daily trials. When the results are relatively safe is predictable transaction costs, i. e., the development of models, replicas of essays, and so on. This suggests that innovation see demand different processes, each one related to a particular aspect of technology, which has in many cases risks, rewards and balances when they are outsourced. In other words, the transaction costs are critical because the degree of outsourcing change depending on the evolution of the innovation process.

Bibliography

- Alfranca, O., Huffman, W.E., 2001, "Impact of institutions and public research on private agriculture research". *Agricultural Economics* 25, 191–198.
- Argyres, N., and Silverman, B., *R&D, Organization Structure, and the Development of Corporate technological knowledge*, Strategic Management Journal Strat. Mgmt. 7., 25: 929-958 (2004) Published online in Wiley InterScience (www.interscience.wiley.com).
- Arrow, K. J., Cropper, M. L., Eads, G. C., Hahn, R. W., Lave, L. B., Noll, R. G., Portney, P. R., Russell, M., Schmalensee, R., Smith, V. K., and Stavins, R. N. (1996), 'Is There a Role for Benefit–Cost Analysis in Environmental, Health, and Safety Regulation?', *Science*, 272(5259), 221.
- *BiotechVisions* 2011, February A1–A8; 2011 John Wiley & Sons, Inc.
- Byerlee, D., Alex, G., Echeverría, R.G., 2002, "The evolution of public research systems in developing countries: facing new challenges". In: Byerlee, D., Echeverría, R.G. (Eds.), *Agricultural Research Policy in an Era of Privatization* (Chapter 1). CABI, Oxon, UK, pp. 19–34.
- Byerlee, D., Fischer, K., 2002, "Accessing modern science: policy and institutional options for agricultural biotechnology in developing countries". *World Development* 30 (6), 931–948.
- Calabresi, Guido (1968), 'Transaction Costs, Resource Allocation and Liability Rules: A Comment', *Journal of Law and Economics*, 67-73.
- Campbell, Alison F. 2005, "The evolving of the concept of value add in university commercialization", *Journal of Commercial Biotechnology*, 11, 4, pg. 337 – 345.
- Cano (2003), "Los diez cimientos de las negociaciones internacionales de comercio en la agricultura", Intervención del señor ministro de Agricultura y Desarrollo Rural en el foro de Portafolio "Oportunidades y amenazas del ALCA y el TLC" Bogotá, septiembre 04.

- Cantley, Mark, (2004), "How should public policy respond to the challenges of modern biotechnology?" *Current Opinion in Biotechnology*, 15:258–263.
- Coase, R. H. 1935. The problem of duopoly reconsidered, *Review of Economic Studies*, vol. 2, 137.
- Coase, R. H. 1937A. "The nature of the firm", p. 33 in Williamson, O. E. and Winter, S. G. (eds) 1991, *The Nature of the Firm*, Oxford, Oxford University Press.
- Coase, R. H. 1937B. "Some notes on monopoly price", *Review of Economic Studies*, vol. 5, 17.
- Coase, R. H. 1939. "Rowland Hill and the penny post", *Economica*, vol. 6, 423
- Coase, R. H. 1945. "Price and output policy of state enterprise: a comment", *Economic Journal*, vol. 55, 112
- Coase, R. H. 1946A. "BBC Enquiry?", *The Spectator*, no. 176.
- Coase, R. H. 1946B, "The marginal cost controversy", p. 75 in Coase, R. H. 1988, *The Firm, the Market and the Law*, Chicago, IL, University of Chicago Press.
- Coase, R. H. 1947A, "The marginal cost controversy: some further comments", *Economics*, vol. 14, 150.
- Coase, R. H. 1947B, "The origin of the monopoly of broadcasting in Great Britain", *Economica*, vol. 14, 189.

