Strategic information planning and campus information systems development in Indonesia.

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ABSTRACT

University strategic planning for information systems and management was investigated for four Indonesian higher educational institutions. A combination of the case study approach and a survey of a small sample of academic staff who have used the systems, was undertaken. Staff perceptions of the service from information systems are described, and related to their perceptions of planning for these systems. A number of evaluations of specific information sources and delivery are given in detail. Policy document analysis showed little information systems planning as part of the university strategic planning. Some observations are made about the influence of strategic information system planning upon successful use of a university's information systems.

KEYWORDS

Strategic information systems; Information services; Wide area networks; Strategic planning; Indonesia; Universities

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Introduction

An information system (IS) within an organisation should be established on the basis of clearly defined potential benefits (Galliers & Sutherland, 1991). To achieve these, the organisation should have a strong and well-developed strategic information system plan (SISP), that consists of a strategy for both information planning and management, including the use of functions and features of information technology (IT) (Galliers, Swatman & Swatman, 1995). Users should perceive the value of the system and the information delivered (Strauss, 1992a). SISP within a tertiary educational institutions, is important for the successful use of an IS service.

Universities and Institutes of Technology in Indonesia have recently begun developing IS in the move towards the creation of campus-wide information systems (CWIS). The value of a CWIS is dependent on its effective utilisation, fostered by effective planning. However, it appears that strategic planning in Indonesia is an insubstantial aspect of "regulation or policy" for managing the information and the IT in their institutions. Our study considers whether the strategic planning has influenced the development and usefulness of IS on Indonesian campuses. We do this by considering the perception of academic staff, and by analysis of planning documents.

Previous studies

Here we briefly review IS development in higher education leading to CWIS, and investigations of the influence of strategic planning.

Information Systems in Higher Education

Traditionally, information sharing among university members has relied on a range of printed materials. Computer technology created opportunities on university campuses for sharing data and information among the staff and the students, and has been deployed since the late fifties (Sullivan, 1996, p.117). University information systems range from library systems, registration systems and financial systems, to campus-housing systems and other university service systems.

Systems were often established in an uncoordinated manner, reflecting interests in different areas, and resulting in issues of redundancy and inefficiency. For example, student affairs, library, and a faculty may have the same information about a student although they use different systems to keep it (Malaney & Alvarez, 1996, p.75). Moves beyond this have resulted in “a single well-known service”, from which information can be accessed regardless of the information providers within the university (Wiggins, 1995, p.510). Such a service, an early example of which was CUINFO at Cornell University, has now been recognised as a CWIS, which is implemented as a central information service for the whole university community.

CWIS development moved from mainframes to a network/workstation environment, and the tools have also been changed from the traditional CWIS platforms to tools with support such as Gopher and World Wide Web and multimedia systems. Irrespective of the level of

technology support, the utility of its information is a measure of a system - Worona's statement "An information systems is 90% information and 10% system", being often quoted. (Wiggins, 1995; Strauss, 1992b)

Definitions of CWIS vary. For Turney (1996, p.178); they consist of "… of news, bulletin boards, information announcements about campus activities and other topics of general interest". For Wiggins (1995, p.509) they are "a system that brings together online documents and ways to access campus computing resources under a single comprehensive umbrella", and for Strauss (1992b, p. 14) "university wide general interest online information systems that work - and that you can afford". Table I shows the type of information carried in a CWIS.

take in Table I

Strategic planning for information systems

Remenyi (1990) explains what makes IS "strategic" is that it directly supports and shapes the competitive strategy of an organisation. He considers that it may function as a management information system or a management support system. He argues that because SIS deals directly in the business line of the organisation by "finding, getting, and keeping clients, it is therefore a strategic resource. Orna (1990) describes strategic IS using her concept of "enterprise information policy" (EIP). She contends that as a dynamic tool, EIP can be used:

- to relate everything done with information to an enterprise's overall objective;
- to enable effective decisions on resource allocation;

- to promote interaction, communication and mutual support between all parts of the enterprise, and between the enterprise and its ‘customers’ and ‘public’;
- to provide objective criteria for assessing results of information-based activities;
- to give feedback to the process of developing the corporate policies enterprise.

