# IMPACT OF INTRANETS ON EXECUTIVE INFORMATION SYSTEMS IMPLEMENTATION IN ORGANISATIONS IN KWAZULU-NATAL

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## Abstract

*Intranets are being used as the platform for developing and deploying critical business applications to support business operations and managerial decision-making across the internetworked enterprise. Executive Information Systems (EIS) grew out of the information needs of executives. Web-based technologies are causing a revisit to existing information technology (IT) implementation models, including those for EIS. Some technologies include: Intranet, Internet, Extranet, e-Commerce Business-to-Business (B2B), e-Commerce Business-to-Consumer (B2C), Wireless Application Protocol (WAP) including other mobile technologies. The author conducted a survey of thirty-one well-established organisations in KwaZulu-Natal which have successfully implemented EIS. A validated survey instrument was administered to an EIS stakeholder in each organisation surveyed to rank Web-based technologies in order of their perceived impact on EIS implementation in organisations surveyed. Using descriptive statistics, the author reports that an Intranet has the highest level of impact on EIS implementation in organisations surveyed in KwaZulu-Natal.*

## INTRODUCTION

Managerial tasks in organisations typically require more collaborative work than day-to-day operational tasks (Abraham and Seal, 2001). Organisations perceive information systems (IS) and any accompanying information perspectives as vital to their success (Blyth, 1995). Abraham and Seal (2001) report that an Intranet facilitates the communication behaviour between individuals who have to accomplish a task together. Communication is facilitated because the Intranet provides the platform to integrate communication tools (eg. electronic mail) as well as information sharing mechanisms (eg. data bases and file servers). As work teams and organisations grow increasingly complex and geographically distributed, so has grown the need for better ways to share knowledge among workers Millen and Fontaine (2003). It makes it easier for people in managerial roles to make use of information technology (IT) to carry out their work. The use of the Intranet becomes integral to the success of the managerial functions in the organisation.

Intranets are being used as the platform for developing and deploying critical business applications to support business operations and managerial decision-making across the internetworked enterprise O'Brien (2000). Many applications are designed to interface with and access existing organisation databases and legacy systems so that employees (within the organisation) can access and run such applications using Web browsers from anywhere on the network whenever needed. O'Brien (2000) reports that some Intranet-using organisations are in the process of Web-enabling operational and managerial support applications including executive information and decision support. The impact of Intranets on executive information systems (EIS) implementation in organisations is the focus of this paper.

## INTRANETS

With the growth in the usage of Web-based technologies, there has been a significant growth in 'organisational Internets' or Intranets (Scheepers and Damsgaard, 1997; McNay, 2000). Intranets build on popular Web-based technologies to facilitate information sharing within the organisation. An

Intranet (or internal Web) is a network architecture designed to serve the internal information needs of an organisation using Web (Internet) concepts and tools (see, for example, Cortese, 1996). An Intranet is a private network that uses Internet software and TCP/IP protocols. Defined technically, Intranets are the application of Internet technology (and specifically the World Wide Web service) for a prescribed community of users (Scheepers and Rose, 2001). An Intranet is a network designed to serve the internal informational needs of an organisation, using Internet concepts and tools (Turban, McLean and Wetherbe, 2004).

Organisations can use Internet networking standards and Web technology to create Intranets (Laudon and Laudon, 2002). It provides similar capabilities, namely inexpensive and easy browsing, communication and collaboration and are used solely for intraorganisational communication activities and information flow (Abraham and Seal, 2001). Access to the Intranet can be easily restricted to organisational members making it the perfect conduit for disseminating private organisational information (Scheepers and Damsgaard, 1997).

Intranets can create networked applications that can run on many different kinds of computers throughout an organisation (Laudon and Laudon, 2002). Typical Intranet applications include:
• publishing corporate documents;
• providing access to searchable directories (eg. telephone and address lists);
• publishing corporate, departmental and individual pages;
• providing access to groupware applications;
• distributing software;
• providing electronic mail;
• transacting with other organisational computer-based IS;
• organisation-wide information searches;
• providing a consistent user interface; and
• data warehousing and decision support access.

Turban et al. (2004) note Intranets have the power to change decision-making processes, organisational structure and procedures and helps re-engineer organisations. Strom (1996) reports that much information on Intranets is available directly on the Web. The use of Intranets is increasing rapidly not only as an internal communication system, but also as a facilitator of e-Commerce (Turban, McLean and Wetherbe, 1999). Robinson (1996) suggests that Intranets can be applied to enhanced knowledge sharing and group decision and business processes. Information that is most frequently included in Intranets *inter alia* includes data warehouse and decision support access Chabrow (1998). Many organisations have benefitted from use of the Intranet Web-based technology and have made their organisations more efficient (Sprout, 1995).

