A Study on the Information Quality Satisfaction of Communication Portals in the Hong Kong Government

Shuk Ying HO, The University of Melbourne, Dept of Accounting & Business Information Systems, Faculty of Economics & Commerce, Victoria 3010, Australia, P: 613-83448897, F: 613-93492397, suho@unimelb.edu.au

Kevin K. W. HO, The Hong Kong University of Science and Technology, Dept of Information & Systems Management, School of Business and Management, Hong Kong, P: 852-23587637, F: 852-23582421, kevinkho@ust.hk

ABSTRACT

Information quality is critical for a communication portal because there are myriad information types, including textual, audio, video and other complex information types which an organization has to manage. In this study, we examine whether information generated from an in-house developed communication portal of the Hong Kong Government would have higher quality than those sister portals developed by individual government departments using commercial packages. We conducted a survey-based study to understand how users evaluate the information quality of these communication portals. This portal case is interesting because: (1) Hong Kong Government has invested millions of US dollars in its implementation; and (2) the number of potential users is huge (over 53,000).

INTRODUCTION

Communication Portals

In 2000, the Hong Kong Government launched an intranet communication portal, namely the Central Cyber Government Office (CCGO), for the daily operation of her employees (Hong Kong Government, 2005). This portal was for Government-to-Government (G2G) and Government-to-Employee (G2E) communication. Figure 1 shows the IT infrastructure of the Government. CCGO connects to bureaux and departments via the core Government Backbone Network. Common applications and services are provided to bureaux and departments to facilitate the efficient delivery of services to both internal and external customers. The aim for developing CCGO is to provide a central portal for all government departments, which have built their own databases or portals using other commercial software applications.

The CCGO portal has an easy-to-use interface and provides a central access point to common information services on the Government-wide Intranet. It caters for five major functions, including (1) an intra-governmental information-sharing centre, for the sharing of notes, circulars, guidelines, statistics and internal forms; (2) instant access to the latest service-wide information such as circular memoranda; (3) a video library to broadcast important events and support video-on-demand; (4) a training centre providing online multi-media tutorials at a user's preferred time and at his own pace; and (5) an inter-governmental business centre for filing of departmental returns. Other services, such as a Government telephone directory, glossaries, discussion fora, bulletin boards, links to other government Internet websites, etc. are also provided. Major future expansions are planned for project collaboration and processes streamlining business operations. CCGO now acts as a platform for G2E (such as the leave application system) and G2G applications (for hosting of departmental portals which help to disseminate inter- and intra-departmental information).

Research Questions

This case of CCGO is contributing to IT practitioners and policy makers because (1) the Hong Kong Government has invested millions of US dollars in the development and enhancement of the system; and (2) the number of potential users can be huge. As reported by the Hong Kong Government in 2005, CCGO has over 53,000 users which are much more than the several thousand users at the early stage of its implementation. The number of users will further be increased in the coming years.

We choose the Hong Kong Government as our subject for study because it is ranked eighth in the Worldwide "Overall Maturity in e-Government" (Accenture, 2003). This indicates Hong Kong is one of the pioneers in e-Government in the world. With much knowledge in the information quality from CCGO, major business firms and governments can obtain insights into whether they should develop their own in-house communication portal or to use commercial packages to host their portal. Thus, our paper aims at addressing the following two research questions: *(1) Does an in-house developed information portal produce higher information quality than portals hosted on commercial packages? (2) Which features of information quality affect user satisfaction?*

The paper is organized as follows. Section 2 presents the prior IS work related to quality of information. Methodology is reported at Section 3. Section 4 describes the survey data and findings, while Section 5 presents its implications from our findings. Section 6 concludes the paper and gives suggestions for future research.

LITERATURE REVIEW

Information quality from a system is important, and some researchers regarded it as the output quality of the whole system (Shih, 2004). Information quality is critical in an organization (Lee *et al.*, 2002) and it has a positive effect on system satisfaction (Bharati, 2003; Shim & Min, 2002; Sullivan & Walstrom, 2001) which is a very important indicator of information system performance (Mahmood, 1987; Miller

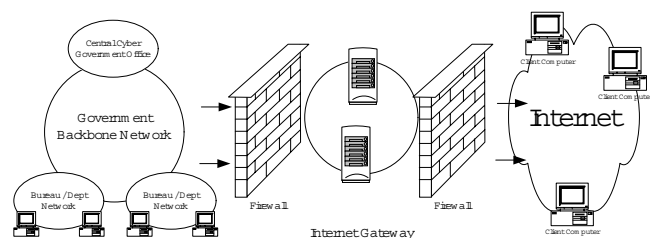*Figure 1. Schematic diagram of communication networks in Hong Kong government*

