

Recover from information system failure: An Indonesian case study

Samiaji Sarosa

Didar Zowghi

Faculty of Information Technology
University of Technology, Sydney, Australia

Phone +61-2-9514-4442

Facsimile +61-2-9514-1807

{samiaji,didar} @it.uts.edu.au

Abstract

Small and Medium Enterprises (SMEs) sometimes acquire information systems that fail to meet their original aims and objectives. In these circumstances, the project sponsors are forced to decide whether they should abandon the system they have paid for or improvise by finding a way around the problem. This paper presents a case study with two Indonesian SMEs who had to deal with information systems failure within their organizations. Although within the information systems literature reports of these types of failure can be found but little is known about the aftermath of failure within SMEs. This case study presents the actions taken by two Indonesian SMEs who had to face with the failure of their web catalogue systems. The notion of IS failure used in this paper is a combination of “expectation failure” and “termination failure”.

Keywords: *Information systems, expectation failure, termination failure, salvage, Indonesian SMEs.*

Introduction

Information systems (IS) failures have been documented extensively in the literature. Research literature in recent years has attempted to explain the reason for and the impact of an IS failure within organisations (e.g. Beynon-Davies, 1999; Poon and Wagner, 2001; Southon et al., 1999). The problem with this type of research about IS failure is that they focus mainly on the reasons for and impacts of the failure. Little is known about whether the organisation recovered from IS failure and what actions the organizations had to take to deal with and recover from the failure. Furthermore, most of the studies were conducted for larger corporation and only very few for small and medium sized enterprises (SMEs) (e.g. Lees and Lees, 1987). Arguably, the impact of IS failure within SMEs could be as significant as larger company or sometimes even more so due to the SMEs’ limited resources (Fink, 1998; Welsh and White, 1981). Accordingly, action taken after an IS failure could be a critical point for SMEs.

This paper is a part of an ongoing research project that investigates the adoption of Information Technology (IT) within Indonesian SMEs. We have conducted interviews with 35 SMEs in Indonesia during December 2003 and February 2004 in order to explore

their IT adoption practices and to discover critical success factors and critical barriers that they face in IT adoption. During this investigation, we came across interesting cases of two participants who faced abandoned web site catalogues. One was abandoned by the developer before it was finished. The second was not used by the SME after the website was fully functional and delivered although its existence was still maintained. This paper presents two different decisions made and actions taken by these two SMEs in order to recover from their IT adoption failure. We believe that reporting these two interesting situations is important because it could benefit researchers who are interested in strategies to recover from IS failure. Moreover, the findings will be of interest also to SMEs who face similar situations and are forced to make such decisions.

The discussion will begin with the theoretical definition of IS failure through a survey of literature. The next section will introduce the research methodology followed by the introduction of the case study. The findings from the case study will be discussed in accordance with the theoretical background of IS failure in the next section. In conclusion, the key findings would be highlighted.

Information Systems Failure

IS failure is a complex phenomena that is difficult to define. There have been a number of efforts to adequately define the concept of IS failure since 1970 (Beynon-Davies, 1999). The term IS failure itself is often influenced by the perception of people who are involved in it (Jiang et al., 1999; Keil et al., 2000; Peterson et al., 2002; Poon and Wagner, 2001). While one group of researchers perceive the notion of “failure” in IS as termination of an IS due to unbearable accumulation of flaws, others consider the same notion as the inability of an IS to meet its stakeholders expectation (Beynon-Davies, 1999). Accordingly, different organisations would behave differently when coping with IS failure within their organisations. Many of the definition of IS failure often assume that technology is neutral and unproblematic (Mitev, 2000) as stated by one summary that defined IS failure as ‘System failure is constituted by the system not working properly: it does not perform as expected, it is not operational at the specified time and it cannot be used in the way intended’ (Wilson and Howcroft, 2002, p.237). This definition, however, does not portray the full complexity of IS failure as a combination of technology and social issues.

There are two approaches that relate IS failure to social and organisational context (Beynon-Davies, 1999), namely concept of “expectation failure” (Lyytinen and Hirschheim, 1987) and “termination failure” (Sauer, 1993). The concept of “expectation failure” was later broadened by Lyytinen (1988) to distinguish between “development failure” and “useage failure”.

