

Factors affecting the helpfulness of free knowledge sharing in OHCs

Peng Ouyang^{1, a}

¹School of Management, Harbin Institute of Technology, Harbin, 150001, China

^aouyao@hit.edu.cn

Abstract. This study examines factors that affect the helpfulness of free knowledge sharing by collecting data from a large online health community in China. The results show that, ease of understanding, quantity of information, volume of hyperlink, patient's engagement, physician's online experience, offline expertise and hospital level will positively affect the helpfulness of free knowledge sharing.

Keywords: Free Knowledge Sharing; Elaboration Likelihood Model; Online Health Community; Information helpfulness.

1. Introduction

OHC has undoubtedly grown into a significant resource for people seeking health information. Among various types of health information in OHC, physicians' free knowledge sharing in OHCs plays a significant role and is preferred by patients. Currently, the majority of prior literatures examine physicians' free knowledge sharing from the perspectives of motivation [1], effect [2], and the antecedents that affect the knowledge sharing [3], fail to care for what factors will affect its helpfulness. Specifically, in this study, we focus on the publicly available, cost-free health-related educational and professional articles in OHCs [2, 3], which have been served as free knowledge sharing and largely studied in literatures [1, 2]. We aim to answer the following questions: (1) how do the characteristics of physicians' free knowledge sharing affect the helpfulness; (2) How does the physician's professional capital affect the helpfulness of the free knowledge sharing?

2. Methods

2.1 Data Collection

We developed a Python-based web crawler to collect data from Haodf from May 1st, 2022 to May 31th, 2022. We collected 1096 physicians' article sections from the Internal Medicine and their free articles. After data processing, 802 physicians and 8135 articles with intact information were saved for further analysis.

2.2 Operationalization of Variables

We measured the helpfulness of article through the number of helpfulness votes for the free public article. The ease of understanding was measured by the rate of nouns, adjectives, verbs, adverbs, and punctuation in the article. This measurement has been adopted by other related studies [6, 7]. We measured the quantity of information by counting all the words in the article [8]. Volume of hyperlink was the total number of hyperlinks in the article while volume of image was a measurement of the total number of images in the article. Physician's professional capital consisted with decisional capital and status capital. Decisional capital was measured through online experience while status capital was measured by offline experience and hospital level. The professional title dummy was used to reflect the physician's offline expertise. Considering the ranking system of physician in China, chief physician was set as 1, others were set as 0. A hospital level dummy was used as a measurement of the hospital level. The hospital level was equal to 1 if the physician was employed by a Grade-A tertiary hospital while others were equal to 0. We considered the total number of patients who make online consultations as the moderating variable of

patient's engagement. Table 1 presents a list of all the variables and their definitions including the control variables used in this study.

Table 1. Description of Variables

Variables	Abbreviations	Measures
Helpfulness of free knowledge sharing	Helpfulness	The number of helpfulness votes for the free public article
Ease of understanding	Ease_un	The rate of nouns, adjectives, verbs, adverbs, and punctuation in the article
Quantity of information	QoI	The total number of words in the article
Volume of hyperlink	Vo_hyper	The total number of hyperlinks in the article
Volume of image	Vo_im	The total number of images in the article
Online experience	On_exp	Physician's online recommendation heat score
Professional title dummy	Pro_title_dum	Physician's professional title in the hospital
Hospital level dummy	Hosp_lev_dum	Level of hospital where the physician was employed
Patient's engagement	Pa_en	The total number of patients who make online consultations
Article age	Article_age	The total number of weeks since the article published in OHCs
Review volume	Re_vol	The total number of reviews the physician received
Presents		The total number of virtual presents the physician received
Online appointment	On_appoint	Whether the physician activate online appointment function model in its homepage

2.3 Hypothesis

For question 1, we put forward the following hypothesis:

H1a: Ease of understanding is positively associated with the helpfulness of physician's free knowledge sharing;

H1b: Quantity of information is positively associated with the helpfulness of free knowledge sharing;

H1c: Volume of hyperlink is positively associated with the helpfulness of physician's free knowledge sharing;

H1d: Volume of image is positively associated with the helpfulness of free knowledge sharing.

For question 2, we put forward the following hypothesis:

H2a: There exists a positive relationship between physician's online experience and the helpfulness of physician's free knowledge sharing;

H2b: Physician's offline expertise is positively associated with the helpfulness of physician's free knowledge sharing;

H2c: The hospital level is positively associated with the helpfulness of physician's free knowledge sharing.