Table 1. Rotated component matrix

	C	T	A	P
A1			0.903	
A2			0.885	
P1				0.865
P2				0.818
T1		0.838		
T2		0.863		
C1	0.876			
C2	0.834			
C3	0.823			
C4	0.735			

Table 2. Reliability scale

No. of Items	No. of Items	Reliability
Accuracy	2	0.916
Presentation Format	2	0.853
Timeliness	2	0.876
Content	4	0.887

& Doyle, 1987; Srinivasan, 1985) and its success (Aladwani, 2002; Aladwani, 2003; Bailey & Pearson, 1983; DeLone & McLean, 1992; Melone, 1990). IS researchers found that higher information quality will lead to higher system usage (Khalil and Elkordy, 2005). And similar findings were established in the context of electronic commerce (Park and Kim, 2006). Besides, information quality is at least partially dependent upon the purpose and/or the use of the data (Lee *et al.*, 2004). IS researchers developing scales for measuring IS satisfaction would also include constructs related to quality of information (Bailey & Pearson, 1983). Therefore, the quality of information has received considerable attention in IS literature.

There are multiple information attributes reflecting information quality. Some widely-used measures are information accuracy (Mahmood, 1987; Miller & Doyle, 1987; Srinivasan, 1985), information presentation consistency (Cykana, Paul & Stern, 1996), information content relevance (Miller & Doyle, 1987; Srinivasan, 1985), and information timeliness (Mahmood, 1987; Miller & Doyle, 1987; Srinivasan, 1985). These measures have been used in this study. Studies also show that users have high expectations that the web-based system would provide high quality information (Negash, Ryan & Igbaria, 2003). The perception of information affects user acceptance of a system significantly (Shih, 2004).

METHODOLOGY
The survey was administered in late 2003 and lasted for 12 weeks. We asked the participants to provide feedback on the information quality of the portal that they were currently using. The questionnaire is adapted from the scale developed by Doll and Torkzadeh (1988) and Lee *et al.* (2002) measuring information quality from the systems. The instrument taps overall satisfaction and covers four dimensions: information relevance, accuracy, timeliness and consistency.

DATA ANALYSIS

Pilot Test
A pilot test involving 12 doctoral students was conducted. The composition of our pilot respondents enabled us to ensure that the views from both IS researchers and civil servants could be included. The respondents took approximately 10 minutes to complete the questionnaire. The finalized version was made up of 43 questions, where were measured on a 5-point Likert scale.

Sample
We contacted government departments and invited them to participate in this study. Some departments, including the Post Office, the Police Force, and public schools, showed their interest. The respondents' job nature ranged from operation to accounting, to administration. We conducted the survey on site and distributed paper questionnaires which contained a cover letter explaining the purpose of the survey and ensuring that all findings would be kept confidential and that the report would only depict data summaries. Each survey session was conducted on company time by a task force member who explained the purpose of the survey and helped answer any questions raised by respondents.

We received 211 questionnaires, of which 204 of them were complete. 69% of the respondents were males and the overall average age was 37 years. Concerning their position in the government, 67% of them were frontline managers. 16% were middle managers who were the section head of the branch/unit. 3% were from senior management and the remaining 14% were clerical or frontline staff. All participants used computers for their daily work. Amongst them, 20 of them used CCGO in their daily work and the others used commercial software (e.g. Lotus Notes or other Microsoft products) for message exchange services and meeting scheduling.

Factor Analysis, Reliability Test and Construct Validity
All independent variables were standardized and grouped by factor analysis using SPSS version 10.0. Principal Components Analysis was employed for factor extraction and Varimax with Kaiser Normalization was used for factor rotation. The model converged in five iterations. A four-factor solution was obtained with all component eigenvalues greater than one. The independent factors were Content Relevance (C), Presentation Format (P), Information Timeliness (T) and Information Accuracy (A). These factors explained 78.6% of the total variance in the survey. Items load highly (> 0.7) on their associated factors (see Table 1).

These factors are evaluated for reliability, convergent validity and discriminant validity. In the reliability test, the internal consistency for each factor is assessed by computing Cronbach's alpha (see Table 2). According to Nunnally (1978), a reliability value of 0.7 or above is acceptable. Hence, all factors are deemed reliable.