- Coase, R. H. 1950A, "The BBC Monopoly, Time and Tide", 7 October.
- Coase, R. H. 1950B, *British Broadcasting: A Study in Monopoly*, London, London School of Economics and Political Science/Longmans, Green.
- Coase, R. H. 1950C, "British television policy: questions of control and finance", *The Times*, 9 September.
- Coase, R. H. 1951, "Report on the BBC", *Time and Tide* (20 January).
- Coase, R. H. 1954, "The development of the British television service", *Land Economics*, vol. 30, 207.
- Coase, R. H. 1959, "The Federal Communications Commission", *The Journal of Law and Economics*, vol. 2, 1.
- Coase, R. H. 1960, "The problem of social cost", p. 95 in Coase, R. H. 1988, *The Firm, the Market and the Law*, Chicago, IL, University of Chicago Press.
- Coase, R. H. 1961, "Why not use the price system in the broadcasting industry?" *The Freeman*, vol. 11, no. 7 (July).
- Coase, R. H. 1962, "The Interdepartment Radio Advisory Committee", *Journal of Law and Economics*, vol. 5, 17.
- Coase, R. H. 1964. Discussion of RE Caves, 'Direct Regulation and Market Performance in the American Economy' and RC Cramton, 'The Effectiveness of

Economic Regulation: A Legal View', *American Economic Review* (Papers and Proceedings), vol. 54, 194.

- Coase, R. H. 1965. "Evaluation of public policy relating to radio and television broadcasting: social and economic issues", *Land Economics*, vol. 41, 161
- Coase, R. H. 1966, "The economics of broadcasting and government policy", *American Economic Review*, (Papers and Proceedings), vol. 56, 440.
- Coase, R. H. 1972, "Industrial organization: a proposal for research", p. 57 in Coase, R. H. 1988. *The Firm, the Market and the Law*, Chicago, IL, University of Chicago Press
- Coase, R. H. 1974A, "Economists and public policy", p. 47 in Coase, R. H. 1994 *Essays on Economics and Economists*, Chicago, University of Chicago Press
- Coase, R. H. 1974B, "The lighthouse in economics", p. 187 in Coase, R. H. 1988 *The Firm, the Market and the Law*, Chicago, IL, University of Chicago Press
- Coase, R. H. 1977. "Advertising and Free Speech", *Journal of Legal Studies*, vol. 6, 1
- Coase, R. H. 1981A, "How Should Economists Choose?" p.15 in Coase, R. H. 1994. *Essays on Economics and Economists*, Chicago, University of Chicago Press
- Coase, R. H. 1981B, "Economics at the LSE in the 1930s: A Personal View", p. 208 in Coase, R. H. 1994. *Essays on Economics and Economists*, Chicago, University of Chicago Press

- Coase, R. H. 1983. "Comments", in *Kitch* (ed.) 1983
- Coase, R. H. 1986, "Arnold Plant, p.176 in Coase, R. H. 1994", *Essays on Economics and Economists*, Chicago, University of Chicago Press
- Coase, R. H. 1988A. *The Firm, the Market and the Law*, Chicago, IL, University of Chicago Press
- Coase, R. H. 1988B. "The nature of the firm: influence", p. 61 in Williamson, O. E. and Winter, S. G. (eds) 1991. *The Nature of the Firm*, Oxford, Oxford University Press
- Coase, R. H. 1988C. "The nature of the firm: meaning", p. 48 in Williamson, O. E. and Winter, S. G. (eds) 1991. *The Nature of the Firm*, Oxford, Oxford University Press
- Coase, R. H. 1988D. "The nature of the firm: origin", p. 34 in Williamson, O. E. and Winter, S. G. (eds) 1991. *The Nature of the Firm*, Oxford, Oxford University Press
- Coase, R. H. 1990. "Accounting and the theory of the firm", *Journal of Accounting and Economics*, vol. 12, 3
- Coase, R. H. 1991A, "The institutional structure of production", p. 3 in Coase, R. H. 1994. *Essays on Economics and Economists*, Chicago, University of Chicago Press
- Coase, R. H. 1991B. "George J. Stigler", p. 199 in Coase, R. H. 1994. *Essays on Economics and Economists*, Chicago, University of Chicago Press