Lyytinen and Hirschheim (1987) identified 4 major categories of IS failure as follows:

1. *Correspondence failure* is a lack of correspondence between IS objectives and evaluation of the IS. This typically reflects management’s perspective on IS failure.

2. *Process failure* is when the IS development project is unable to produce a workable systems or the project produces an IS beyond initial budget (cost, time, etc).
3. *Interaction failure* is when the system is hardly ever used or there are major problems in using the system.
4. *Expectation failure* is the inability of an IS to meet a specific stakeholder group's expectation.

Lyytinen (1988) argued that stakeholder groups might face the failure in either the development or the use phase. In development phase, the stakeholders try to fit the IS development process to fit their interest, while in use phase the stakeholders endeavour to align the IS with their ongoing concern. Ewusi-Mensah and Przasnyski (1994) while supporting Lyytinen idea, argued that IS failure is better defined as the failure in IS usage or operation, whereas the failure in the development of IS should be called project abandonment. The project abandonment itself can be categorised into three different types:

1. *Total abandonment* is where all project activities are terminated completely before the implementation.
2. *Substantial abandonment* is where major modification occurs to the project that makes it significantly different from the original specification before the implementation.
3. *Partial abandonment* is where the original specification is reduced without resulting in major changes before the implementation.

Sauer (1993) portray IS development as an interaction of project organisation, supporters and IS arranged in a triangle shape. Project organisation depends on its supporters for the provision of support. Supporters depend on IS for benefit, and IS depends on the effort and expertise of project organisation to sustain it. In this model, IS development process is open to flaws. Flaw is defined as undesired problem that needs to be solved. The flaws need to be corrected within an acceptable cost range. When flaws are not adequately dealt with, it might reduce the capacity of IS in serving its supporters and might introduce new flaws into the systems. At some stage the accumulation of flaws might trigger a decision to stop support and terminate the project. Accordingly, IS can not be deemed a failure until the development or operation ceases and the supporter dissatisfied since the IS no longer served their interests. This is what Sauer has referred as the termination failure.

Sauer's definition of IS failure is somehow narrower than Lyytinen and Hirschheim's that the failure caused by an unbearable accumulation of flaw as a result of interaction between three components of Sauer's model. Even with a tolerable accumulation of flaws, the IS failure still can occur when environment variables such as unfavourable government regulations or economic condition are influencing the interactions between those three components. Lyytinen and Hirschheim's definition on the other hand provide a wider understanding of IS failure as it covers more ground.

Research methodology

As the main topic of this doctoral project is investigating IT adoption within Indonesian SMEs, an initial model of IT adoption within SMEs was developed from the literature. The model was used to develop a semi structured interview. The questionnaire was developed to obtain data regarding the experience of Indonesian SME managers during their IT adoption, especially the factors that influenced them. Semi structured interview was selected to give room for open ended replies, and therefore allowed the participants to introduce factors different from those included in the literature based model. The questions were asked to find out who were involved in the IT adoption process internally, the manager's perception toward IT, factors considered when the decision was made, and external parties involved. The questionnaire was originally developed in English and then translated into Indonesian by the first author who is native Indonesian speaker. The Indonesian language questionnaire version was tested by a number of fellow Indonesian students in Australia. This resulted in the refinement and improvement of the interview questions.

Once the final version of the semi structured interview was ready, the field study was conducted by the first author between the months of December 2003 and February 2004 in Indonesia. The participants were selected from a list of Indonesian SMEs in the furniture and handicraft industry and situated in Yogyakarta and Surakarta region in Central Java; the list was compiled from data provided by Indonesian Yellow Pages and Indonesian SMEs council and association.

Potential participants were invited to respond by mail, facsimile, and email. Follow up telephone calls, face to face meetings, and email were made to secure an interview appointment. Thirty six participants accepted the invitation and were involved in this study but only 35 participants were included since one participant was found not to be qualified as an SME as defined in (SMIDEC, 1998). The first author conducted all the interviews at the participants' premises in Indonesian.

During the interview, two participants revealed that they have tried to develop web based catalogue in the past but their endeavour was unsuccessful. Interviewer explored their experience further by asking questions regarding the initial ideas, the development stage, the deployment, and the action after the failure. Questions regarding participants' own reflection on what went wrong were also asked.

