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Research Impact Before Metrics: Historical Signals of Recognition and Lessons for Today

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ABSTRACT

Conventional tools such as the Journal Impact Factor, h-index and citation dashboards dominate the way research impact is currently evaluated. Yet for centuries before the institutionalization of bibliometrics, scholarship was acknowledged and celebrated through diverse, non-quantitative pathways. This article explores the pre-metric era, examining how research influence was recognized through community endorsement, institutional adoption, pedagogical integration, print dissemination, industrial application and policy uptake. The study presents twelve historical "impact signals" ranging from fellowships and prizes to controversy and debate and illustrates their significance with extended case studies. By highlighting both the strengths and blind spots of these earlier practices, including their tendency to privilege elites while marginalizing peripheral scholars and argue that understanding pre-metric recognition provides valuable insights for contemporary debates on research evaluation. Recovering these practices underscores that impact is multidimensional, context-dependent and narrative-rich. Revisiting them may help diversify current evaluative frameworks and reduce over-reliance on narrow, commercial metrics.

KEYWORDS

Research impact, pre-metric era, historical evaluation, bibliometrics, scholarly communication, knowledge dissemination, responsible metrics, research assessment, learned societies, scientific recognition

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INTRODUCTION

The dominance of commercial research indicators such as the journal impact factor (JIF), introduced by Eugene Garfield in the early 1970s, has profoundly reshaped scholarly communication, institutional policy and career trajectories[1]. Today, metrics such as h-indices, citation counts and journal rankings are routinely employed to measure scholarly performance, often serving as decisive factors in funding, promotion and tenure evaluations. While such numerical tools offer a semblance of objectivity, they have also been critiqued for narrowing the understanding of research value and creating dependencies on a limited set of commercialized indicators[2,3].

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Yet, the recognition of scholarship predates these tools by centuries. Long before the arrival of citation indexing, research impact was discerned through less standardized, but often more nuanced, modes of recognition. These included community endorsement within learned societies, institutional uptake through textbooks and curricula, the translation and circulation of texts across linguistic boundaries and the transformative influence of discoveries on industry, public health and policy[4-6]. In these ways, the notion of "impact" was already embedded within academic cultures, even if it lacked quantification.

Importantly, pre-metric practices were far from uniform. They reflected the structures of authority, prestige and access within particular historical and cultural contexts. Recognition could be bestowed through election to elite academies in seventeenth-century Europe, through chains of scholarly transmission in Islamic intellectual traditions or through oral debate and pedagogical adoption in South and East Asian contexts. Such practices illustrate that impact was not a purely western or modern construct but a diverse and historically situated phenomenon[7].

This article, therefore, offers a perspective on how impact was measured and understood in the pre-metric era, expanding on earlier work by highlighting a wider range of historical "impact signals" and their significance. These practices of recognition, though uneven and often exclusionary, nonetheless provide valuable lessons for today's debates on responsible research evaluation. By recovering older signals of impact, we can diversify evaluative imagination beyond commercial metrics and foster a broader, more context-sensitive understanding of what it means for research to matter.

HISTORICAL PERSPECTIVES ON RESEARCH IMPACT

Community recognition: From the seventeenth century onward, learned societies such as the Royal Society of London, the Académie des Sciences in Paris and the Berlin Academy served as central authorities for assessing and endorsing scientific contributions. Membership in these organizations conveyed more than formal affiliation; it signified recognition by peers and often conferred significant prestige. Honors such as fellowships, society medals, or invitations to present plenary addresses were regarded as public affirmations of scholarly excellence and functioned as early indicators of research "impact." Isaac Newton's election to the Royal Society in 1672, following his pioneering work on light and color, illustrates how institutional acknowledgment could solidify intellectual authority. Likewise, Émilie du Châtelet's translation of Newton's Principia into French in the eighteenth century demonstrates that contributions enhancing the accessibility and dissemination of knowledge were also highly valued.

Print culture and dissemination: The rise of print culture played a critical role in shaping perceptions of scholarly influence. Before citation metrics existed, the success and reach of a work were often judged by tangible signs: multiple editions, frequent reprints or translation into other languages. Such indicators reflected sustained interest and wider dissemination. Andreas Vesalius's De humani corporis fabrica (1543) reshaped anatomical studies through its detailed illustrations and widespread adoption across European medical schools. Similarly, Charles Darwin's On the Origin of Species (1859), which went through six editions in his lifetime and was rapidly translated into several languages, demonstrates how printed works could extend influence beyond academic circles. In this sense, print dissemination served as an early measure of impact, both within scholarly communities and in the broader public sphere (Table 1)[5,6].