- Coase, R. H. 1992, "Coase on Posner on Coase", *Journal of Institutional and Theoretical Economics*, vol. 149, 96
- Coase (1994), *La empresa, el mercado y la ley, El problema del coste social*, The Nobel Foundation (1991), Alianza Editorial S.A., Madrid, (España).
- Coase, R. H. 1995. "Ronald H. Coase", p. 227 in Breit, W. and Spencer, R. W. (eds), *Lives of the Laureates*, 3rd edn, Cambridge, MA, MIT Press
- Coase, R. H. 1996A. "Foreword", p. xiii in Buckley, P. and Michie, J. (eds), *Firms, Organisations and Contracts*, Oxford, Oxford University Press
- Coase, 1998A, "The new institutional economics", *American Economic Review Papers and Proceedings*, vol. 88, 72
- Coase, R. H, 1998B. "Comment on TW Hazlett", 'Assigning Property Rights to Radio Spectrum Users: Why Did FFC License Auctions Take 67 Years?' *Journal of Law and Economics*, vol. 41, 577
- Coase, R. H. and Barrett, E. W. 1968, "Educational TV: Who Should Pay?" Washington, DC, American Enterprise Institute for Public Policy Research
- Coase, R. H. and Fowler, R. F. 1935B, "The pig-cycle: a rejoinder", *Economica*, vol. 2, 423
- Coase (1994), *La empresa, el mercado y la ley, El problema del coste social*, The Nobel Foundation (1991), Alianza Editorial S.A., Madrid, (España).
- Colciencias (2008), *La Biotecnología, motor de desarrollo para la Colombia de 2015*, Grupo Biogestión de la Universidad Nacional de Colombia y CorpoGen, Bogotá, D.C., Colombia.

- Colciencias, (2008), “*La biotecnología: sector estratégico para la Colombia del 2015*”, División de Ciencia, Comunicación y Cultura, Ministerio de Educación Nacional, versión web, disponible en: <http://www.mineducacion.gov.co/cvn/1665/article-161751.html>, consultado el 28 de Febrero de 2011.
- Comunidad Andina (1996), *Decisión 391- Régimen Común sobre Acceso a los Recursos Genéticos*, versión web, disponible en: <http://www.comunidadandina.org/normativa/dec/D391.htm>, consultado el 20 de Diciembre de 2010.
- Cooter, Robert D. (1982), ‘*The Cost of Coase*’, *Journal of Legal Studies*, 1-33. Reprinted in Donahue, Charles Jr, Kauper, Thomas E. and Martin, Peter W. (eds) (1992), *Property: An Introduction to the Concept and the Institution*. Reprinted in Ackerman, Bruce, Ellickson, Robert and Rose, Carol (eds) (1995), *Foundations of Property Law*.
- Dahlander, Linus y Gannb Davis, (2010): “How open is innovation?” *Research Policy* 39, 699–709.
- Dahlman, Carl J. 1979. “The Problem of Externality.” *Journal of Law and Economics* 22, (October): 141–62.
- Dietz, F. J., and Vollebergh, H. R. J. 2002, “Explaining Instrument Choice in Environmental Policies”, in J. C. M. Van de Bergh (ed.), *Handbook of Environmental and Resource Economics*, Cheltenham, Edward Elgar, 339–51.
- Dinero (2005), *El Tesoro inexplorado*, versión web, disponible en: <http://www.dinero.com/edicion-impresas/negocios/articulo/el-tesoro-inexplorado/31360> consultado el 29 de Julio de 2011.
- El Tiempo (2011), “Santos dijo que su Gobierno le apostará a la ciencia y la tecnología”, versión web, disponible en: http://www.eltiempo.com/colombia/cartagena/ARTICULO-WEB-NEW_NOTA_INTERIOR-9385004.html, consultado el 10 de Julio de 2011.
- FAO (2006), “El hambre y la malnutrición en el mundo”, versión web, disponible en: http://www.feedingminds.org/info/background_es.htm, consultado el 17 de Junio de 2011.
- Foltz, Jeremy D., Kim Kwansoo and Brham, Bradford. 2003: “A dynamic analysis of university agricultural biotechnology patent production”, *Amer. J. Agr. Econ.* 85(1): 187–197.