All the interviews were recorded and transcribed. From the transcripts, content analysis (Boyatzis, 1998; Neuendorf, 2002; Weber, 1985) was conducted. For the two participants who were experiencing IS failure, a separate analysis was conducted to extract information about the failure. From time to time the original recorded interviews were looked up to ensure the consistency of the data extracted.

The case study

In Indonesia, an SME is defined as any business organization which possesses assets less than US\$ 1 Million (excluding land and building) and has annual sales turnover less than

US\$ 5 Million (SMIDEC, 1998). The furniture and handicrafts industries were chosen as the participant for the study because they are not obviously information intensive; these SMEs usually do not have a dedicated IT department, yet they need to use IT in their day to day operations. All the participants already used basic computer applications for their business, such as office applications (for administrative functions, reporting, and book keeping), internet applications (for simple business intelligence, email, simple marketing and order tracking), and graphic manipulation applications for product design. The chosen (adjacent) regions of Central Java are considered as one of the main centres of furniture and handicrafts in Indonesia; as all the SMEs are from the same region they face similar business environments (transportation, raw materials sources, export market, etc.). The following are the description of the two participants' company case

Company 1 (C1)

C1 is a furniture and handicraft company that was initially serving local customers and in recent years expanded its market to overseas customers. C1 sells their products for both retail and wholesale customers. The main characteristic of C1 products is the ever changing model and style in particular, the variety of materials used to build their products in their effort to keep up with trends. Accordingly, they need to introduce the new range at least 4 times a year, however, financial capability limited C1 to introduce new range only twice a year.

In the early stage of overseas trade, C1 used conventional mail, telephone, and facsimile to communicate with its overseas customers. In the early 2000, a web developer company approached the owner (also acting as the manager) and persuaded him to build a web site containing the company's catalogue. The owner was convinced that this might help them communicate and market their products more widely and rapidly to international market than the existing methods. The web developer company secured an outsourcing deal that included the development of the web catalogue, hosting services with their preferred ISP, ISP account for C1, and hardware and software to manage the web catalogue for C1. The value of the deal was not disclosed by C1. The C1 owner assigned the sales/marketing manager to assist the web developer with their existing products range. In 2001, the web development was abandoned by the developer company. The only deliverables handed by the developer was a personal computer (PC) that was intended to manage the website once deployed. C1 have already paid for the PC and a down payment for the web catalogue development.

In reflection, C1 owner believed the developer's lack of communication effort was to blame for failure.

“They only intensively came here for sales negotiation purposes”

The developer was faced with an abundance of product data during the development process as the amount of data increased rapidly. The developer only visited C1 and communicated with them three times in total, twice was for sales deal and once for gathering products data for the purpose of catalogue in the beginning of the project and then the developer delivered the PC. C1 have tried to keep the developer up to date by

providing the new product range data once available. There were no indications perceived by C1 that the developer were experiencing financial difficulties. After a while during 2001, the communication with the developer stopped completely. C1 were left with a PC and no product catalogue. In the end, the PC was used for internet access (email and web browsing) and administration (office application) related activities. For the internet connection, C1 were forced to subscribe to another ISP. The owner/manager of C1 decided to completely dismiss the idea of web catalogue in the foreseeable future although many vendors later offered him to develop web catalogue systems with cheaper price.

“We have received many attractive offers to develop a website and cheaper too, however I think we do not need it now, not before we could afford someone to exclusively handle the matter.”

Company 2 (C2)

The owner/manager of C2 operates three different businesses, a motel, a cookery manufacturer, and a stone furniture and handicraft manufacturer. The stone furniture and handicraft business are the most recent. Initially, the C2 production capability was about 100 units per month, small compared to the average furniture and handicraft SMEs. The owner believed that there is a lucrative market, especially international market, for the stone furniture and handicraft. In one trade exhibition, some of his colleagues advised him to build a website for his stone furniture and handicraft products range. He followed his colleagues' advice including their recommended web developer.

As in the case of C1, all the required effort, product, and service for the development of C2's web catalogue were outsourced to the developer. Fortunately, the developer offered various packages of all in one web development that included web site development, hosting services, and other services. The typical package price was about US\$ 500 – US\$ 1000. The developer also purchased a PC (apart from the original package) and installed in the C2 premise along with internet connection setup using a public ISP known as Telkom Net. This PC was intended as a tool to manage the website once deployed. The PC was purchased upon the request of C2's owner. The developer was intensively in contact with C2 in developing the web catalogue, they even had their own photographer to take pictures for the catalogue. The web catalogue was delivered on time and on budget. The developer then trained the C2 owner to use and update the web catalogue.

