International Journal of Business, Human and Social Sciences
ISSN: 2517-9411
Vol:6, No:12, 2012

An Empirical Study of the Expectation-Perception Gap of I.S. Development

Linda, Sau-ling Lai

***Abstract*—**This paper adopts a notion of expectation-perception gap of systems users as information systems (IS) failure. Problems leading to the expectation-perception gap are identified and modelled as five interrelated discrepancies or gaps throughout the process of information systems development (ISD). It describes an empirical study on how systems developers and users perceive the size of each gap and the extent to which each problematic issue contributes to the gap. The key to achieving success in ISD is to keep the expectation-perception gap closed by closing all 5 pertaining gaps. The gap model suggests that most factors in IS failure are related to organizational, cognitive and social aspects of information systems design. Organization requirement analysis, being the weakest link of IS development, is particularly worthy of investigation.

***Keywords*—**Information Systems Development, Expectation-Perception Gap, Gap Analysis, Organization Analysis.

I. Introduction

THE rather alarming failure rates reported for IS projects (e.g., [1],[3],[7]) suggest that there is considerable room for improvement in the way that information systems are currently developed. Development failures very often result from adopting a narrow, uniquely technical approach which ignores the realities of the organization an information system is designed to serve [6]. Information systems, as a bridge between technological solutions and organizational problems, must be built from the side of organizational users. A systems project, no matter how expensive and elaborately designed, is still of little value if it does not perform as its users expect.

An IS failure, according to [5], is 'a gap between stakeholders' expectations expressed in some ideal or standard and the actual performance' (p.46) perceived by the users. This account of failure has both an objective and a subjective dimension. It is objective to the extent that it reflects the goals and purposes of the systems stakeholders. It is also subjective to the extent that it depends on an actor group's reading of the situation: how it conforms to the actor group's interests and values. The degree of "meeting" and "reflection" can only be measured against the expectation and perception of IS stakeholders who enact some organisational roles in a particular setting.

Fig. 1 shows various problematic issues and their relationships with the gaps that lead to failures in information systems development. In this model of ISD failure, the gap between users' expectations and perceptions [8] of an information system (Gap 6) results from five gaps (Gaps 1 through 5) during the process of IS project development. Each of the five gaps is in turn caused by the various factors that are itemised in the left-hand column of Fig. 1. The philosophical foundations of the expectation-perception gap are also shown on the right-hand side of Fig. 1.

The expectation-perception gap (Gap 6) is a function of gaps 1, 2, 3, 4 and 5. Thus, the key to achieving success in information systems development is to keep Gap 6 closed by closing gaps 1 through 5.

In this way, we may argue that information systems failure (or user expectation mismatch) results from one or more of the following reasons:

1. users' inability to cogitate their information needs;
2. developers' inability to comprehend users' information needs;
3. developers' inability to translate their perceived information needs of users into requirement specifications;
4. developers' inability to transform specified needs for information provision into systems deliverables; and
5. users' inability to utilise the delivered systems to satisfy their information needs.

II. An Empirical Study

Fig. 1 depicts issues germane to an understanding of problems related to IS development and for taking corrective measures to solve the problems. An empirical survey study was conducted to investigate how systems users and developers in organisations perceive the size of each gap and the extent to which problematic issues contribute to the gaps.

A. Development of the Questionnaire

Based on the conceptual understanding and insights gained from the literature review and case studies, the author developed two sets of questionnaire to assess the extent of the five discrepancies (Gap 1 to Gap 5) that lead to the expectation-perception failure (Gap 6) in IS development. In our gap model (shown in Fig. 1), Gaps 1 and 6 are users' gaps and Gaps 2, 3 and 4 are on the developers' side. Gap 5 straddles the boundary between users and developers of the model.

Linda Sau-ling Lai is an Associate Professor at the Macao Polytechnic Institute, Rua de Luis Gonzaga Gomes, Macao SAR, China (corresponding author to phone: 853-66245539; e-mail: sllai@ipm.edu.mo).