Strauss and Wiggins have considered these concepts in a university-wide environment. Strauss (1992a, p.16) argues that when a CWIS could attract university communities (internally and externally) and when communities, including the “computer-phobic” users, enjoy exploring the system, it would be very worthwhile to the university. Using this approach, the university may gain its competitive advantages over other educational institutions (Wiggins, 1995, p.510).

Ward, Griffiths & Whitmore (1990, p.88) see that objectives for strategic planning should be to build a robust information management framework for the long-term management of information and its supporting technologies, and to:

- identify current and future information needs for the organisation that reflect close alignment of business and IS/IT strategies, objectives and functions;
- determine policies for the management, creation, maintenance, control and accessibility of the corporate information resource;
- reposition IS/IT function more centrally in the business, with representation at top management level;
- ensure that sound IS architecture is created so that high quality systems can be built and maintained;
- identify a portfolio of skills that will be required over the lifetime of the plans;

- determine an effective and achievable organisation structure for the IS/IT function;
- ensure that the IS/IT function is outward looking and not focused internally on technology issues, and that the aims are widely communicated;
- ensure that there is an acceptance of shared responsibility between IS/IT and business people for the successful exploitation of information and IT.

SISP in higher education

Van Valey & Poole (1994) surveyed existing computing activities at Western Michigan University (WMU) in order to put forward a plan for the expansion of the computer technology to facilitate its effective use. The result of this survey indicates that information about existing computing activities, although not explicitly described as a strategic issue, is very useful for further planning and decision making processes in the university.

Tellis (1997) conducted a similar study using documentation analysis and a survey questionnaire. He investigated the managerial and economic aspects of employing information technology in Fairfield University. Like the WMU study before, which does not explicitly acknowledge strategic planning, Tellis's work indicates how a university should manage its information system with respect to IT management planning.

Luby (1996) conducted semi-structured interviews in order to investigate the process of strategic planning in the University of Paisley. The study shows that the process of strategic planning requires the university managers to recognise the complexity of a university environment and to create university staff awareness of this complexity. Accordingly, Luby recommends that all university staff should have what is called a "strategic perspective" for

basic action in the planning process. With this perspective, each staff member should have a personal development plan relevant to the university strategic plan.

Oh (1995) used a questionnaire to survey people involved in the setting up and development of a CWIS. She addressed basic principles such as target audience, control of information, quality and confidentiality of information, legal issues, priorities, and cost, that needed to be considered before a CWIS development. From the survey responses, she developed a taxonomy with ten different approaches for CWIS development. Each of the approaches is based on:

- overview of the situation where the CWIS could be developed;
- reasons for setting up the CWIS;
- kind of support of top-management;
- ultimate managerial control over the system;
- problems that may occur and how to solve them.

Although it does not address the issue of a strategic IS, this study is concerned with how the CWIS should be developed and strongly suggests how and what the university managers should do regarding CWIS development for its proper functioning.

Some research has investigated the process of university planning and examined aspects of information-based activities with respect to the planning. However, there seems to be no literature that investigates the importance of a CWIS to the university communities and how

it should be embedded as a strategy within university strategic planning in achieving the university's objectives and targets.

Investigative method

We sought information on IS use and expectations by academics in Indonesia. In particular we tried to determine:

- How and why could an IS be beneficial to institution staff?
- How should an IS be embedded as a strategy in institutional planning?
- What are the major factors in strategic planning related to the IS service?

The educational institutions considered were:

- Institut Teknologi Bandung (ITB)
- Universitas Indonesia (UI)
- Universitas Diponegoro (UNDIP)
- Universitas Gadjah Mada (UGM)

A combined case study and survey approach (Gable, 1994; Yin, 1994) was adopted. Strategic planning documents were analysed to investigate their influence on policies or regulations for information strategies and management. The survey was conducted on a sample of Indonesian academic staff, presently studying in Australia. The 26 respondents are users of the systems, rather than information providers or system administrators.