The stone furniture and handicraft business was not developed as expected. The production capacity was still about 100 units per month. There were no new customers or orders for the last few months. The owner relied heavily on the web catalogue to advertise the products and made no other effort. Although the owner depended heavily to the web catalogue, he was reluctant to use the web catalogue system and internet application. The owner could use computer to type letters, browse the internet, and check email (using webmail interface provided with the web catalogue), yet he could not reply to emails from potential customers. It was revealed in the interview that he could not reply to the interviewer email therefore the interview appointment was made by phone. In

the interview, he admitted that he forgot how to use email to reply and was reluctant to learn again.

“I have forgotten how to use it (the webmail facility) and to be honest I am lazy and not that smart.”

The web catalogue itself seemed to function correctly and the owner believed that the web catalogue was exactly as he was expected

“I do not have a high expectation (for the web catalogue), I just want a catalogue that can be shown if I participate on a trade exhibition. ..“

In reflection, the C2 owner believed that although the web catalogue systems worked just fine, his inability to utilise it and his lack of exerting effort in developing the stone furniture and handicraft business rendered it useless.

“I am passive in this matter (the business) and reluctant to do it (developing the business)”.

After the deployment, he used the PC for his own personal activities such as playing games, word processing, web browsing, and occasionally checking his email. When asked if he would keep the web catalogue, he answered yes. The reason given was that he was proud that he had his own website and email and this was reflected on his business card. He did not mind to pay the developer for maintaining the web catalogue even though there were no benefits from it. The typical cost for such maintenance was US\$ 50-100 annually. The web catalogue itself was never updated since its deployment since there were no business activities related to the content of the web catalogue. Therefore there were nothing new to be used to update the web catalogue.

Discussion

From the IS failure theoretical perspectives, both C1 and C2 can be seen as the case of IS failure. C1 was a case of the IS failed to meet stakeholders' expectation in the development stage (Lyytinen, 1988; Lyytinen and Hirschheim, 1987) with total abandonment of the project by the developer (Ewusi-Mensah and Przasnyski, 1994). From different view, the supporters (C1) ceased the support for project organisations (the developer) since the project organisations failed to provide an innovation (in this case by providing web catalogue) and therefore the IS failed to deliver service (Sauer, 1993). It can be concluded that, in C1's case, the innovation process was failed due to the lack of communication between the supporter (C1) and the project organisation (the developer).

The case for C2 was different. According to Sauer's model, it was not a failure since the supporter (C2) still supported the project organisation (the web developer) to maintain the IS (the web catalogue) even though C2's business itself was stagnant. C2's owner still perceived that he was served adequately at least superficially by the IS (web catalogue). In contrast to Sauer's model, we may conclude that the case of C2 can indeed be

considered as a failure. More specifically, this could be considered as an Interaction Failure (Lyytinen, 1988; Lyytinen and Hirschheim, 1987) although the systems itself was delivered on time and on budget satisfying the requirements (Ewusi-Mensah and Przasnyski, 1994). C2 hardly ever used the web catalogue for what it was intended for, that is, for marketing purposes. The only active subsystem occasionally used was the webmail system for the C2 owner's personal activities.

Both companies had IS failure problems, however what did they do and what should have they done in coping and recovering from the failure is important too. Both C1 and C2 eventually salvaged the hardware purchased as the part of the web catalogue development project. C1 used it for business purposes while C2 used it for the owner's personal usage.

IS failure can be seen as an opportunity to learn from mistakes for future references by conducting post-mortem analysis (Ewusi-Mensah, 1997; Ewusi-Mensah and Przasnyski, 1995; Irani et al., 2001). The post-mortem analysis is expected to extract critical factors leading to failure that need to be avoided in the future IS development (Yeo, 2002). Informally, both C1 and C2 seemed to have conducted some form of post mortem analysis. C1 perceived that the lack of communication between his company and the developer was the main reason for the failure. The developer seemed unable to gain reasonable understanding of the complexity and nature of C1's products. As a result, they were unable to deliver the web catalogue that could accommodate C1's rapid products range changes. Although, for the moment C1 put the idea of web catalogue on hiatus, it is believed that in the future they would be able to do a better job as long as they could afford to hire someone to handle it exclusively.