- Gaskell, G. et al. 2006. "Europeans and Biotechnology in 2005: Patterns and Trends". *Eurobarometer* 64.3, final report to the European Commission's Directorate-General for Research.
- CGIAR Science Council, 2005a, "CGIAR Research Priorities 2005–2015". *ScienceCouncil Secretariat*, Rome.
- Dixit, Avinash K. 1996. *The Making of Economic Policy: A Transaction-Cost Politics Perspective*. Cambridge, MA: MIT Press.
- Dorward, A.R., Kydd, J.G., Morrison, J.A., Urey, I., 2004, "A policy agenda for pro-poor agricultural growth". *World Development* 32 (1), 73–89.
- González, C., (2007), "*Biotecnología: desde el punto de vista de los negocios*", versión web, disponible en: <http://www.unicauca.edu.co/biotecnologia/ediciones/vol5/4Vol5.pdf>, consultado el 08 de Junio de 2011.
- González, J. et al., "Herramientas de Financiación para Proyectos que involucren Bio-Diversidad de Cosméticos y Productos de Aseo", Universidad Externado de Colombia, Facultad de Finanzas, Gobierno y Relaciones Internacionales, versión web, disponible en: http://www.andi.com.co/Archivos/file/Cosmeticos/Clase%20Mundial/BOLETIN10/P_rptaUExternado.pdf, consultado el 9 de Julio de 2011.
- Hayek, Friedrich A. 1960, *The Constitution of Liberty*, London and Henley: Routledge and Kegan Paul. (Traducción en español: (2008) *Los Fundamentos de la Libertad*, Octava Edición, Unión Editorial, Madrid, p. 426.)
- Hayek, Friedrich A. 1976, *Law, Legislation and Liberty*, Vol. 111: The Mirage of Social Justice, London: Routledge & Kegan Paul.

- Hayek, Friedrich, A. 1988, *The Fatal Conceit: The Errors of Socialism* (The Collected Works of Friedrich August Hayek, Volume I) Routledge y Chicago University Press.
- Hall, A., 2005, "Capacity development for agricultural biotechnology in developing countries: an innovation systems view of what it is and how to develop it". *Journal of International Development* 17 (5), 611–630.
- Herdt, R. W. 2006, "Biotechnology in agriculture". *Annual Review of Environment and Resources* 31: 265–295.
- Hoffman, Elizabeth and Spitzer, Matthew L. (1982), 'The Coase Theorem: Some Experimental Tests', *Journal of Law and Economics*.
- Joscow, Paul L, 1991, in Williamson, O. E. and Winter, S. G. (eds), *The Nature of the Firm. Origins, Evolution and Development*, Oxford, Oxford University Press
- Joskow, P. L. 2005, "Vertical integration". In C. Menard and M. Shirley (eds), *Handbook of New Institutional Economics*. Berlin: Springer, 319–348.
- Kalmanovitz, Salomón. 2001, *Las instituciones y el Desarrollo económico*, Bogotá, Norma.
- Kherallah, M., Kirsten, J., 2001, "The New Institutional Economics: Applications for Agricultural Policy Research in Developing Countries" *Markets and Structural Studies Division Discussion Paper 41*. IFPRI, Washington, DC.
- Libecap, G. D. 2005, "State regulation of open-access, common-pool resources".
- Lusk, J. L., Jamal, M., Kurlander, L., Roucan, M. and Taulman, L. 2005, "A meta-analysis of genetically modified food valuation studies"; *Journal of Agricultural and Resource Economics* 30: 28–44.
- Ménard, C. and M. Shirley (eds), *Handbook of New Institutional Economics*. Berlin: Springer, 545–572.