Convergent validity is achieved if there are higher correlations between items in the same factor (Campbell and Fiske, 1959). To access this validity, Pearson correlation coefficients are computed with the two-tailed *t*-test. Table 3 provides the correlation matrix. All correlations between pairs of items within the same factor are statistically different from zero at 0.01 significance level. Thus, convergent validity is demonstrated.

Discriminant validity is demonstrated if an item correlates more highly with items within the same factor than with items in a different factor. Validity is determined by counting the number of times an item has a higher correlation with an item from another factor than with items in its own factor. Campell and Fiske (1959) suggest that a count of less than one-half is acceptable. We made more than 200 comparisons by examining the correlation matrix of items (see Table 3). There is no correlation value between items from different factors higher than those between items within the same factor. Based on this assessment, items in each factor are discriminant from items in another factor.

Data Analysis
We calculated and compared the scores of the four latent factors for both CCGO and the commercial software packages. Results demonstrate that both CCGO (mean=4.87) and software package (mean=4.20) had high output accuracy when compared to the mean of our scale (i.e. 3). In particular, the score for CCGO is statistically higher than the one for software package (p=0.02). It is generally agreed that new systems often take time and experience to ensure all things are operating at peak accuracy. As CCGO was launched for around four years when we conducted our study, most bugs and software problems should have already been fixed. Also, as it is the portal hosted by the central government, users would believe that its information accuracy would be higher than those provided by individual departments.

Table 3. Correlation matrix

	A1	A2	P1	P2	T1	T2	C1	C2	C3	C4
A1	1.00									
A2	0.85	1.00								
P1	0.33	0.37	1.00							
P2	0.43	0.41	0.74	1.00						
T1	0.36	0.40	0.49	0.50	1.00					
T2	0.38	0.35	0.34	0.42	0.78	1.00				
C1	0.39	0.41	0.42	0.32	0.40	0.33	1.00			
C2	0.47	0.50	0.37	0.34	0.47	0.41	0.76	1.00		
C3	0.36	0.40	0.44	0.32	0.25	0.24	0.72	0.65	1.00	
C4	0.40	0.45	0.25	0.32	0.42	0.51	0.66	0.77	0.50	1.00

Table 4. Regression model with satisfaction as the dependent variable

	UnStd Coefficient		Std Coeff.		
Constructs	**B**	**Std. Error**	**Beta**	**T**	**p-value**
(Constant)	1.701	0.692		2.459	0.015
Content	0.083	0.158	0.048	0.530	0.597
Timeliness	-1.331	0.341	-0.414	-3.908	0.000
Accuracy	0.143	0.068	0.134	2.088	0.038
Format	1.952	0.314	0.777	6.216	0.000

Second, both CCGO (mean=3.05) and commercial software (mean=3.36) had satisfactory information presentation formats. Unlike information accuracy, the score for commercial products in information presentation is significantly higher than the one of CCGO (*p*=0.04). This observation may be due to the fact that most employees had used the commercial software, such as Lotus Notes, for many years and hence, they were more familiar with its interfaces and presentation formats.

Third, users were dissatisfied with the information timeliness for both CCGO (mean=2.66) and commercial software (mean=2.45). Even though we observe that the score for CCGO is higher than the score of commercial products, this different is not statistically significant (*p*=0.08). We noticed during our study that the information disseminated in CCGO usually has a time lag of around 2 working days. As the government was using e-mail and fax to send out information before they were uploaded to CCGO, users might have an impression that timely information could not be provided by CCGO. For those users who were using commercial packages, they faced the same problem.

Fourth, both CCGO (mean=2.26) and commercial software (mean=2.59) had the score of information content relevance below the mid point of the scale. Similar to the result obtained for information timeliness, the difference between CCGO and commercial products is statistically insignificant (*p*=0.12). This observation is not surprising because similar to portals on the Internet, CCGO and her sister portals also had information overload problem. The information overload arises from the belief of content providers that they should provide as much "useful" information to potential users as possible. Hence, for a general user, s/he will find that most of the information provided is irrelevant to her/him. This will, obviously, push down the score of information content relevance.

To have a more thoughtful analysis of the relationship between these information quality constructs and user satisfaction, we have conducted regression analysis with satisfaction as the dependent variable (see Table 4). The R-square of the regression equation is 0.315 which suggests that there exists a high correlation between these information quality constructs with user satisfaction.