## EXECUTIVE INFORMATION SYSTEMS

EIS grew out of the development of IS to be used directly by executives and used to augment the supply of information by subordinates (Srivihok, 1998). An EIS is a computer-based system that serves the information needs of top executives (Turban et al., 2004). For the purposes of this paper, EIS is defined as 'a computerized system that provides executives with easy access to internal and external information that is relevant to their critical success factors' (Watson, Houdeshel and Rainer, 1997). EIS are an important element of the information architecture of an organisation. EIS has become a significant area of business computing and there are increasing amounts of money invested by organisations in EIS development projects (Kaniclides and Kimble, 1995) and the subsequent operation (use) of these systems (Belcher and Watson, 1993). For example, in October 1997 the largest water utility in South Africa, Rand Water, took a decision to build an EIS (based on Oracle® products) and invested R4,5m in revamping its IT infrastructure to support that deployment (Harris, 2000).

Web-based technologies are causing a revisit to existing IT implementation models, including EIS. Web-based tools 'are very much suited' to executives key activities of communicating and informing

(Pijpers, 2001). With the emergence of global IT, existing paradigms are being altered which are spawning new considerations for successful IT implementation.

## BACKGROUND AND GOAL OF THE RESEARCH

Intranet technology is essentially a pull technology and Intranet use is largely voluntary (Lyytinen, Rose and Welke, 1998). Computer or IS usage has been identified as the key indicator of the adoption of IT by organisations (Suradi, 2001). Igbaria and Tan (1997) report that system usage is an important variable in IT acceptance since it appears to be a good surrogate measure for the effective deployment of IS resources in organisations. From the available literature, there is little evidence to suggest that the impact of Web-based technologies on EIS implementations has previously been investigated. This creates a platform for conducting such research. User acceptance of IT has been a primary focus in IT implementation research (Al-Gahtani, 2001). Researchers in the field rely on the theories of innovation diffusion to study implementation problems. The Davis (1989) and Davis, Bagozzi and Warshaw (1989) Technology Acceptance Model (TAM) is based on the diffusion of innovation model. TAM is a well-respected model of IT adoption and use (Al-Gahanti, 2001).

As the usage of IT increases, Web-enabled information technologies can provide the means for greater access to information from disparate computer applications and other information resources (Eder, 2000). Some of these Web-based technologies include: Intranet, Internet, Extranet, e-Commerce Business-to-Business (B2B), e-Commerce Business-to-Consumer (B2C), Wireless Application Protocol (WAP) and other mobile technologies. The focus of this paper is on Intranets. There exists a high degree of similarity between the characteristics of a 'good EIS' and Web-based technologies (Tang, Lee and Yen, 1997).

The technology for EIS is evolving rapidly and future systems are likely to be different (Sprague and Watson, 1996). EIS is now clearly in a state of flux. As Turban (Personal communication, October, 7, 2001) notes, 'EIS is going through a major change'. There is therefore both scope and need for research in the particular area of future EIS implementations being impacted by Intranets as executives and business end-users need systems that provide access to diverse types of information that form part of information age economies. Emerging (Web-based) technologies can redefine the utility, desirability and economic viability of EIS technology (Volonino, Watson and Robinson, 1995). The research question is thus posed whether Web-based technologies (with specific focus on Intranets) impact EIS implementations in organisations.

With the absence of research efforts on the impact of Intranets on EIS implementation in South Africa, this research begins to fill the gap with a study of selected organisations in KwaZulu-Natal which have implemented EIS.

## RESEARCH METHOD AND DATA GATHERING

The survey instrument developed by the author was based on previous instruments used in published research papers (see Davis, 1989; Davis et al., 1989; Averweg, 2002). The questionnaire consists of three parts:
**Section 1** contains the organisation's demographics;
**Section 2** contains the attributes of the organisation's EIS and which are extracted and translated from the Roldán (2000) EIS questionnaire; and
**Section 3** contains seven-point Likert scale statements (anchored with (1) Not at all and (7) Extensively) dealing with how an interviewee perceives specific Web-based technologies impacted his organisation's EIS implementation. The selected Web-based technologies are (1) Intranet; (2) Internet; (3) Extranet; (4) e-Commerce: Business-to-Business (B2B); (5) e-Commerce: Business-to-Consumer (B2C); (6) Wireless Application Protocol (WAP) and other mobile technologies; and (7) Any other Web-based technologies.