The line of questioning constructed in the questionnaire is based on the Likert attitude scale method. It was used to analyse perceptions of what an IS is, and how it functions in their institutions, as well as to investigate the perceived usefulness. A pilot questionnaire was tested, and then modified in order to clarify ambiguities. The administered questionnaire is available from the authors.

Interpretation of findings is based on document analysis; statistical analysis, both descriptive and inferential (Mann-Whitney Test (U test), and Spearman Rank Order Correlation Test (Rho test)); and content analysis.

We endeavoured to determine the extent of SISP and its influence on CWIS as perceived by academic staff users. The conceptual framework applied is based on Strauss's (1992a), and Orna's (1995) concepts of how the information should be managed and organised. This respectively concerns how to make an IS work in terms of its usefulness to the user, and how to plan information policies with regard to information strategy and management. Thus, the units of analysis carried out focus on:

- User-perceived usefulness of the CWIS, based on acceptance of quality of the information, system performance and overall organisational management of the IS;

- Strategic planning with respect to information strategy and management including:

    - technology use;
    - objectives and priorities with regard to IS;
    - information resources;

- organisational context;
- criteria for managing information.

Findings

System service - information provided

Information is provided for external and internal users of the institutions. For staff, the type of information provided includes: teaching activities; student and alumni records; research activities; human resource / employment records; finance; inventories; and community service activities. Table II summarises staff use of these.

take in Table II

According to respondents' perceptions, external users of the institutions, future undergraduate and postgraduate students, as well as research sponsors use the information provided more than alumni, industries and corporations. This is summarised in Table III.

take in Table III

Respondents considered the accuracy and the currency of the information sought mostly as “average” or "normal" (midpoint on a 3 point scale), and user satisfaction with all types of information provided (indicated from how much the information sought meets users' needs), was mostly “average”. Relationship tests showed a high correlation (Rho) between

perceptions of information meeting user needs and the accuracy or currency of the information (P=0.05).

System service - technology use

Frequency with which users seek information seems to differ according to whether the information was sought through a manual or automated system (Table IV). Despite the evident differences for teaching activities and student records, the data do not establish significant difference between manual and automated use across all activities (P=0.05).

take in Table IV

Obtaining information by academics was mostly through personal interaction (65%) and use of the telephone (52%). Letters and fax machine were the next preference resources to be used. On the other hand, to provide information the institutions used notice board (74%) and memos or paperwork (70%). Telephone (30%) and personal interaction (35%) were in the next rank. Email (13% for obtaining, 13% for providing), and other online data communication technologies (9%, 0%), were not as heavily used (percentages represent use as ‘very often’ or ‘often’).

System performance

Response times for both manual and automated systems were mostly considered “reasonable” (scale highpoint)(Table V) (letters, email, telephone, fax, online data communication, personal interactions). Correlation between overall functioning of IS, and resource used was established only for email, telephone and personal interaction.

take in Table V

Reliability of the personal computer systems was also queried against overall functioning of IS. This was based on the availability of the local system at time of need. Moderate correlation was indicated. When users' own systems are unavailable, they may use alternative shared machines.

Although the performances of a manual and computer-based IS were different, there was no significant difference in frequency of information seeking using manual or automated systems.

Organisational context and IS

There was significant correlation between perception of effectiveness of information providers and perceived functioning of the IS, except in the case of student affairs divisions.

Respondents felt that how the IS would strategically be planned, and staff awareness of the importance of an IS, would influence the functioning or the performance of the IS.

Although appropriate organisational culture was regarded as necessary for development of IS, strong support was given to the following factors of influence: institutional guidelines and priorities; clear objectives for the campus IS; infrastructure; staff demands; budget planning and control; feasible and appropriate resources; management support and consistency; academic staff awareness.

There was also support for the need for strategic planning, the improvement of staff's skills, and for an information policy with respect to the development of IS.

Strategic planning documents

Analysis of strategic planning documents (Institut Teknologi Bandung, 1994,1997; Universitas Indonesia, 1989, 1997; Universitas Diponegoro, 1997; Universitas Gadjah Mada, 1997) was undertaken.