Uptake in pedagogy and practice: The codification of research findings into teaching and training materials provided another critical signal of impact. When a scientific framework or discovery was incorporated into textbooks, examination syllabi or laboratory manuals, it entered collective knowledge and shaped future generations of practitioners. Antoine Lavoisier's reformation of chemical nomenclature and experimental methodology exemplifies this process. By the early nineteenth century, his chemistry had been embedded in curricula across Europe, displacing older frameworks and training students in a

Table 1: Twelve historical impact signals in the pre-metric era and their modern parallels

Signal	Description	Illustration/Historical example	Modern parallel
Endorsement and Fellowship	Membership in academies, societies, or giving invited lectures signaled prestige	Newton was elected fellow of the Royal Society (1672)	Election to national academies; keynote invitations; "Highly Cited Researcher" lists
Prizes and Medals	Recognition through formal awards and distinctions	The Copley medal is awarded for major scientific breakthroughs	Nobel prize, fields medal, and major research awards tracked in databases
Reviews and Reputation	Esteem is established through influential reviews in journals or books	*Nature* reviews shaping Darwin's reception	Citation reviews, journal impact factors, and peer review reports on platforms like Publons
Editions and Reprints	Multiple editions, reprints, or print demand reflected impact	Darwin's *On the Origin of Species* in six editions	Citation counts, download metrics, and usage statistics (e.g., Altmetric attention score)
Translations and Transmission	Circulation across languages expanded reach and influence	Newton's *Principia* translated into French (1729)	International co-authorships; global citation networks; multilingual preprints
Teaching and Textbooks	Integration into curricula and teaching materials ensured long-term uptake	Lavoisier's chemistry in European curricula	Citation in textbooks; inclusion in standardized syllabi; adoption in MOOCs
Instruments and Standards	Scientific instruments and methods institutionalized discoveries	Kelvin's instruments as laboratory standards	Patents, technology-transfer metrics, methodological citation in protocols
Correspondence and Requests	Visibility gained through scholarly networks and exchanges of letters	Darwin's vast correspondence with naturalists	Email lists, conference networking, and research social platforms (e.g., ResearchGate)
Policy and Public Health	Uptake of findings into governance or health practices indicated influence	John Snow's cholera findings are reshaping sanitation policy	Policy citations, government reports, and WHO guidelines citing academic work
Industrial and Clinical Uptake	Application in industry, medicine, or technology, validated research	Pasteur's vaccines in agriculture and medicine	Industry collaboration metrics, clinical trial citations, and technology-transfer indices
Eponymy and Concept Entrenchment	Concepts named after originators embedded discoveries in collective memory	Ohm's Law; Alzheimer's disease	Named indices (h-index, g-index); terms in databases; brand-like recognition in metrics
Controversy and Debate	Intellectual disputes amplified visibility and scholarly influence	Newton-Leibniz calculus dispute	Social media debates (Twitter/X); citation spikes after controversy; retraction metrics

Source: Csiszar[4]

new scientific worldview. Beyond Europe, colonial-era curricula in South Asia and Africa also reveal how the adoption or imposition, of certain scientific paradigms signaled intellectual prestige, even if it was tied to unequal power relations[7-10]. Thus, pedagogy served as both a measure of intellectual acceptance and a mechanism of knowledge transmission, underscoring the societal reach of research.

Public and industrial relevance: Finally, the translation of research into practical applications provided perhaps the most visible and enduring marker of impact. Louis Pasteur's contributions to microbiology exemplify this trajectory. His discoveries in fermentation and vaccination rapidly transcended the laboratory, shaping industrial processes in brewing and winemaking, improving agricultural productivity and transforming public health through the prevention of diseases such as anthrax and rabies. The rapid integration of his findings into practice demonstrates how societal uptake functioned as one of the strongest historical indicators of influence. Similarly, James Watt's refinements to the steam engine, grounded in applied science, catalyzed the Industrial Revolution and highlighted the permeability between scholarly insight and practical application. These cases underscore how the pre-metric era often judged research by its tangible contributions to society, a dimension sometimes obscured in today's citation-driven culture[4].