The questionnaire was administered by the author during a semi-structured interview process. Pooling data across different technologies is consistent with prior research in user acceptance (see, for example, Davis, 1989; Davis et al., 1989). The sample was selected using the unbiased 'snowball' sampling technique. Cooper and Emory (1996) state that this technique has found a niche in applications where respondents are difficult to identify and are best located through referral networks. A formal extensive interview schedule was compiled and used for the structured interviews. Interviews were conducted during May-June 2002 at the interviewee's organisation.

There are six major metropolitan Councils in South Africa. Ethekwini Municipality Area (EMA) is the most populous municipality in South Africa (SA2002-2003, 2002). EMA's geographic area size is 2,300 km$^2$ with a population of 3,09 million citizens (Statistics South Africa, 2001). The author's survey of organisations in KwaZulu-Natal which have implemented EIS is confined to organisations in the EMA. It is acknowledged that some organisations may have implemented more than one EIS. In those cases and for this study, only the latest EIS implementation is used in the author's survey.

Some studies suggest EIS should not only be accessed by executive users (Volonino et al., 1995; Rai and Bajwa, 1997). Salmeron (2001) notes EIS as the technology for information delivery for all business end-users. EIS have spread throughout organisations (Kennedy, 1995; Messina and Sanjay, 1995). It is evident that EIS requires continuous input from three different stakeholder groups (known as constituencies):
• EIS executives/ business end-users;
• EIS providers (*ie*. persons responsible for developing and maintaining the EIS); and
• EIS vendors or consultants.

All constituencies are surveyed in the author's data sampling. A field study of thirty-one different organisations in the EMA which have successfully implemented EIS was conducted.

## RESULTS AND DISCUSSION

The number of activity sectors in the survey sample is 17. The two highest activity sectors are Manufacturing 7 (22,6%) and Financial Services 6 (19,5%). Twenty-seven (90%) of organisations surveyed were large enterprises in the EMA. One organisation surveyed had an annual 'sales for the year exceeding R12 bn' (Butcher, 2002). Twenty (64,5%) of organisations surveyed had more than 500 employees. The three EIS constituencies, number of surveyed interviewees and associated percentages per constituency are reflected in Table 1.

*Table 1. EIS constituencies and number of interviewees surveyed per constituency*

| Stakeholder groups (constituencies) | Number of interviewees surveyed and associated percentage of total sample |
|---|---|
| EIS executives/business end-users | 20 (64,5%) |
| EIS providers | 7 (22,6%) |
| EIS vendors or consultants | 4 (12,9%) |
| **SAMPLE SIZE** | **31 (100%)** |

The frequency of EIS usage reported by the respondents in the organisations surveyed is reflected in Table 2. From Table 2, frequently (several times per day) and regular use of the EIS were reported by a total of 25 (80,6%) respondents. An EIS has the effect of multiplying the frequency of use (Palvia, Kumar, Kumar and Hendon, 1996).

*Table 2. Frequency of EIS usage reported by respondents and associated percentages*

| Frequency of EIS use in organisation | Tally and associated percentage of EIS use in organisation as reported by respondents in total sample surveyed (N=31) |
|---|---|
| Very rarely or not at all | 1 (3,2%) |
| Rarely (a few times per month) | 1 (3,2%) |
| Occasionally (a few times per week) | 1 (3,2%) |
| Sometimes (about once per week) | 1 (3,2%) |
| Fairly regularly (several times per week) | 4 (12,9%) |
| Regularly (once a day) | 12 (38,7%) |
| Frequently (several times per day) | 13 (41,9%) |

From Section 4 of the survey instrument and using descriptive statistics, a tally and associated percentage of the perceived degree to which specific Web-based technologies impacted a respondent's EIS implementation is given in Table 3. The shaded area in Table 3 suggests that there is little (if any) perceived impact by Web-based technologies on EIS implementation in organisations surveyed in KwaZulu-Natal.

