



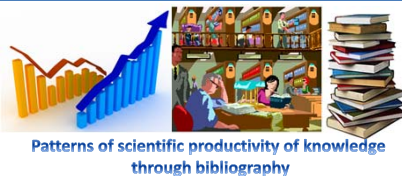
Empirical Regularities in Patterns of Academic Research Productivity

Insights and Implications from the Information Systems Literature

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Introduction

Scholars across various disciplines publish thousands of peer reviewed journal articles each year. For any academic discipline, the published articles in its respective journals represents the 'production units' in the 'production process' of scientific knowledge, and their bibliometric distributions reflect the patterns in such scientific productivity across authors. Is there any empirical regularity in scientific productivity patterns as captured through bibliometric distributions? What does it imply about the extent of 'success breeds success' phenomenon in the context of publication outcomes by authors in an academic discipline?



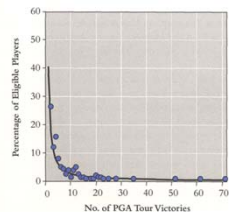
Foundation

The Lotka's Law of Scientific Productivity Pattern:

The number of authors publishing n papers is about 1/n^c of those publishing only one paper

$$\sqrt[n]{a_n} = a_1 / n^c, n = 1, 2, 3, \dots \quad c = 2$$

- ✓ a_n = The number of authors publishing n papers
- ✓ a_1 = The number of authors publishing one paper
- ✓ The parameter c captures the relative degree of authorship concentration
- ✓ The smaller the value of c, the higher degree of authorship concentration
- ✓ Lotka's law has been observed in mature business disciplines like economics and finance
- ✓ As an academic disciplines matures, the value of c gets closer to 2.0
- ✓ Lotka's law investigates the distinct empirical regularities in the bibliometric distribution patterns
- ✓ The proportion of all contributors that make a single contribution is about 60%



Lotka's law applied in golf

Motivation

- ✓ Investigating the empirical regularity for a relatively young discipline like IS
- ✓ Comparison of authorship concentration overtime in a relatively young academic discipline like IS
- ✓ Present the systematic evidence on the degree to which 'success breeds success' from publication
- ✓ Finding evidence of the existence of 'entry barriers' in scholarly publication
- ✓ Investigating the identity and direction of IS journals

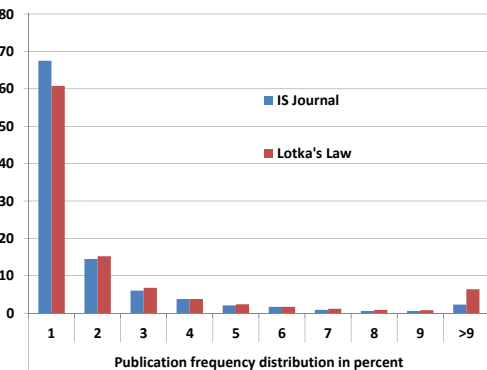


Method & Data

- ✓ Undertake the systematic analysis of empirical regularities in the pattern of research outputs in the IS discipline
- ✓ Compare result with Lotka's Law
- ✓ Use a comprehensive dataset that includes all research publications in 8 leading IS journals over the 1975-2009 time period.

Selected Journals	Issues Covered	Scope of the data used in this study	
		Number of published papers	Number of distinct authors
Decision Support Systems (DSS)	v1(1), 1985-v48(1), 2009	1,520	2,598
European Journal of Information Systems (EJIS)	v1(1), 1991-v18(6), 2009	497	855
Information & Management (I&M)	v1(1), 1977-v46(8), 2009	1,490	2,063
Information Systems Journal (ISJ)	v1(1), 1991-v19(6), 2009	298	492
Information Systems Research (ISR)	v1(1), 1990-v20(4), 2009	379	611
Journal of Management Information Systems (JMIS)	v1(1), 1984-v26(3), 2009	776	1,145
MIS Quarterly (MISQ)	v1(1), 1977-v33(4), 2009	741	1,016
All the above 7 journals combined	n.a.	5,701	6,311

Empirical Analysis and Results: Consistent empirical characterization is found with Lotka's Law



Journal	Exponent c of the Generalized Lotka's Law			Overall fit (Adj. R ²)
	Estimate	Std. Err.	t-value	
ISR	2.59	0.08	32.17	0.99
MISQ	2.48	0.08	31.79	0.99
DSS	2.75	0.09	31.59	0.98
EJIS	3.07	0.03	92.72	0.99
I&M	2.73	0.08	34.68	0.99
ISJ	2.99	0.04	71.44	0.99
JMIS	2.43	0.09	28.76	0.98
'All 7'	2.3	0.03	70.74	0.99

