Contents Creation by Users and the Sustainability of Community Based Search on the Web

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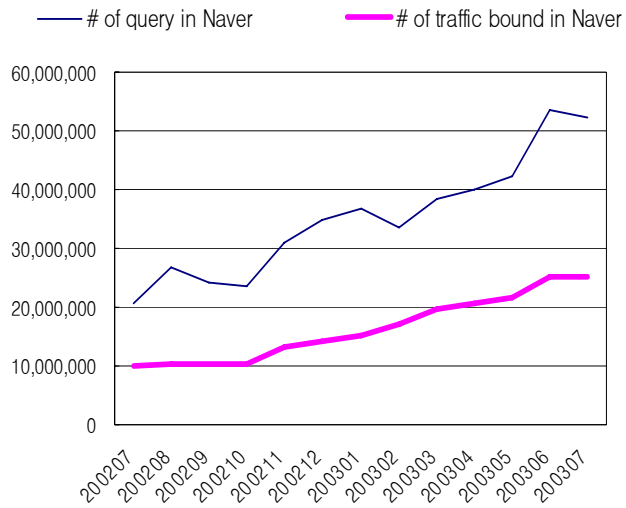
Backgrounds

- **User Created Contents and Community Based Search**
  - KIN (지식인) service in NAVER
  - Yahoo.answer, Google.answer
- **The evolution of Portal**
  - The merits of UCC and Portal's traffic monopolization
  - From a Gateway to a Destination Site



Research Question

- **What happens to the satellites if confinement of traffic within portals continues to increase?**
  - Traffic flow is the ultimate incentive to any site
  - Will the satellites eventually be starved to death by portals' monopolizing traffic?

- **Will this then finally cause the collapse of the information ecology?**
  - Much UCC within portals is synthesized and customized from the content of satellites.
  - What's portal's strategy for the long-term sustainability?

Basic Settings

- Game of Attention between 1 Portal and **n** Satellites
  - 2 Stage Traffic Competition based on Site Quality
  - Satellite

$$q_{s,i} = I_{s,i}$$

  - Portal

$$q_{p,i} = \alpha n_i I_{s,i} + \beta I_{p,i} \qquad (0 < \alpha < 1,\ 0 < \beta)$$

- Monopolistic Competition in Satellites' Market

$$\pi_{s,i}(n_i) = 0$$

α : *contribution ratio of satellite investment in portal's content*

β : *contribution ratio of portal's investment in its content creation*

n_i : *number of satellites in stage i*

Demand & Profit

- Spatial Model for Demand
  - Stage1

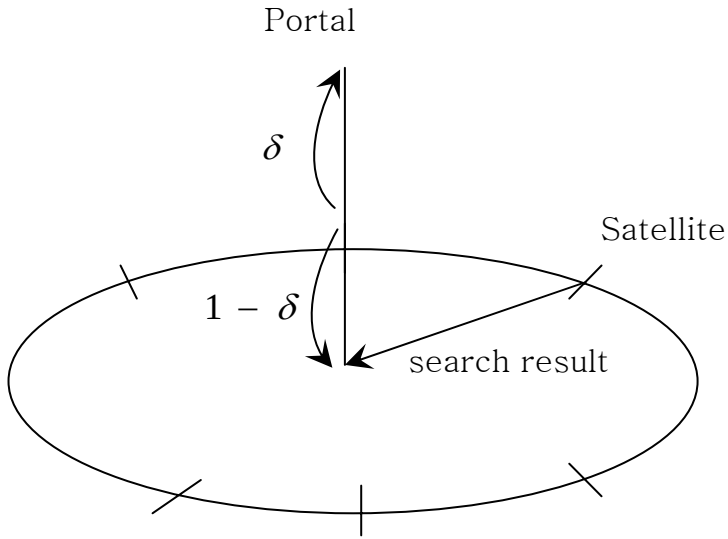
$$U_{p,1}(\delta) = (q_{p,1})(1+\gamma\delta_1) - \lambda\delta$$

$$U_{s,1}(\delta) = n_1 q_{s,1} - \lambda(1-\delta)$$

  - Stage2

$$U_{p,2}(\delta) = (q_{p,2} + \gamma\,\delta_1\, m_1)(1+\gamma\,\delta_2\, m_2) - \lambda\delta$$

$$U_{s,2}(\delta) = n_2 q_{s,2} - \lambda(1-\delta)$$



➡ δ_i is determined where $U_{p,i}(\delta) = U_{s,i}(\delta)$

- Profit Function

$$\pi_{s,i} = cn_i m_i \frac{1-\delta_i}{n_i} - I_{s,i}$$

$$\pi_{p,i} = cn_i m_i \delta_i - I_{p,i}$$

λ : marginal disutility by distance from best relevant information

c : revenue from unit users

m_i : total amount of traffic in stage i

Case 1: When the Number of User is Fixed

- $m_i = 1$
- Stage 2

$$\max_{I_{p,2}} \pi_{p,2} \qquad \max_{I_{s,2}} \pi_{s,2}$$

- Stage 1

$$\max_{I_{p,1}} \pi_{p,tot} = \pi_{p,1} + \pi_{p,2}(\bar{n}_2, I^*_{p,2}, I^*_{s,2}, \delta_1(I_{p,2}, I_{s,2}, n_1)) \qquad \max_{I_{s,1}} \pi_{s,1}$$

- Solutions

➡ $\delta_1^* < \delta_2^* \qquad I^*_{s,2} < I^*_{s,1}$

Proposition1

Under the condition of a fixed amount of traffic on the Internet, the community-based search causes the portal to monopolize traffic while the number of satellites diminishes.