Attention was paid in particular to situation analysis ("SWOT"), considering the institutions' internal and external influences, strategy formulation, such as specific goals for the development plan, tactical and operational planning for achieving the goals, based on key action plans. The analysis of the documents was aimed to determine:

- objectives and priorities with regard to an IS;
- information stock (Orna, 1990);
- resources for making the information accessible;
- how information is used in relation to resources and its objectives;
- who manages and processes the information;
- technologies used to support information-based activities;
- costs and values of information.

Objectives of each of the institutions are developed based on Tridharma Perguruan Tinggi (Triple Mission of Higher Education Institution), which consists of education, research and

community service aspects. To prioritise the objectives, each institution has its specific key objectives and goals, tactical and operational plans with respect to their visions. For example ITB emphasises efficiency of teaching and learning method. UI, on the other hand, aspires to the triple mission through objectives that focus more on integrated organisational management, a higher education autonomous system and becoming an internationally respected research university.

The information stock such as educational and training programs, research programs, human resources, and supporting facilities is described extensively in the respective documentation.

Information resources within each institution relate to the information providers that hold or own the information. These are top management; faculties, divisions, centres, and other supporting units (such as libraries, computing and research centres); and departments. Information flow appears to be similar in the different institutions, following a combination of fixed decision rules and autonomous function rules (Orna, 1990, p. 37). Those that manage and process the information can be seen from the organisational structure and function.

Each of the institutions has established a computer-based IS, and currently uses and values the IT system. However, the existing hardware and software as well as other information and communication technology elements as part of the institutions' assets were not described.

Discussion

The research provided a wealth of descriptive data on perceptions, but no conclusive information showing influence of SISP on IS use.

Staff considered the IS service as average (or normal), rather than being well satisfied with it. This finding was based on the investigation of user satisfaction with the following for which the results revealed generally "average" satisfaction:

- quality of information provided in relation to its accuracy and currency;
- response time in seeking information;
- reliability of the computer-systems used including standalone systems;
- management of the IS.

For all institutions involved, the findings were generally the same for the purpose and priorities of information use, the information resources, the management and process of the information, and the use and value of the IS.

User perception of the extent to which institution’s strategic planning comprises IS planning, was also "average" (midpoint on three point scale). There was insufficient information in strategic planning documentation to support or reject this view.

Several methodological limitations influenced findings. These included:

- very small number of survey subjects;
- inconsistent data since some respondents have been away from Indonesia for periods of up to six years;
- respondents were not fully representative of the academic communities;

- lack of respondents' knowledge of strategic planning.
- limited number of institutions represented;
- lack of description in supporting documents covering data regarding university IT assets and management strategies for information-based activities;
- difficulties of interpretation of the strategic plan documents;
- linking the conceptual models to the survey questions;
- limited approaches to testing whether strategic plans have an impact from the viewpoint of the people whom they supposedly influence.

The study may therefor be regarded as exploratory, and further research needs to attend to:

- A mechanism for establishing a causal relationship of the effect of strategic planning on the usefulness of an IS service to the user community;
- Better ways of assessing the value of information;
- Analysis of strategic information management documentation accompanied by follow-up interviews of relevant staff;
- Action research involving staff reference groups to determine the effect of policy implementation.

Nevertheless, the study provided an outline of IS development on Indonesian campuses, and an investigative framework for further analysis of IS planning.

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Table I: Information Categories in CWIS [Adapted from Wiggins, 1995, pp. 518, 519]

