On studying business models in mobile social networks based on two-sided market

06/04/2015

Hansol Kim
On studying business models in mobile social networks based on two-sided market

Y. Wang
Jiangsu Key Lab of Wireless Communications, Nanjing University of Posts and Telecommunications (NJUPT), Nanjing, China
e-mail: wfwang@njupt.edu.cn; wfwang1974@gmail.com

Y. Wang
State Key Laboratory of Networking and Switching Technology, Beijing University of Posts and Telecommunications, Beijing, China

J. Tang
College of Telecommunications and Information Engineering, Nanjing University of Posts and Telecommunications, Nanjing, China

Q. Jin
Waseda University, Tokyo, Japan
e-mail: jin@waseda.jp

J. Ma
Hosei University, Tokyo, Japan
e-mail: jianhua@hosei.ac.jp

The Journal of Supercomputing, December 2014, Volume 70, Issue 3
Contents

1. Introduction

2. Business model of mobile social network as a platform

3. Modeling and analyzing of Freemium business model in MSN

4. Numerical simulations

5. Conclusions
Introduction

<Background>

Recently, the availability of mobile broadband connections and location technologies, their increasing affordability, and the usability of new mobile devices (e.g. smartphones) have led to the emergence of mobile social networks.

- For instance, investors are currently looking for social media start-ups that can build upon Facebook’s success in engagement.
- Facebook’s mobile advertising revenue account for 49% of Q3 revenue in 2013.
Introduction

<Purpose of paper>

• This paper’s main goal is to investigate the emerging field of mobile social network revenue streams. Business model within the unique framework of two sided market Quantitatively characterize the economic features of Freemium business model in mobile social network.
What is Freemium?

The word freemium is made up from the words free and premium.

- It describes a business model where you give a core product away for free and sell premium products
- like the way Skype gives away free computer calls and sells voicemail, calls to landlines and other products
Modeling and analyzing of Freemium business model in MSN

- We theoretically analyze a monopoly mobile social network platform.
- Figure illustrates the interaction among customers, service provider, and MSN platform, in which customers are classified into free users and premiums.

<table>
<thead>
<tr>
<th>Notation</th>
<th>Meaning of notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( p )</td>
<td>The price that MSN platform charges the premium user</td>
</tr>
<tr>
<td>( v_{pm} )</td>
<td>A gross utility that a premium user derives from using MSN platform</td>
</tr>
<tr>
<td>( v_f )</td>
<td>A gross utility that a free user receives from using MSN platform</td>
</tr>
<tr>
<td>( s )</td>
<td>The price that MSN charges the service provider who utilizes MSN platform, to target MSN platform’s consumers including free and premium users</td>
</tr>
<tr>
<td>( a )</td>
<td>The marginal value that a service provider places on an additional consumer</td>
</tr>
<tr>
<td>( b )</td>
<td>The marginal value that a consumer places on an additional service provider</td>
</tr>
<tr>
<td>( c )</td>
<td>The cost that MSN platform provides service for free and premium users</td>
</tr>
</tbody>
</table>
Theoretical analysis

<Consumers>

\[ u_f = v_f + b \cdot n_{sp} - t_1 \cdot n_f = 0 \]
Then, \[ n_f = \frac{v_f + b \cdot n_{sp}}{t_1} \]  \hspace{1cm} (1)

\[ u_{pm} = v_{pm} + b \cdot n_{sp} - t_1 \cdot n_{pm} - p = 0 \]
Then, \[ n_{pm} = \frac{v_{pm} + b \cdot n_{sp} - p}{t_1} \]  \hspace{1cm} (2)

<Service providers>

\[ u_{sp} = a \cdot (n_f + n_{pm}) - s - t_2 \cdot n_{sp} = 0. \]
Then \[ n_{sp} = \frac{a \cdot (n_f + n_{pm}) - s}{t_2} \]  \hspace{1cm} (3)

From the above equations, we can get

\[ n_f(p, s) = \frac{t_1 t_2 v_f + ab(v_{pm} - v_f) - abp - bt_1 s}{(t_1 t_2 - 2ab)t_1} \]  \hspace{1cm} (4)

\[ n_{pm}(p, s) = \frac{(v_{pm} - p)(t_1 t_2 - ab) + abv_f - bt_1 s}{(t_1 t_2 - 2ab)t_1} \]  \hspace{1cm} (5)

\[ n_{sp}(p, s) = \frac{a(v_f + v_{pm} - p) - t_1 s}{t_1 t_2 - 2ab} \]  \hspace{1cm} (6)
Theoretical analysis

<Mobile social network platform>

The platform faces the problem of choosing $p$ and $s$ to maximize platform’s profit, shown as follows.