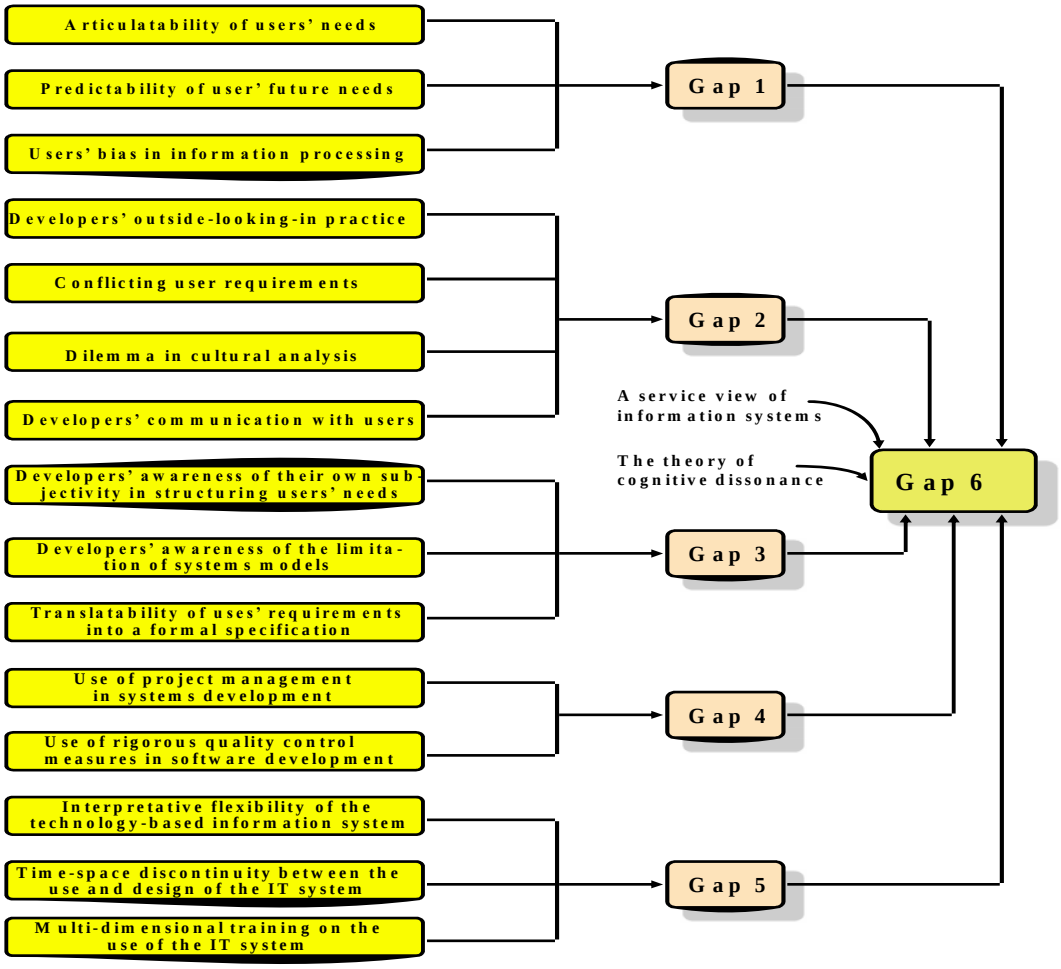


Fig. 1 An expectation-perception gap model of IS failure

On the basis of closeness to and knowledge about the various gaps, the most appropriate respondents are end users for assessing Gaps 1 and 6, and systems developers for assessing Gaps 2, 3, and 4. The measurement of Gap 5 depends on combined responses from systems users and developers. The questionnaires for end users and systems developers are illustrated in Fig. 2.

The nature of Gap 6 is different from the other five gaps. It indicates users' overall assessment of an information system. According to [4], a global measure requires a global question. The summing of detailed, independent items to obtain a global measure of an overall construct is not appropriate because the "whole" is more complex than the sum of its parts. The author has thus selected a single-item instrument to measure the overall expectation-perception mismatch (Gap 6) of systems users. The adopted statement reads: 'the overall perceived performance of the information system meets my expectation of it' (statement one of users' questionnaire). The potential antecedents of Gaps 1 through 5 are operationalized by statements. Respondents were asked to use a five-point scale, ranging from "strongly agree" (1) to "strongly disagree" (5) to indicate their opinion of the extent to which each statement was relevant to the ISD project under investigation.

The overall average score for each antecedent (obtained in step 3) of gaps 1 through 5 is used to plot the line chart shown on Fig. 3. The average score for each antecedent (on a scale of 1 to 5 on which the higher score the more favourable the status of the antecedent) can be computed through the following three steps:

1. For negatively worded statement pertaining to the antecedent, reverse the ratings given by the respondents (i.e., score 5 as 1, 4 as 2, etc.).
2. For each respondent, add the scores on the statements comprising the antecedent and divide the total by the number of statements.
3. Add the scores obtained in step 2 across all respondents and divide the total by the number of respondents.