*Table 3. Tally and associated percentage of the expected degree to which specific Web-based technologies impacted respondent's EIS implementation*

| Web-based technology | The degree to which Web-based technologies impacted respondent's EIS implementation (N=31) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Not at all | Very little | Somewhat little | Uncertain | Somewhat much | Very much | Extensively |
| Intranet | 17 (54,8%) | 2 (6,5%) | 2 (6,5%) | 0 (0,0%) | 3 (9,7%) | 4 (12,9%) | 3 (9,6%) |
| Internet | 21(67,7%) | 1 (3,2%) | 1 (3,2%) | 0 (0,0%) | 2 (6,5%) | 3 (9,7%) | 3 (9,7%) |
| Extranet | 24 (77,4%) | 1 (3,2%) | 2 (6,5%) | 1 (3,2%) | 1 (3,2%) | 2 (6,5%) | 0 (0,0%) |
| e-Commerce: (B2B) | 28 (90,4%) | 1 (3,2%) | 0 (0,0%) | 0 (0,0%) | 0 (0,0%) | 1 (3,2%) | 1 (3,2%) |
| e-Commerce: (B2C) | 26 (83,9%) | 1 (3,2%) | 1 (3,2%) | 0 (0,0%) | 2 (6,5%) | 0 (0,0%) | 1 (3,2%) |
| WAP and other mobile technologies | 29 (93,6%) | 1 (3,2%) | 0 (0,0%) | 0 (0,0%) | 0 (0,0%) | 0 (0,0%) | 1 (3,2%) |
| Portal | 26 (83,8%) | 0 (0,0%) | 0 (0,0%) | 0 (0,0%) | 2 (6,5%) | 2 (6,5%) | 1 (3,2%) |

Table 3 shows that only seven (22,5%) of organisations surveyed reported that the Intranet significantly impacted their EIS implementation. Three interviewees reported that their organisation's EIS implementations were significantly impacted ('Very much' and 'Extensively') by portal technologies. This is noteworthy as the portal technology impact on EIS implementations (9,7%) is higher than the Extranet (6,5%), e-Commerce: (B2B) (6,4%), e-Commerce: (B2C) (6,4%) and WAP and other technologies (3,2%) impacts. Corporate portals provide single-point access to specific enterprise information and applications available on the Internet, Intranets and Extranets (Turban et al., 2004). For a discussion of the impact of portal technologies on EIS implementation in organisations, see Averweg (2002).

Combining the results ('Somewhat much', 'Very much' and 'Extensively') for each of the seven Web-based technologies, Table 4 gives a descending ranking order of the levels of impact on EIS

implementations. From the selected Web-based technologies, Intranets have the highest level of impact on EIS implementation in organisations in KwaZulu-Natal. By utilising their Intranet, organisations have the ability to share (internal) information, collaborate and transact across various incompatible technical platforms and IS and across functional, structural and geographical boundaries within the organistion in a standard user-friendly manner (McNaughton, Quickenden, Matear and Gray, 1999; Damsgaard and Scheepers, 2000). Intranets are envisioned as platforms for organisational knowledge management (Davenport and Pruzak, 1998). This information is particularly useful for IT practitioners in the planning of future EIS implementations.

*Table 4.  Descending rank order of impact levels of Web-based technologies on EIS implementation*

| Rank | Web-based technology | Tally and level of impact on EIS implementations |
|:---:|---|:---:|
| 1 | Intranet | 10 (32,2%) |
| 2 | Internet | 8 (25,9%) |
| 3 | Portal | 5 (16,2%) |
| 4 | Extranet | 3 (9,7%) |
| 4 | e-Commerce: (B2C) | 3 (9,7%) |
| 6 | e-Commerce: (B2B) | 2 (6,4%) |
| 7 | WAP and other mobile technologies | 1 (3,2%) |

## CONCLUDING REMARKS

Intranet technology calls into question some traditional IT implementation wisdom and presents new challenges for seeking to implement the technology (Balasubramanian and Bashian, 1998). Consequently approaching an EIS implementation with a traditional mindset or using existing implementation models may be shortsighted. There is a need to identify crucial differences in existing IT implementation models that enable some organisations to success with their EIS investment where others have failed.

While problem dimensions may differ from organisation to organisation and that each organisation and user may have their own problem situations which change over time, there is a need to develop and implement flexible EIS which can be maintained easily to meet the changing Intranet needs. Developers must be aware of emerging trends in the Intranet market to create systems that will be able to incorporate the latest technological developments and new methods of information delivery and presentation. As the use of Web-based technologies in the distribution of internal information in organisations in KwaZulu-Natal becomes more widespread, it is envisaged that future EIS implementations will be further impacted by Intranets.

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