“The website need a dedicated person to handle it...(to be successful)”

In contrast, the developer for C2 seemed to have done their homework. They interacted regularly with C2 in developing the web catalogue and the developers were able to deliver the systems on time and on budget and to project sponsor's apparent satisfaction. The web catalogue was operational and usable. It was the business that could not expand and operate. After all, the web catalogue was intended as promotional tool only, if the business being promoted was stagnant then the web catalogue could not do anything. C2 should have questioned the original objective of developing web catalogue system (Lees and Lees, 1987). It seems that this is a matter of Business-IT Alignment, where the business itself failed to perform and as a result the IT could not support it properly (Cragg et al., 2002; Tallon et al., 2000). Business-IT alignment is a research area that is currently of interest in the IS community but beyond the scope of this paper.

Both C1 and C2 have behaved differently in coping with the failure. C1 has acknowledged the failure and assumed the down payment paid to the developer as sunk cost. They immediately adapted the PC for communication with their customers. Despite the failure, C1 has seized the potential PC utilisation to replace their previous method of communication. There was no ongoing cost from the failed web catalogue development apart from operating and maintaining the PC. At least C1 still managed to gain benefit from its investment in PC to support the business. C2, on the other hand, was reluctant to

abandon the web catalogue altogether. Although it seems irrational, C2's owner believed that the cost of maintaining the web catalogue was justified by assisting to uphold self and company's image gained by the presence on the web. The ongoing cost of maintaining the website viewed as not important to him since he still owned two different businesses to support it. The web catalogue acted as an artefact of a abandoned company and only served as self promotional tool.

Conclusion and future direction

There are two different approaches used in this paper to define IS failure, which are the concept of expectation failure (Lyytinen, 1988; Lyytinen and Hirschheim, 1987) and supported by Ewusi-Mensah and Przasnyski (1994) and the concept of termination failure (Sauer, 1993). Both C1's and C2's web catalogue development project can be defined as a failure using the concept of expectation failure. C1 was a process failure since the developer failed to deliver the system (web catalogue). The project completely abandoned despite the fact that it had already incurred cost for acquiring a set of PC and developer's initial payment. C2, on the other hand, was an interaction failure, since the owner of C2 unable to use the systems and very reluctant to learn or recruit someone to operate. It was also exarcebate by the fact that C2's business was stagnant. In contrast, according to the termination failure concept, C2 might not be a failure since the system still exists and fully functional, C2's owner benefited from the systems in a form of self image although that was not the initial intention of the web catalogue development, and the developer was paid by C2's owner to maintain the web catalogue presence. After the failure, C1 immediately recorded the initial payment as sunk cost, while the PC acquired for the web catalogue management was immediately adapted for other purposes namely communication with customers replacing the conventional method. C2 maintained the presence of the web catalogue although it was never used as intended and the business itself was stagnant.

IS failure have been studied in recent years. However, the focus was more on larger companies. Arguably, SMEs also suffer from IS failure with various levels of impact (Lees and Lees, 1987). Nonetheless, the case study reported in this paper has shown how two SMEs reacted after they were faced with IS failure. In the light of the case study, there are two directions that can be pursued further, the first one is what the impact of IS failure is toward SMEs. The second is how organisations, especially SMEs, should act when facing IS failure. Studies such as one described in this paper provide additional insight into the strategies that must be developed for SMEs when acquiring IT and also on occasions when the IT adoption does not go according to the initial plans and expectations.

Reference

Beynon-Davies, P. (1999) "Human Error and Information Systems Failure: The Case of The London Ambulance Service Computer-aided Despatch System Project", *Interacting with Computers*, 11, 6, pp 699-720.