- ✓ The regression results show that the estimated values of exponent c range from 2.30 to 3.07
- ✓ The highly statistical significances of the estimated values of exponent c along with the highly adjusted R² values indicate that the general inverse power law type distributions provide a statistically perfect description of the observed bibliometric distribution pattern

- ✓ The graph above shows the publication frequency distribution in percentage
- ✓ The highly skewed nature is observable
- ✓ The skewed publication distributions reflect the significantly lower 'odds of success' for repeated publications relative to the first time publication in the IS field
- ✓ The Chi-Square statistics shows that the null hypothesis can be rejected and the original Lotka Law provides a good statistical fit for the observed bibliometric distribution pattern

Empirical Analysis and Results: Authorship Concentration Trends

Journal	Incremental Time-Windows						
	1975 - 1979	1975 - 1984	1975 - 1989	1975 - 1994	1975 - 1999	1975 - 2004	1975 - 2009
MISQ	3.1	2.87	2.67	2.63	2.52	2.53	2.48
I&M	-- ¹	3.12	3.06	2.88	2.78	2.73	2.73
JMIS	-- ¹	2.97	2.39	2.59	2.44	2.4	2.43
DSS	-- ¹	-- ¹	2.95	2.93	2.96	2.92	2.75
ISR	-- ¹	-- ¹	-- ¹	3.5	3.06	2.72	2.59
ISJ	-- ¹	-- ¹	-- ¹	3.78	3.34	3.09	2.99
EJIS	-- ¹	-- ¹	-- ¹	3.76	3.04	3.08	3.07
'All 7'	3.35	2.71	2.54	2.39	2.32	2.31	2.3

--¹ = The respective journal was not in publication over this time period.

--² = The respective journal was in publication over this time period, but variation in publication count data across authors over this time period is not enough to estimate Generalized Lotka's Law.

- ✓ The exponent c measures relative degrees of authorship concentration – lower values indicating higher concentration
- ✓ The higher concentration indicates an evidence for the phenomenon 'success breeds success'
- ✓ Journals as combined publication outlets generally exhibits higher author concentration levels than as individual publication outlets
- ✓ Premier disciplinary journals typically exhibit higher author concentration levels and thus a higher degree of 'closed shop' phenomenon
- ✓ IS seems to be consistent with trends observed with maturation in other disciplines

Empirical Analysis and Results: Authorship Concentration across different disciplines

Journals	Empirical estimate of the exponent c in the Generalized Lotka's Law	Source
Economics Area	1.84	
American Economic Review	2.31	
Econometrica	2.35	
International Economic Review	2.86	
Journal of Political Economy	2.66	
Quarterly Journal of Economics	3.11	Cox & Chung (1991)
Rand Journal of Economics	2.74	
Review of Economics and Statistics	2.95	
Review of Economic Studies	2.58	
Finance Area	2.00	
Journal of Finance	2.1	
Journal of Financial Economics	1.95	Chung & Cox (1990)
Journal of Financial and Quantitative Analysis	2.26	
Accounting Area	1.92	
Accounting, Organizations and Society	2.25	
Contemporary Accounting Research	2.94	
Journal of Accounting and Economics	2.45	Chung, Pak & Cox (1992)
Journal of Accounting Research	2.39	
The Accounting Review	2.45	

- ✓ Empirically estimated value of c of the leading journals across the economics, finance and accounting areas show that while the values are generally very similar (in the range between 2.0 and 3.0), they tend to be on the lower side.
- ✓ Compared to IS, all three has a lower c value.



Conclusion and Discussions

- ✓ We find strong evidence that a very distinct empirical regularity exists in the distribution patterns in the IS discipline
- ✓ The estimated value of c exponent ranges between 2.43 to 3.07 across the leading IS journals. These values are similar to several other more mature disciplines within the business management area, and are consistent with expected maturation characteristics in the development of an academic discipline
- ✓ The c value sheds insights for authors and editors of IS journals when it comes to understanding the degree of 'market concentration' and the consequent level of 'closed shop' phenomenon in their own versus other related 'intellectual marketplaces'
- ✓ IS scholars experience a very similar level of 'closed shop' phenomenon when it comes to publication in their leading disciplinary journals

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