The overall average score of gaps 1 through 5 (obtained in step 2) was used to plot the bar chart shown on Fig. 3. The average score for each gap (on a scale of 1 to 5 on which the higher score the more favourable the status of the gap) can be computed through the following steps:

1. For each gap, add the overall average scores of all

antecedents pertaining to it.

2. For each gap, divide the total obtained in step 1 by the number of antecedents pertaining to it.

1. The overall perceived performance of the * system meets my expectation of it.
2. I have a clear picture of my requirements for the * system.
3. I am able to visualise my requirements for the * system based on the future direction of my work.
4. My requirements for the * system are mainly based on the specific tasks of my work that are easy to recall from memory.
5. I have tried to refute my initial requirements for the * system.
6. My requirements for the * system are based on a small sample of my work.
7. My interpretation and use of the * system are consistent with the original design intent of its systems developer.
8. There is a considerable time-space discontinuity between the design and use of the * system.
9. The systems developers have provided procedural training on the use of the * system.
10. The systems developers have provided conceptual training on the use of the * system.

* CPR/POMP/RAM system

(a)

1. I know the requirements of the users of the * system.
2. The requirements for the * system elicited from the users are self-conflicting and competing.
3. I am able to apply users' cultural frameworks to interpret users' expectations of the * system.
4. I am aware of the cultural influence on users' expectations of the * system.
5. I understand the organisational activities that the * system is developed to support.
6. Users' requirements for the * system are not necessarily logical and objective
7. Requirements for the * system should be based on the business tasks/objectives users have to fulfil.
8. I try to interpret and make sense of the organisational environment when I analyse the users requirements of the * system.
9. I am aware of the effects of my personal characteristics on the process of rationalising users requirements of the * system.
10. I am aware of the limitations of the models I used in expressing the real world requirements of the * system.
11. Real world requirements of the * system are well translated into the requirements specification.
12. I use control and monitor measures to keep the * system project developed within cost.
13. I use control and monitor measures to keep the * system project developed within time.
14. I use control and monitor measures to keep the * system project developed within performance.
15. The functionality (such as conformity, usability, reliability, efficiency, security and auditability) of the software deliverables of the * system are rigorously controlled at specified standard.
16. The adaptability (such as maintainability, flexibility, reusability and portability) of the software deliverables of the * system are carefully designed to meet users' changing requirements.
17. The users' interpretation of the * system are consistent with the design intent of me.
18. There is a considerable time-space discontinuity between the design and use of the * system.
19. I have provided procedural training to users on the use of the * system.
20. I have provided procedural training to users on the use of the * system.

* CPR/POMP/RAM system

(b)

Fig. 2 (a) Questionnaire for IS users (b) Questionnaire for IS developers

B. The ISD Projects Studied

The two sets of questionnaire were used to collect data from stakeholders of the following three ISD projects:

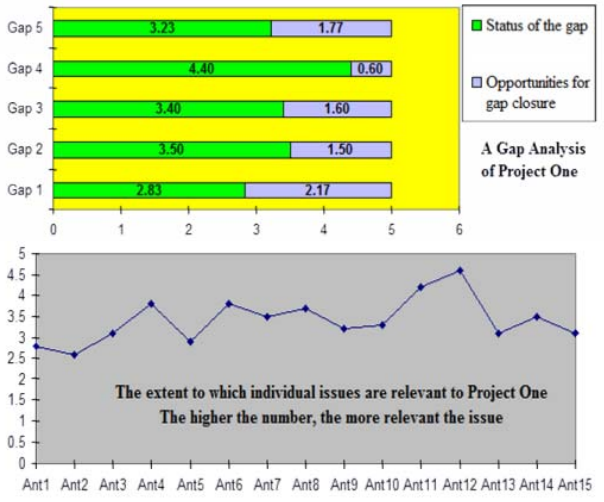
1. The first project surveyed was the Computer-based Patient Record (CPR) system of a public hospital in Hong Kong. The system aims to facilitate more efficient order processing for patient treatments (e.g., to book X-ray treatments, to order special medicines from pharmacological sections, etc.). Its users are the medical officers and nursing staff. The system is a pilot scheme of an integrated clinical management system for the computerisation of hospital services in Hong Kong.
2. The second project surveyed was the Purchase Operation and Menu Planning (POMP) system of the catering division of a major airline in Hong Kong. It aims to link up menu planning to purchasing functions so that just-in-time delivery of perishable items is possible. The end users include managers and contact personnel of the division.
3. The third project surveyed was the Recruitment and Appointment Monitoring (RAM) system of the human resources office of a university in Hong Kong. It is a database system for recording information about job applicants, tracking progress of recruitment, automating the issue of correspondence relating to recruitment and producing statistical and monitoring reports on staff appointments. The systems users include members of the administrative and clerical staff of the human resources office.