Based on the regression result, information content relevance (*p*=0.60) was not a significant factor affecting user satisfaction. However, timeliness (*p*<0.01), information accuracy (*p*=0.04) and information presentation formats (*p*<0.01) were significant factors affecting user satisfaction.

To conclude, generally our subjects considered CCGO to be better than commercial packages in information accuracy. However, the information presentation format of CCGO was not as good as commercial packages. Concerning information timeliness, users thought that it failed to provide an acceptable performance whereas information content relevance was an insignificant factor.

DISCUSSION
With plenty of in-house IT and development resources, the Hong Kong Government was one of the first to implement an advanced communication portal. The benefits of CCGO include more secure creation and access to information, versioning, information audit trails (especially good for highly regulated industries), approval paths, secured distribution, and workflow and collaboration automation. The major drawback to her is the software and implementation costs. It costs millions of US dollars.

Our study shows three practical implications. First, in-house developed communication portal had higher information quality in output accuracy. It might be due to the fact that an in-house developed system had a higher degree of connectedness with other existing, in-house developed components. The output from one subsystem could be easily fed into another subsystem. Therefore, if an organization intends to develop system generating high-quality information, it should take the in-house development approach if the other existing sub-systems are in-house developed as well.

Also, it is interesting to know that the presentation format of CCGO was found to be worse than that of commercial systems. There can be two reasons: the first reason was that the system development team neglected the importance of interface design. The second reason was that users were more familiar with commercial software packages and thus, they perceived them to be presented in a better format.

In addition, civil servants were dissatisfied with the information content relevance and information timeliness. There could be two reasons. First, CCGO is an Intranet portal targeted for civil servants from more than 80 departments. Indeed, information obtained from CCGO is too general. Hence, its functions are not designed to be too tailored for each individual department. Departmental information was not available at CCGO when we conducted our research. With the implementation of Departmental Portals in CCGO in 2004, we expect that this problem will have been resolved. A follow up study will be conducted to see whether these further enhancements will improve the information content relevance of CCGO.

It is also interesting to observe that the beta value for timeliness is negative which is different from our original prediction. Originally, we expected that civil servants would desire timeliness of information and hence, they could complete their work in a more efficient way. We suggested that the negative value for timeliness was contributed to by the adaptation problem. It was because when we conducted the study, the Government had just started to migrate from paper-based office to paperless office. As a result, civil servants were required to adjust their pace to face the fast turnaround of information flow and to collect information actively through web-surfing which brought a paradigm shift for which they required some time to adapt. As a result, they were of the view that timeliness was a burden instead of an advantage to them. Hence, we observed a negative coefficient.

CONCLUSION AND FUTURE RESEARCH
Our study conducted a survey in a number of governmental departments to examine the information quality of an in-house developed communication portal by the Hong Kong Government. Results show that the portal was performing satisfactorily and producing higher-quality information than other commercial software packages. However, its users preferred to use the commercial presentation format. The major limitation of our study is that it is limited to a Far-East metropolitan city. However, we are of the view that this will not undermine the significance of our study as Hong Kong is a forerunner in e-Government. For future research, we are planning to conduct another survey to address the managerial resistances when CCGO is fully implemented in 2006.