- MacCann, Philip. 2011, "International business and economic geography: knowledge, time and transactions costs", *Journal of Economic Geography* 11, pp. 309–317.
- McEachern, (2000), W.A. Economics, 5th edition, Cincinnati: South-Western.
- McHughen, A. 2007, "Fatal flaws in agbiotech regulatory policies". *Nature Biotechnology* 25: 725–727.
- Ministerio del Poder Popular de Ciencia, Tecnología e Industrias Intermedias, Gobierno Bolivariano de Venezuela, "Venezuela ha incrementado inversión en ciencia y tecnología", versión web, disponible en: <http://www.mcti.gob.ve/Noticias/3064>, consultado el 12 de Julio de 2011.
- Myers, Robert J, Sexton, Richard J., Tomex, William, "A century of research on agricultural markets": *Amer. J. Agr. Econ.* 92(2): 376–402.
- *Nature biotechnology*, 2009, "Firms seek new models to access public equity", volume 27 number 10 October.
- North, Douglas (1998), "*Desempeño Económico en el Trascuro de los Años*", Economía: Teoría y Práctica, Número 9, versión web, disponible en: http://www.izt.uam.mx/economiatyp/numeros/numeros/09/articulos_PDF/9_8_Desempeno.pdf, consultado el 15 de Junio de 2011.
- OCyT,(2009), *Indicadores de Ciencia y Tecnología Colombia 2009*, versión web, disponible en: http://www.ocy.org.co/html/index.php?option=com_content&view=article&id=73%3AAla-publicacion&catid=56%3Alinks&Itemid=93&lang=es, consultado el 29 de Julio de 2011.
- OCyT, (2010) *Indicadores de Ciencia y Tecnología Colombia 2010*, versión web, disponible en: http://ocy.org.co/html/archivosProyectos/COLOMBIA_2010.pdf, consultado el 29 de Julio de 2011.
- Phillips, Peter W, 2002, "Biotechnology in the global agri-food system" *Trends in Biotechnology* Vol.20 No.9.

- Pinilla (2004), “Herramientas para la competitividad a partir del uso de la biotecnología”, *Economía y desarrollo*, volumen 3, Número 2, versión web, disponible en: <http://www.fuac.edu.co/revista/II/II/seis.pdf>, consultado el 15 de Junio de 2011.
- Polinsky, A. Mitchell (1974), ‘Economic Analysis as a Potentially Defective Product: A Buyer’s Guide to Posner’s Economic Analysis of Law’, *Harvard Law Review*, 1655-1681.
- Portafolio (2010), Inversión en ciencia en Colombia está entre las más bajas en A. Latina, versión web, disponible en: <http://www.portafolio.co/archivo/documento/CMS-7516751>, consultado el 06 de Julio de 2011.
- Porter, Michael (1998). *Competitive Advantage: Creating and Sustaining Superior Performance*. The Free Press.
- Prakash, C.S., “*Benefits of Biotechnology for Developing Countries*”, AgBioWorld, version web, disponible en: <http://www.agbioworld.org/biotech-info/topics/dev-world/benefits.html>, consultado el 23 de Octubre de 2010.
- Pray, C., Paarlberg, R. and Unnevehr, L. 2007 “Patterns of political response to biofortified varieties of crops produced with different breeding techniques and agronomic traits”. *AgBioForum* 10: 135–143.
- Qaim, M. and Zilberman, D. 2003, “Yield effects of genetically modified crops in developing countries”. *Science* 299: 900–902.
- Rawls, John, 1971, *Theory of the Justice*, Cambridge, Harvard, University Press (Traducción en español: ([1995] *Teoría de la Justicia*, México, Fondo de Cultura Económica).
- Regan, Donald H. (1972), ‘The Problem of Social Cost Revisited’, *Journal of Law and Economics*.
- Raney Terry, 2006, “Economic impact of transgenic crops in developing countries”, *Current Opinion in Biotechnology*, 17:174–178.
- Reprinted in Medema, Steven G.(ed.) (1995), *The Legacy of Ronald Coase in Economic Analysis*, Aldershot, Edward ElgarPublishing.