C. Data Collected

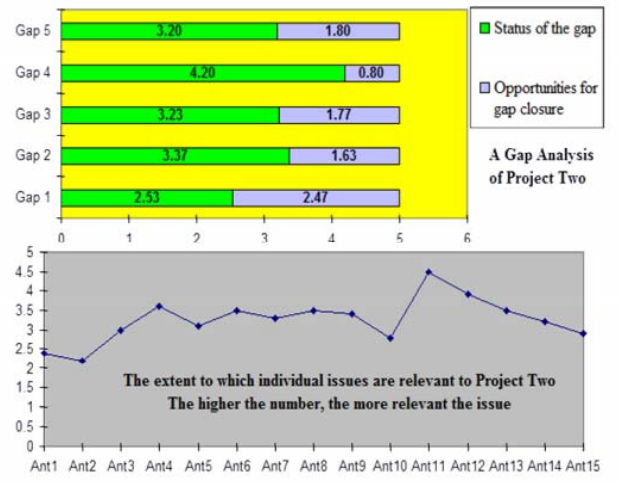
A total of 187 questionnaires were collected, which represents a response rate of 53%. For statistical purposes, project managers, systems analysts and programmers are grouped under the category of systems developer. The user group includes functional managers and front-line personnel. The percentage of respondents from the system developer group and user group are 31 and 69 respectively.

D. Empirical Findings

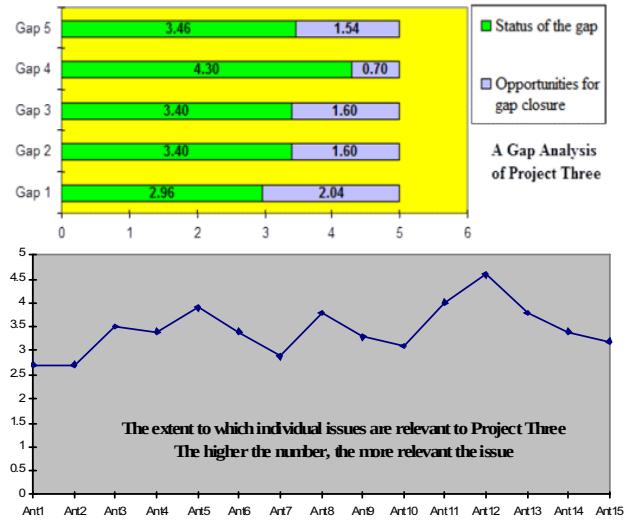
The results of the survey are shown in Fig. 3 by project (numbered one to three). The bar charts show the size of the gaps as perceived by systems users and developers. The green bars indicate the status of the gaps (the higher the number, the smaller the gap) and the purple bar show the opportunities for gap closure. The line charts illustrate the extent to which individual issues are relevant to the surveyed ISD projects.



(a)



(b)



(c)

Fig. 3 (a) Survey findings of Project One (b) Survey findings of Project Two (c) Survey findings of Project Three

E. Discussion

An interesting pattern of results across studied ISD projects is that the size of Gap 4 (delivery gap) is smaller than other gaps. This seems to be contradictory to a common belief held by the IS community that the physical construction of a technology based system is most complicated and thus the most vulnerable phase of project development. As mentioned before, the size of Gap 5 (Utility Gap) is assessed by both systems users and developers. It is thus desirable to ascertain the differences, if any, between the perceptions of IS specialists and end users. Fig. 4 shows the assessment of Gap 5 by systems users and developers separately. A striking finding is that in all three cases, the systems developers appear to have a more optimistic view of the utilisation of the implemented technology system than that of end users.