REFERENCES

1. Accenture (2003), "E-Government leadership – Realizing the Vision," [Online, Internet], Available: http://www.accenture.com/xd/xd.asp?it=enweb&xd=industries%5Cgovernment%5Cgove_egov_leader.xml, Accessed 30 Jul. 2005.
2. Aladwani, A. M. (2002), "Organizational actions, computer attitudes, and end-user satisfaction in public organizations: An empirical study," *Journal of End User Computing*, 14(1), 42-49.
3. Aladwani, A. M. (2003), "A deeper look at the attitude-behavior consistency assumption in information systems satisfaction research," *the Journal of Computer Information Systems*, 44(1), 57-63.
4. Bailey, J. and Pearson, S. (1983), "Development of a tool for measuring and analyzing computer user satisfaction," *Management Science*, 29, 530-545.
5. Bharati, P. (2003), "People and information matter: Task support satisfaction from the other side," *Journal of Computer Information Systems*, 43(5), 93-102.
6. Campbell, D. and Fiske, D. W. (1959), "Convergent and discriminant validation by the Multitrait-Multimethod Matrix," *Psychological Bulletin*, 56, 81-105.
7. Cykana, P., Paul, A. and Stern, M. (1996), "DoD guidelines on data quality management," *Proceedings of the Conference on Information Quality*, Cambridge, MA, 154-171.
8. DeLone, W. H. and McLean, E. R. (1992), "Information systems success: The quest for the dependent variable," *Information Systems Research*, 3, 60-95.
9. Doll, W. J. and Torkzadeh, G. (1988), "The measurement of end-user computing satisfaction", *MIS Quarterly*, 12, 259-274.
10. Hong Kong Government (2005), "IT infrastructure and standards – Infrastructure for E-government – Central Cyber Government Office," [Online, Internet] Available: http://www.ogcio.gov.hk/eng/infra/eccgo.htm Accessed 28 September 2005.
11. Khalil, O.E.M., and Elkordy, M.M. (2005), "EIS Information: use and quality determinants," *Information Resources Management Journal*, 18(2), 68-93.
12. Lee, Y. W., Strong, D. M., Kahn, B. K. and Wang, R. Y. (2002), "AIMQ: A methodology for information quality assessment," *Information and Management*, 40, 133-146.
13. Lee, Y. W., Pipino, L., Strong, D. M. And Wang, R. Y. (2004), "Process embedded data integrity," *Journal of Database Management*, 15(1), 87-103.
14. Mahmood, A. (1987), "Systems development methods – A comparative investigation," *MIS Quarterly*, 11, 293-311.
15. Melone, N. P. (1990), "A theoretical assessment of the user-satisfaction construct in information systems research," *Management Science*, 36, 76-91.
16. Miller, J. and Doyle, B. A. (1987), "Measuring effectiveness of computer-based information systems in the financial services sector," *MIS Quarterly*, 11, 107-124.
17. Negash, S., Ryan T. and Igbaria, M. (2003), "Quality and effectiveness on Web-based customer support systems," *Information and Management*, 40, 757-768.
18. Nunnally, J. C. *Psychometric theory* (2nd edition). New York: McGraw-Hill. 1978.
19. Park, C.H. and Kim, Y.G. (2006), "The effect of information satisfaction and relational benefit on consumers' online shopping site commitments," *Journal of Electronic Commerce in Organizations*, 4(1), 70-90.
20. Shih, H. P. (2004), "An empirical study on predicting user acceptance of e-shopping on the Web," *Information and Management*, 41, 351-368.
21. Shim, S. J. and Min, B. K. (2002), "Organizational factors associated with expert systems implementation," *Journal of Computer Information Systems*, 42(4), 71-76.
22. Srinivasan, A. (1985), "Alternative measures of system effectiveness: Associations and implications," *MIS Quarterly*, 9, 243-253.
23. Sullivan, J. R. and Walstrom, K. A. (2001), "Consumer perspectives on service quality of electronic commerce web sites," *Journal of Computer Information Systems*, 41(3), 8-14.

Related Content

Energy Efficiency Using the Fast Reroute Technique
Diego Reforgiato Recuperoand Sergio Consoli (2015). *Encyclopedia of Information Science and Technology, Third Edition (pp. 7096-7105).*
www.irma-international.org/chapter/energy-efficiency-using-the-fast-reroute-technique/112408

Cyber Security Protection for Online Gaming Applications
Wenbing Zhao (2018). *Encyclopedia of Information Science and Technology, Fourth Edition (pp. 1647-1655).*
www.irma-international.org/chapter/cyber-security-protection-for-online-gaming-applications/183880

Information: A Multidimensional Reality
José María Díaz Nafría (2012). *Systems Science and Collaborative Information Systems: Theories, Practices and New Research (pp. 37-70).*
www.irma-international.org/chapter/information-multidimensional-reality/61285

Management Model for University-Industry Linkage Based on the Cybernetic Paradigm: Case of a Mexican University
Yamilet Nayeli Reyes Moralesand Javier Suárez-Rocha (2022). *International Journal of Information Technologies and Systems Approach (pp. 1-18).*
www.irma-international.org/article/management-model-for-university-industry-linkage-based-on-the-cybernetic-paradigm/304812

Rural Intelligent Public Transportation System Design: Applying the Design for Re-Engineering of Transportation eCommerce System in Iran
Leila Esmaeiliand Seyyed AliReza Hashemi G. (2015). *International Journal of Information Technologies and Systems Approach (pp. 1-27).*
www.irma-international.org/article/rural-intelligent-public-transportation-system-design/125626