- Boyatzis, R. E. (1998) *Transforming Qualitative Information: Thematic Analysis and Code Development*, Sage Publications, Thousand Oaks.
- Cragg, P., King, M. and Hussin, H. (2002) "IT Alignment and Firm Performance in Small Manufacturing Firms", *The Journal of Strategic Information Systems*, 11, 2, pp 109-132.
- Ewusi-Mensah, K. (1997) "Critical Issues in Abandoned Information Systems Development Projects", *Communications of the ACM*, 40, 9, pp 74-80.
- Ewusi-Mensah, K. and Przasnyski, Z. H. (1994) "Factors Contributing to The Abandonment of Information Systems Development Projects", *Journal of Information Technology*, 9, 3, pp 185-201.
- Ewusi-Mensah, K. and Przasnyski, Z. H. (1995) "Learning from Abandoned Information Systems Development Projects", *Journal of Information Technology*, 10, 1, pp 3-14.
- Fink, D. (1998) "Guidelines for The Successful Adoption of Information Technology in Small and Medium Enterprises", *International Journal of Information Management*, 18, 4, pp 243-253.
- Irani, Z., Sharif, A. and Love, P. (2001) "Transforming Failure into Success through Organisational Learning: An Analysis of A Manufacturing Information System", *European Journal of Information Systems*, 10, 1, pp 55-66.
- Jiang, J. J., Klein, G., Balloun, J. L. and Crampton, S. M. (1999) "Systems Analysts' Orientations and Perceptions of System Failure", *Information and Software Technology*, 41, 2, pp 101-106.
- Keil, M., Wallace, L., Turk, D., Dixon-Randall, G. and Nulden, U. (2000) "An Investigation of Risk Perception and Risk Propensity on The Decision to Continue A Software Development Project", *The Journal of Systems and Software*, 53, 2, pp 145-157.
- Lees, J. D. and Lees, D. D. (1987) "Realities of Small Business Information System Implementation", *Journal of Systems Management*, 38, 1, pp 6-13.
- Lyytinen, K. (1988) "Expectation Failure Concept and Systems Analysts' View of Information System Failure: Results of an Exploratory Study", *Information & Management*, 14, 1, pp 45-56.
- Lyytinen, K. and Hirschheim, R. A. (1987) "Information Systems Failure: A Survey and Classification of The Empirical Literature", In *Oxford Surveys in Information Technology*, Vol. 4 (Ed. Zorkoczy, P. I.) Oxford University Press, Oxford, pp. 257-309.
- Mitev, N. (2000) "Toward Social Constructivist Understanding of IS Success and Failure: Introducing A New Computerized Reservation System", in *Proceeding of The 21st International Conference on Information Systems*, Brisbane, Australia, pp. 84-93.
- Neuendorf, K. A. (2002) *The Content Analysis Guidebook*, Sage Publications, Thousand Oaks.
- Peterson, D. K., Kim, C., Kim, J. H. and Tamura, T. (2002) "The Perception of Information Systems Designers from The United States, Japan, and Korea on Success and Failure Factors", *International Journal of Information Management*, 22, 6, pp 421-439.

- Poon, P. and Wagner, C. (2001) "Critical Success Factors Revisited: Success and Failure Cases of Information Systems for Senior Executives", *Decision Support Systems*, 30, 4, pp 393-418.
- Sauer, C. (1993) *Why Information Systems Fail : A Case Study Approach*, Alfred Waller, Henley-on-Thames.
- SMIDEC (1998) *Profile of SMEs in APEC Economies, Small and Medium Industries Development Corporation*, Kuala Lumpur.
- Southon, G., Sauer, C. and Dampney, K. (1999) "Lessons from A Failed Information Systems Initiatives: Issues for Complex Organisations", *International Journal of Medical Informatics*, 55, 1, pp 33-46.
- Tallon, P. P., Kraemer, K. L. and Gurbaxani, V. (2000) "Executives' Perceptions of The Business Value of Information Technology: A Process-oriented Approach", *Journal of Management Information Systems*, 16, 4, pp 145-173.
- Weber, R. P. (1985) *Basic Content Analysis*, Sage Publications, Newbury park.
- Welsh, J. A. and White, J. F. (1981) "A Small Business Is Not A Little Big Business", *Harvard Business Review*, 59, 4, pp 18-32.
- Wilson, M. and Howcroft, D. (2002) "Re-conceptualising Failure: Social Shaping Meets IS Research", *European Journal of Information Systems*, 11, 4, pp 236-250.
- Yeo, K. T. (2002) "Critical Failure Factors in Information Systems Projects", *International Journal of Project Management*, 20, 3, pp 241-246.