Type of Information	Some examples
General information about the university	Brief history, photographs of campus, campus maps, parking information, visitor information (main sights, places to eat)
Academics	Catalogs, calendars, enrolment procedures, academic advising, closed class list; noncredit courses; adult and night classes; enrolments
Housing	Residence halls, local housing options
Alumni Information	How to join association, event
Health	Student health center, medical/clinical center; advisory brochures, counseling options, radiation / biological / chemical safety procedures
Employment	Faculty, staff, student (on campus as well as placement services)
Libraries	Services, hours, locations, gateways to catalog and to online databases; connections via online forms/email to services such as interlending
Campus computing information	Services offered, gateways to email services; host services
People directories	Faculty/staff and student phone books online, email directories
University ordinances	Bylaws, rules, policies, procedures.
Handicapped information	Building accessibility, facilities (talking PCs, etc)
Transportation	Campus bus lines, local transportation information, getting to campus
Events	Seminars, plays, movies, concerts -- by date, by type of event, by venue
Weather	Local weather, pointers to other weather servers
Classified advertisement services	Student ride lines, items for sale
Campus purchasing services	Catalogs and forms; connection to online purchasing system
University outreach	Town/gown relations, community and extension services and facilities
Pointers to information resources on Internet	

Table II: Frequency of staff seeking information (%)

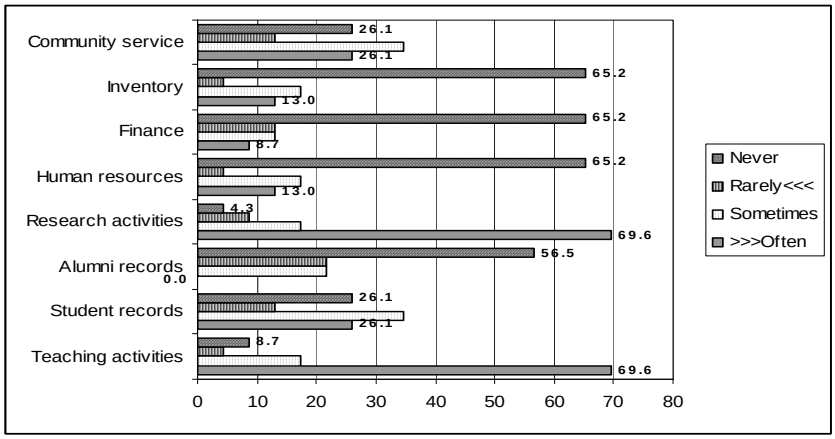

Table III: Information provided to external users (%)

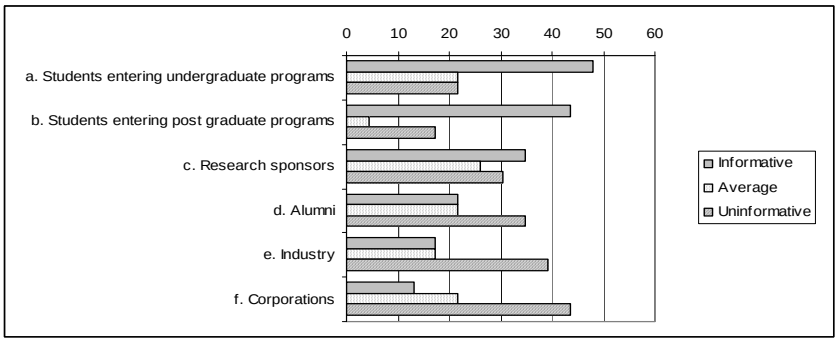

Table IV: Comparison between seeking information through CBIS and non-CBIS (%)

Types of information	Seeking Information Through CBIS				Seeking Information Through non-CBIS			
	>>> Often	Some-times	Rarely >>>	Never	>>> Often	Some-times	Rarely >>>	Never
Teaching Activities	83.3	16.7	0.0	0.0	54.5	18.2	9.1	18.2
Student Records	33.3	25.0	0.0	41.7	18.2	45.5	27.3	9.1
Alumni Records	0.0	41.7	25.0	33.3	0.0	0.0	18.2	81.8
Research Activities	66.7	16.7	8.3	8.3	72.7	18.2	9.1	0.0
Human Resources or Employment	8.3	33.3	0.0	58.3	18.2	0.0	9.1	72.7
Finance	8.3	16.7	16.7	58.3	9.1	9.1	9.1	72.7
Inventory	8.3	25.0	0.0	66.7	18.2	9.1	9.1	63.6
Community Service Activities	25.0	41.7	0.0	33.3	27.3	27.3	27.3	18.2

Table V: Degree of acceptance of response time (%)