Strengths and blind spots of pre-metric recognition: The pre-metric era of research evaluation possessed distinct strengths that remain relevant today. Recognition was deeply contextual, tied not only to intellectual originality but also to practical uptake. When discoveries influenced pedagogy, industry or public health, they were celebrated as transformative knowledge. This meant that "impact" was not confined to scholarly circles but extended into policy, social life and economic practice. For example, John Snow's demonstration of cholera's waterborne transmission reshaped London's sanitation policies, illustrating how practical change signaled recognition. Narrative-based evaluations, whether in reviews, correspondence or society reports, further highlighted originality, imagination and the potential for long-term transformation. In this sense, recognition captured dimensions of influence that modern numerical metrics often obscure[11].

However, these strengths were counterbalanced by significant blind spots. Systems of recognition tended to privilege established elites: men, Europeans and those embedded in powerful institutional networks. Women scholars such as Caroline Herschel or Maria Sibylla Merian received some recognition but were frequently marginalized relative to their male contemporaries. Similarly, colonial and peripheral scholars often struggled to gain visibility within dominant European circuits, even when their contributions were substantial. Informal practices of recognition, while rich in narrative detail, lacked consistency and introduced biases of geography, class and gender. Furthermore, without quantitative baselines, comparisons across fields were difficult, leaving some disciplines, such as the humanities, undervalued relative to the natural sciences. These limitations remind us that even non-metric forms of recognition were far from equitable or comprehensive[12-14].

RECENT PERSPECTIVES

Recent scholarship highlights both the persistence of metric dominance and emerging alternatives in research evaluation. Şener *et al.*[15] show that metric-based systems can function as gatekeeping mechanisms that disproportionately disadvantage young researchers, while Núñez and Castrillón[16] demonstrate that alternative metrics capture broader social impact, particularly in underrepresented contexts such as the Cuban social sciences. Morgan-Thomas *et al.*[17] emphasize that despite widespread support for responsible research assessment frameworks, journal rankings and citation-based indicators continue to shape evaluation cultures. Complementing these critiques, Cristofoletti *et al.*[18] traces the long and complex pathways through which publicly funded research can exert influence on policy, underscoring the need for context-sensitive approaches. Finally, Thelwall[19] explores how artificial intelligence may play a role in assessing research quality, offering both potential efficiencies and risks of systemic bias. Collectively, these studies reveal that while metrics remain entrenched, there is a growing call for more diverse, narrative-rich and technologically informed approaches to evaluating research impact.

LESSONS FOR CONTEMPORARY EVALUATION

Reflecting on these historical practices highlights the plural and contextual nature of research impact. Contemporary debates around responsible metrics, including the Leiden Manifesto and the San Francisco Declaration on Research Assessment, echo these earlier traditions by calling for evaluative approaches that emphasize diverse outputs, narrative accounts and the translation of research into societal benefit. Pre-metric modes of recognition also remind us of the importance of qualitative judgment, peer testimony and the consideration of knowledge in practice, not merely as citation counts in databases. Incorporating these lessons into today's frameworks could help balance the efficiency of numerical indicators with the depth and inclusivity of narrative-based recognition. By blending historical sensibilities with modern tools, research evaluation can avoid the distortions created by over-reliance on commercial bibliometric indicators.

CONCLUSION

Research impact existed long before impact factors or citation indices. It was visible in the networks scholars built, the translations and reprints that spread ideas, the integration of discoveries into pedagogy and their uptake in industry, policy and public health. These signals of recognition were often narrative-rich, socially embedded and context-dependent, offering a far broader view of what it meant for knowledge to matter. Revisiting these practices provides not only a historical perspective but also a valuable corrective to contemporary evaluation systems. If today's academic culture is to move beyond the tyranny of numbers, it must learn from the pre-metric era: valuing not only how often knowledge is cited but what it accomplishes in the world.

SIGNIFICANCE STATEMENT

This article highlights how research impact was recognized and celebrated long before the invention of bibliometric tools such as citation counts and impact factors. By recovering twelve historical "impact signals" ranging from society fellowships and textbooks to industrial uptake and policy influence, it shows that knowledge was valued for its societal, cultural and practical contributions as much as for its academic circulation. Recognizing these pre-metric practices is significant because it broadens our evaluative imagination at a time when universities and funding bodies often rely heavily on narrow, commercialized indicators. By drawing lessons from history, the article advocates for more diverse, inclusive and context-sensitive approaches to assessing research impact in the present.

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