- Rojas y Nemoá, (2010), *Desencuentros institucionales sobre la investigación en diversidad genética*, Rev. Colomb. Biotecnol. Vol. XII No. 2 Diciembre 2010 4-8, versión web, en: http://www.plebio.unal.edu.co/images/pdf/publicaciones/desencuentros_institucionales.pdf, consultado el 29 de Julio de 2011.
- Robbins, Lionel C., *The Nature and Significance of Economic Science* (1932), La cita en español es de *Ensayo sobre la naturaleza y significación de la ciencia económica*, México, Fondo de Cultura Económica (1980), p. 104. Primera reimpresión de la segunda edición en español (1951).
- Salgado, C., Elvira, *Teoría de costos de transacción: Una breve reseña*, Cuad. Adm. Bogotá (Colombia), 16 (26) : 61- 78, julio-diciembre, 2003.
- Santa Ana André y Valle. Silvio, 1995, "Public perception of biotechnology: problems in the Third World", Biotopics, Vol. XIII.
- Sen Amartya, 1997, *Sobre la desigualdad económica*, Barcelona, Crítica. Pp. 146.
- Sheldon, Ian M. 2002. "Regulation of Biotechnology: will we ever "freely" trade GMO's?" *European Review of Agriculture Economics*, Vol 29, (I), pp. 155 – 176.
- Schmalensee, Richard and Roberto D. Willing (eds), 1989, *Handbook of Industrial Organization*, 126.
- Tetlock, P. C. 2008, 'Has Economic Analysis Improved Regulatory Decisions?' *Journal of Economic Perspectives*, 22(1), 67–84.
- Torres, Ricardo (2002). *Bases para una política nacional de biotecnología*. Sexto Borrador.
- United Nations Conference on Trade and Development, United Nations New York and Geneva, 2002, "*Key Issues in Biotechnology*", version web, disponible en: <http://www.unctad.org/en/docs/poitetebd10.en.pdf>, consultado el 3 de Enero de 2010.
- Vesga, Rafael, "*Emprendimiento e Innovación en Colombia: ¿qué nos está haciendo falta?*", Facultad de Administración Universidad de Los Andes, versión web, disponible en: <http://cec.uniandes.edu.co/pdf/rav.pdf>.

- Walker, B., Barrett, S., Polasky, S., Galaz, V., Folke, C., Engström, G., Ackerman, F., Arrow, K., Carpenter, S., Chopra, K., Daily, G., Ehrlich, P., Hughes, T., Kautsky, N., Levin, S., Mäler, K.-G., Shogren, J., Vincent, J., Xepapadeas, T., and de Zeeuw, A. 2009, "Looming Global-scale Failures and Missing Institutions", *Science*, 325, 1345–6.
- Weingast, B. R. 2005. "The performance and stability of federalism: an institutional perspective". In C. Menard and M. Shirley (eds), *Handbook of New Institutional Economics*. 149–174.
- Wennekers, S. (2006) *Entrepreneurship at Country Level. Economic and Non economic Determinants*. Erasmus Research Institute of Management (ERIM).
- Williamson, O. E. 1991, "Comparative economic organization: the analysis of discrete structural alternatives". *Administrative Science Quarterly* 36(2): 269–296.
- Williamson (1993), *Calculativeness, Trust, and Economic Organization*, University of California, Berkeley, Journal of Law and Economics, Vol. 36, No. 1, Part 2, John M. Olin Centennial Conference in Law and Economics at the University of Chicago, pp. 453-486.
- Williamson, O. E. and Winter, S. G. (eds) 1991, *The Nature of the Firm. Origins, Evolution and Development*, Oxford, Oxford University Press
- Winston, C. 2006, "Government Failure versus Market Failure", Washington, DC. *AEI–Brookings Joint Center for Regulatory Studies*.
- World Economic Forum (2008) *Global Competitiveness Report 2007-2008*. World Economic Forum, Geneva.
- Zerbe, Richard O., Jr (1980), 'The Problem of Social Cost in Retrospect', *Research in Law and Economics*.

- Zilberman, D. 2006, "The economics of biotechnology regulation". In Just, R. E., Alston, J. and Zilberman, D. (eds), *Regulating Agricultural Biotechnology: Economics and Policy*. New York: Springer Publishers, 243–261.