Proposition2

Under the condition of a fixed amount of traffic and a monopolistically competitive satellite market, the portal's increasing monopolization of traffic causes satellites to invest less in its content at each progressive stage, so that the content quality of satellite sites gradually degrades stage by stage.

Case 2: When the Number of User is Growing

$$m_i = i$$

- Solutions

Portal demand $m_1\delta_1^* < m_2\delta_2^*$ **Satellite demand** $m_1(1-\delta_1^*) < m_2(1-\delta_2^*)$

$$I_{s,2}^{*\,case1} < I_{s,1}^{*\,case1,2} < I_{s,2}^{*\,case2}$$

$$n_2^{-\,case2} < n_2^{-\,case1}$$

Proposition3

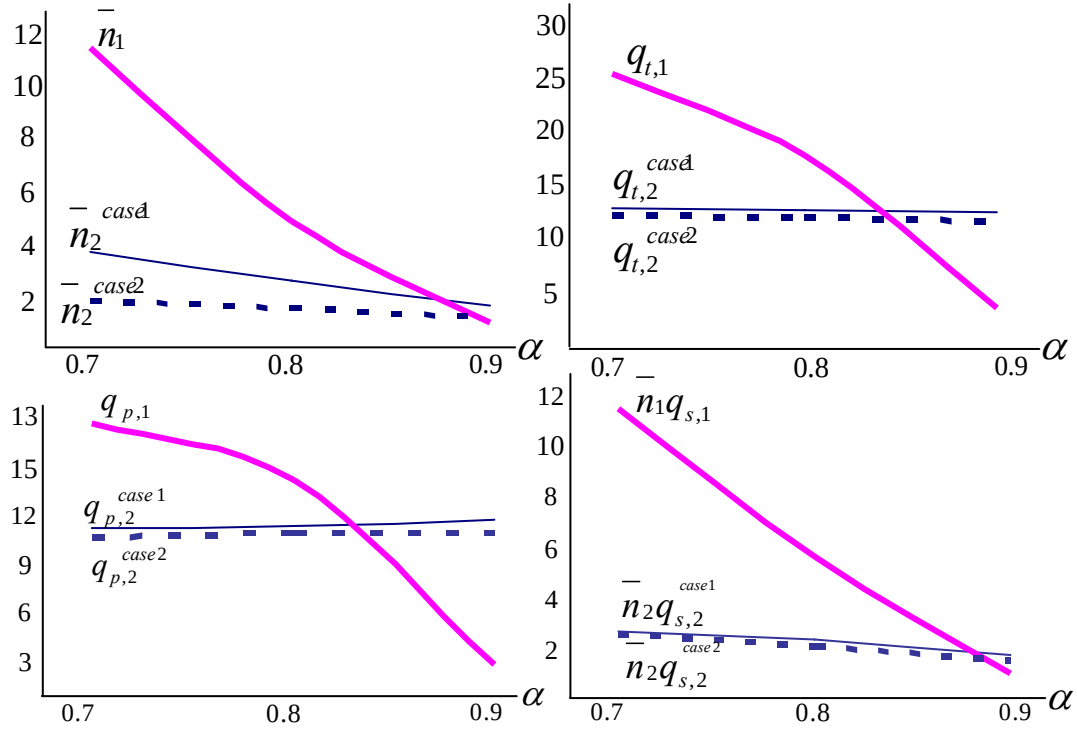
Under the condition of an increasing amount of traffic, the community-based search causes both the portal and satellites to get more traffic in each progressive stage.

Proposition4

Under the condition of an increasing amount of traffic, each satellite increases its investment level in the second stage so that the investment level is larger than when traffic is fixed. However, the number of participants in the satellite market at this stage, is less than when traffic is fixed.

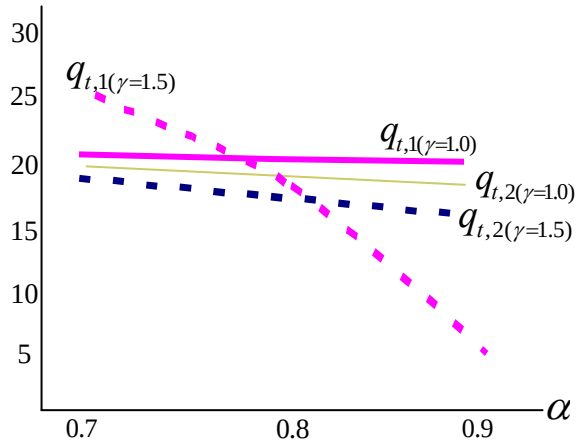
Numerical Analysis

- Information Synthesis and Replication (α)



$\gamma = 1.5, c = 1, \mu = 4\ \beta = 0.2$

- Network Externality (γ)



$\lambda = 1.2, \beta = 0.2, c = 1$

Proposition5

The community-based search can be an efficient service delivering an increase in total web quality when network externality within the knowledge community is high, and when the content of the portal depends greatly on the satellites' content.

Proposition6

The community-based search can be an inefficient service resulting in a decrease in overall web quality when network externality within the knowledge community is low and when the content of the portal is not dependent on the satellites' content.

Proposition7

Growing demand (traffic) increases the possibility of the collapse of the information ecology on the web more than fixed demand because it reduces overall web quality.

Conclusion

- Traffic monopolization can be a portal's myopic Strategy
  - from the long-term perspective, it can result in the death of both satellites and portal, and ultimately the fundamental collapse of the web under inefficient conditions for the community-based search
- Portals must understand the positive feedback loop in the web economy
  - the importance of the co-existence of both portal and satellites Avoid suboptimal results from extreme strategies
  - *"coopetition"* with satellites for long-term sustainability, both for themselves and for the overall health of the web.

Q&A