$$\Pi(p, s) = (p - c) \cdot n_{pm}(p, s) - c \cdot n_f(p, s) + s \cdot n_{sp}(p, s)$$

(7)

Specifically, given $s$, the optimal $p$ for the monopoly MSN platform, defined by $\partial (p, s)/\partial p = 0$, is shown as follows

$$p(s) = \frac{2bc t_1 + at_1(v_f + v_{pm}) - 2t_1^2 s}{(a + b)t_1}$$

(8)

And the optimal $s$ for the monopolist given $p$, defined by $\partial (p, s)/\partial s = 0$, is follows

$$s(p) = \frac{v_{pm}(t_1 t_2 - ab) + abv_f + t_1 t_2 c - 2p(t_1 t_2 - ab)}{(a + b)t_1}$$

(9)
Theoretical analysis

Solving those two Eqs. (8) and (9) simultaneously gives the consumers’ subscription price and the fee charged to the SPs that maximize the platform’s profit.

\[ p^M = \frac{(2t_1t_2 - a^2 - 3ab)v_{pm} + a(b - a)v_f + 2t_1t_2c - 2bc(a + b)}{4t_1t_2 - (a^2 + 6ab + b^2)} \]  
\[ s^M = \frac{(b - a)(ab + t_1t_2)v_{pm} + a(2t_1t_2 - 3ab - b^2)v_f - 4ab^2c - t_1t_2(a - 3b)c}{t_1(4t_1t_2 - (a^2 + 6ab + b^2))} \]  
\[ n_f^M = \frac{v_f}{t_1} + \frac{b^2(v_{pm} - 3c) + ab(2v_f + v_{pm} - c)}{t_1(4t_1t_2 - (a^2 + 6ab + b^2))} \]  
\[ n_{pm}^M = \frac{2(t_1t_2 - ab)v_{pm} + (a^2 + ab)v_f - (2t_1t_2 - ab + b^2)c}{t_1(4t_1t_2 - (a^2 + 6ab + b^2))} \]  
\[ n_{sp}^M = \frac{2av_f + (a + b)v_{pm} - 3bc - ac}{4t_1t_2 - (a^2 + 6ab + b^2)} \]  

Note that superscript \( M \) indicates: monopoly MSN platform

And the optimal profit of the monopoly MSN platform can be given as follows

\[ \Pi^M = \frac{a^2v_f^2 + (a^2 + ab)v_f v_{pm} + (t_1t_2 - ab)v_{pm}^2 - (4t_1t_2 - 3ab - b^2)c v_f - (2t_1t_2 - ab + b^2)c v_{pm}}{t_1(4t_1t_2 - (a^2 + 6ab + b^2))} + \frac{2b^2c^2 + t_1t_2c^2}{t_1(4t_1t_2 - (a^2 + 6ab + b^2))}. \]
Numerical simulations

The numerical results are provided to illustrate the characteristics of Freemium model. And, for comparison, we also model and analyze all above terms for traditional business model, in which no free users are permitted, so-called no-free-user model (NFmodel).

- This paper are normalized, and thus should be set as comparable in quantity.
- As a special kind of digital product, the marginal cost that MSN platform provides service for free and premium users.
- The gross utility of a free user $v_f$ should be naturally less than a premium user’s utility $v_{pm}$.
- Parameters are commonly set as $t_1 = 1, t_2 = 1, c = 0.01$. 
Numerical simulations results

• From Fig. A,B(a) and A,B(b), in comparison with NF model, the participation levels of PM and SP in Freemium are both higher than those in NF model.
• Fig. A© shows that MSN platform with Freemium model can charge premium user a slightly higher price than that in NF model.
• However, on contrary to Fig. A©, Fig B© shows that, MSN platform with Freemium model can charge premium user a slightly lower price than that in NF model.
Numerical simulations results

**<Fig. A>**

- Fig. A(d) offers the prices that MSN platform charges SP in Freemium and NF models are **both negative**, which implies that MSN platform will compensate SPs to encourage them to reside in platform. \((b > a)\)

- Fig. B(d) illustrates that, **different** from Fig. A(d) in which platform has to compensate SP, MSN platform can charge **SP positive price in both models**, and the paid price by SP in Freemium is larger than that in NF models.
Conclusions

• In this paper, we discuss the distinguished features of MSN services as TSM, summarize the various revenue streams of MSN, characterize the basic components of general business model in MSN.

• This paper quantitatively characterizes the relationship among participation levels of free and premium users as well as CP/SPs, and illustrates the mutual enhancement among those participants.

• Freemium in MSN is thoroughly compared with traditional business model where no free users are permitted.

• The numerical results show that the participation levels of PM and SP, as well as the profit of MSN platform always exceed the corresponding terms in NF model.
Thank you for listening

Q & A