2.4 Research model

To test the direct effect, first we constructed a cross-sectional model for the effect of central route and peripheral route on the helpfulness of free knowledge sharing:

$$\begin{aligned}
 \text{Helpfulness} = & \beta_0 + \beta_1 \times \text{Ease_un} + \beta_2 \times \text{QoI} + \beta_3 \times \text{Vo_hyper} + \beta_4 \times \text{Vo_im} + \\
 & \beta_5 \times \text{Log}(\text{Pa_en}) + \beta_6 \times \text{On_exp} + \beta_7 \times \text{Off_exp} + \beta_8 \times \text{Hosp_level} + \\
 & \beta_9 \times \text{Controls} + \varepsilon
 \end{aligned}$$

where β_0 was the intercept term, β_1 to β_8 were the interested coefficients. “Controls” was the control variables while ε was the error term.

The analysis was performed by R language program [4] for both the analysis of the data and the empirical research. The variable of patient’s engagement was modified by a log function due to its high range variation. We ran the above models through zero-inflated negative binomial regression models because the helpfulness and some independent variables had two much zero values.

3. Results

Table 2 shows the empirical results. Model 2 shows that the coefficient of Ease_un with helpfulness is significantly positive, suggesting that ease of understanding of free knowledge sharing is positively related to its helpfulness. Thus, H1a is supported. The coefficient in Model 2 demonstrates that QoI is significant and positively associated with the helpfulness of free knowledge sharing. Therefore, H1b is supported. Column 3 of Table 2 reveals that the coefficient between Vo_hyper and helpfulness is significantly positive. Hence, H1c is supported. Whereas, the coefficient between Vo_im and helpfulness is negative and not significant. Therefore, H1d is not supported.

In view of the effect of peripheral route on the helpfulness, as shown in Column 3 of Table 2, it could be found that the coefficient of On_exp with helpfulness is significantly positive. Therefore, H2a is supported. The coefficient between Off_exp and helpfulness is positive and significant, which suggests that the hypotheses of H2b is supported. H2c is also supported, because the coefficient of Hosp_level with helpfulness is significantly positive.

Table 2. Zero-inflated negative binomial regression results		
<i>Dependent Variable: Helpfulness</i>	Model 1	Model 2
Ease_un		4.7152***
QoI		0.0001***
Vo_hyper		0.1571***
Vo_im		-0.0141
On_exp		1.0355***
Pro_title_dum		0.1436*
Hosp_lev_dum		0.6851***
Log (Pa_en)		0.2259***
Article_age	-0.0021***	-0.0020***
Re_vol	0.0010***	0.0001
Presents	-0.0026***	-0.0033***
On_appoint	0.7385***	0.5677***
Ease_un×log(Pa_en)		
QoI×log(Pa_en)		
Vo_hyper×log(Pa_en)		
Vo_im×log(Pa_en)		
On_exp×log(Pa_en)		
Pro_title_dum×log(Pa_en)		
Hosp_lev_dum×log(Pa_en)		
Constant	0.3300**	-7.1235***
Zero inflation model		

Log (Pa_en)	0.0638	0.2193**
Article_age	0.0044***	0.0043***
Presents	-0.0163**	-0.0180**
Re_vol	-0.0175***	-0.0142**
Constant	-1.5042***	-2.7128***
Alpha	4.1657	3.5511
Log likelihood	-13145.93	-12818.74
Observations	8135	8135

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4. Conclusion

In this research, we examine what factors affect the helpfulness of free knowledge sharing in OHCs. We found that ease of understanding, quantity of information and volume of hyperlink would positively affect the helpfulness of free knowledge sharing through central route, while physician's online experience, offline expertise, hospital level and patient's engagement would positively affect the helpfulness of free knowledge sharing through peripheral route. Volume of image had no significant effect on the helpfulness of free knowledge sharing. Our research contributes to the literature on free knowledge sharing and information helpfulness.

References

- [1] Zhang X, Guo F, Xu T, Li Y. What motivates physicians to share free health information on online health platforms? *Information Processing & Management*. 2020;57(2): 102166.
- [2] Meng F, Zhang X, Liu L, Ren C. Converting readers to patients? From free to paid knowledge-sharing in online health communities. *Information Processing & Management*. 2021;58(3):102490.
- [3] Yan Z, Wang T, Chen Y, Zhang H. Knowledge sharing in online health communities: A social exchange theory perspective. *Information & Management*. 2016;53(5):643-53.
- [4] R Core Team. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>. 2022.
- [5] Qin W, Wu Y. jiebaR: Chinese Text Segmentation. 2019.
- [6] Liu X, Wang GA, Fan W, Zhang Z. Finding Useful Solutions in Online Knowledge Communities: A Theory-Driven Design and Multilevel Analysis. *Information Systems Research*. 2020;31(3):731-52.
- [7] Zhang Y, Li X, Fan W. User adoption of physician's replies in an online health community: An empirical study. *Journal of the Association for Information Science and Technology*. 2020;71(10):1179-91.
- [8] Ouyang P, Wang J-J, Jasmine Chang A-C. Patients need emotional support: Managing physician disclosure information to attract more patients. *International Journal of Medical Informatics*. 2022;158:104674.