The data shown in the line charts reveal that different factors are likely to be responsible for different gaps in different projects of different organisations. The observation is in general consistent with other research findings published in IS literature. For example:

- The articulatability (Ant1), predictability (Ant2) and translatability (Ant10) of user requirements and the interpretation inflexibility (Ant13) of the use of an IS is higher with transaction-oriented systems (Projects 1 and 3) than that of knowledge-based system (Project 2);
- IS developers find it easier to achieve a shared understanding with users (Ant 7) from organisations of proactive and progressive culture (Projects 1 and 2) than users from an organisation of bureaucratic culture (Project 3);
- There are more conflicting user requirements (Ant5) for projects developed in an ill-structured situation (Projects 1 and 2) than projects developed in a well-defined organisational context (Project 3).

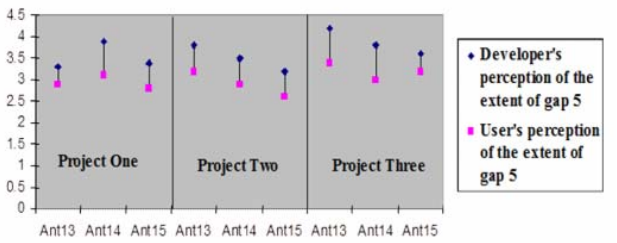


Fig. 4 Assessment of Gap 5 by systems users and developers

III. Implications of the Empirical Findings

The empirical findings suggest that Gaps 1 through 5 (which lead to Gap 6) exist in all kinds of information systems development. However, each gap may have different drivers for different types of projects developed under different organisational environment. For this reason, IS professionals need to monitor problematic issues (see Fig. 1) and determine, perhaps through structured analysis, which issues are critical for achieving success in a particular project setting. The issues identified as most critical would be targets for intensive attention for closing Gaps 1 through 5 and thus closing Gap 6. The management of IS development may begin with an understanding of the extent of Gap 6 and then searches in succession for evidence of Gap 1 through 5, taking corrective measures wherever and whenever necessary.

IV. Conclusion

The expectation-perception mismatch explained earlier leads to resources being spent on refining systems, or worse, delivering systems which are simply not used by their host organisation. The most common explanation of this discrepancy is the reliance of IS developers on a product-centred perspective for systems development which assumes that user needs can be defined and that solutions to these needs can be engineered using an appropriate systems development methodology. However as organisations increasingly question their purpose and processes and as boundaries between

organisations become increasingly fuzzy and vague, it is no longer possible to start with the notion that it is necessary to create or computerise an information system. IS development thus has to be seen as a continuous process which is led by the human activity system in the organisation which the information system will serve [2]. In order to deliver systems and services that IS users perceive valuable, IS managers must become expert in determining and assessing users' expectation and perception

ACKNOWLEDGMENT

The author would like to acknowledge the support from the Macao Polytechnic Institute for conducting the research reported in this paper.

REFERENCES

[1] Bartis, E., & Mitev, N. (2008). A multiple narrative approach to information systems failure: a successful system that failed. *European Journal of Information Systems*, *17*(2), 112-124.
[2] Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. (2009). Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility. *Future Generation computer systems*, *25*(6), 599-616.
[3] Davis, A.M. (1990). *Software Requirement Analysis and Specification*, Prentice-Hall International, Englewood Cliffs, N.J.
[4] Galleta, D.F. and Lederer, A.L. (1989). Some cautions on the measurement of user information satisfaction. *Decision Sciences*, ***20***(3), 419-439.
[5] Lyytinen, K. (1988). Stakeholders, information systems failures and soft systems methodology: an assessment. *Journal of Applied Systems Analysis*, *15*, 61-81.
[6] Smithson, S.C., and Land, F.F. (1986). Information systems education for development. *Information Technology for Development*, *1*(2), 59-74.
[7] Wood, M. (2008). Project Failure Statistics and Facts. *The Project Management Hut*, http://www.pmhut.com/project-failure-statistics-and-facts (accessed July 2012).
[8] Zeithaml, V.A., Parasuraman, A., and Berry, L.L. (1990). *Delivering Quality Service: Balancing Customer Perception and Expectation*, The Free Press, N.Y.

Linda Lai is an Associate Professor at the Macao Polytechnic Institute (2006 to present). Prior to her current position, she undertook remits as academic and administrator at the City University of Hong Kong for 15 years. Dr. Lai holds two research degrees from Lancaster University, UK - one in the area of I.T. applications and the other focusing on wider management issues. She has published more than 40 articles including high impact journal papers and international keynote conference papers. Her articles are cited and also mandatory reading for undergraduate and postgraduate students in internationally-renowned universities. Dr. Lai specializes in Decision Science, Knowledge Management and Electronic Commerce.