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Public sector ICT management strategy and its impact on e-government: a case study

Bob Stea
PepsiCo. Inc, bob.stea@pepsi.com

G Harindranath
University of London, g.harindranath@rhul.ac.uk

PUBLIC SECTOR ICT MANAGEMENT STRATEGY AND ITS IMPACT ON E-GOVERNMENT: A CASE STUDY

Bob Stea, PepsiCo Inc., Worldwide Technical Operations, PepsiCo Inc., 100 Stevens Ave, Valhalla, NY 10595 USA, Bob.Stea@pepsi.com

G. Harindranath, School of Management, Royal Holloway, University of London, UK, G.Harindranath@rhul.ac.uk

Abstract

This paper explores the relationship between public sector information and communications technology (ICT) management strategies and electronic government (e-Gov) initiatives. We use an adaptation of the technology enactment framework to explore various technological, organisational, and institutional factors that play a role in the development of ICT management strategies in a public agency. Using the case study of a city (anonymised and referred to in this paper as the 'City') in the U.S. state of Connecticut, we examine how these factors in turn help determine the city's e-Gov initiatives. Our findings show that the bureaucratic structure and culture of the public agency play a key role in the type of ICT strategy adopted in the city and that this has important repercussions for the outcome of its e-Gov programme.

Keywords: ICT management strategy, electronic government, public sector

1 INTRODUCTION

A recent United Nations study (UNDPEPA, 2002) showed that 169 out of 190 national governments surveyed utilise the Internet in some capacity to improve the delivery of information and services to the public through a variety of e-Gov initiatives. This unparalleled level of activity has caused public agencies to look to lessons and best-practices from the private sector (BAH, 2002). It has been shown that public agencies need to perform better the planning and strategic decision-making that is routinely found in private companies (Kaplan and Norton, 2001). According to Johnson and Scholes (2000) the concepts of strategy and strategic management are just as important in the public sector as in the private sector, although public managers can be distinguished from their private counterparts by the added dimension of political considerations.

Research examining the subject of ICT in the public sector has generally not received the same attention as in the private sector (Northrop, 2003). This paper is a contribution in this direction. Using the case of a public agency in the US state of Connecticut, the paper explores the factors that determine how government agencies develop unique strategies for ICT implementation, as well as the relationship between this unique approach to ICT strategy and its impact on e-Gov initiatives.

2 PUBLIC SECTOR ICT STRATEGY AND E-GOVERNMENT

Prior research has demonstrated that often the nature and characteristics of public agencies affect the manner in which they tend to plan for and use ICT. For instance, Allen *et al*. (2004) studied ICT

implementation in public agencies and found that using ICT strategically is impeded by hierarchical structures that exist within such agencies and the inability to share information among the various departmental 'silos'. Coombs and Hull (1996) identified the internal political tension within public agencies as an impediment to ICT strategy and development. Bajjaly (1998) reports assertions by governmental ICT managers that elected politicians have a minimal understanding of ICT, and that politics commonly disrupts the planning of ICT projects.

Referring to the risk tolerance of bureaucratic organisations, Clark and Munn (1986) coined the phrase 'structural amnesia' according to which organisations disregard problems that threaten their values or hasten their deconstruction. They found that organisations exhibit a self-preservation mechanism in which they selectively choose the problems and risks worthy of consideration. This often leads to a disconnect between factual events and acknowledged reactions. Douglas (1986) also acknowledges that environmental factors which confirm new risks may not translate into acceptance and definition by an agency.

Allen *et al*. (2004) propose a similar line of reasoning with regards to e-Gov. Their proposal, termed 'digital amnesia', continues with this risk-based approach as applied to ICT utilisation. This would prevent government agencies from using ICT in a manner that facilitates a transformation of their governance structures. Their conclusion is doing things differently can be an arduous process when an agency is resistant to 'creative destructionism'. Paquet and Roy (2000) concur, pointing to the tardiness of governments and explaining that it is embedded through a history of adherence to traditional controls and decision-making processes.

Another factor seen as important is the relationship between elected officials and the civil servants within government agencies. According to Dufner *et al.* (2002), the loosely coupled nature of public agencies often mean a distancing of functional and operational staff from the top-level decision process, and this in turn can result in decentralisation and fragmentation of ICT planning efforts.

Fountain (2001) delineates the components of the 'bureaucratic' form of government, against which the application of ICT acts. These components are compared with those of a 'network' organisation. Her comparison leads to the conclusion that the Internet will only act to reinforce the rules and procedures inherent in government. It will also act to add a layer of a 'network' organisation over the existing bureaucracy instead of having the revolutionary impact hypothesised. Her technology enactment framework (TEF) (see figure 1) offers a perspective on technology and organisational structure in which they are co-dependant on each other, rather than one simply being a function of the other.

Fountain (2001) argues that the tendency of public agencies to perpetuate their bureaucracies makes them less inclined to undertake technological changes that can undermine them. Their bureaucratic, vertical structures also make them shy of horizontal inter-agency networks, and this in turn can inhibit the adoption of technologies and applications such as e-Gov that thrive on these very networks. The unique cultural, cognitive, socio-structural, legal and historical backgrounds embedded within large public bureaucracies also help determine their attitudes to technology adoption and enactment within these organisations. Thus, the TEF proposes that the unique relationship between technology and a variety of organisational and institutional factors produces an enactment of technology that may be different than the actual objective technology, and can lead to the outcomes that tend to strengthen the existing institutional arrangements of the organisation.

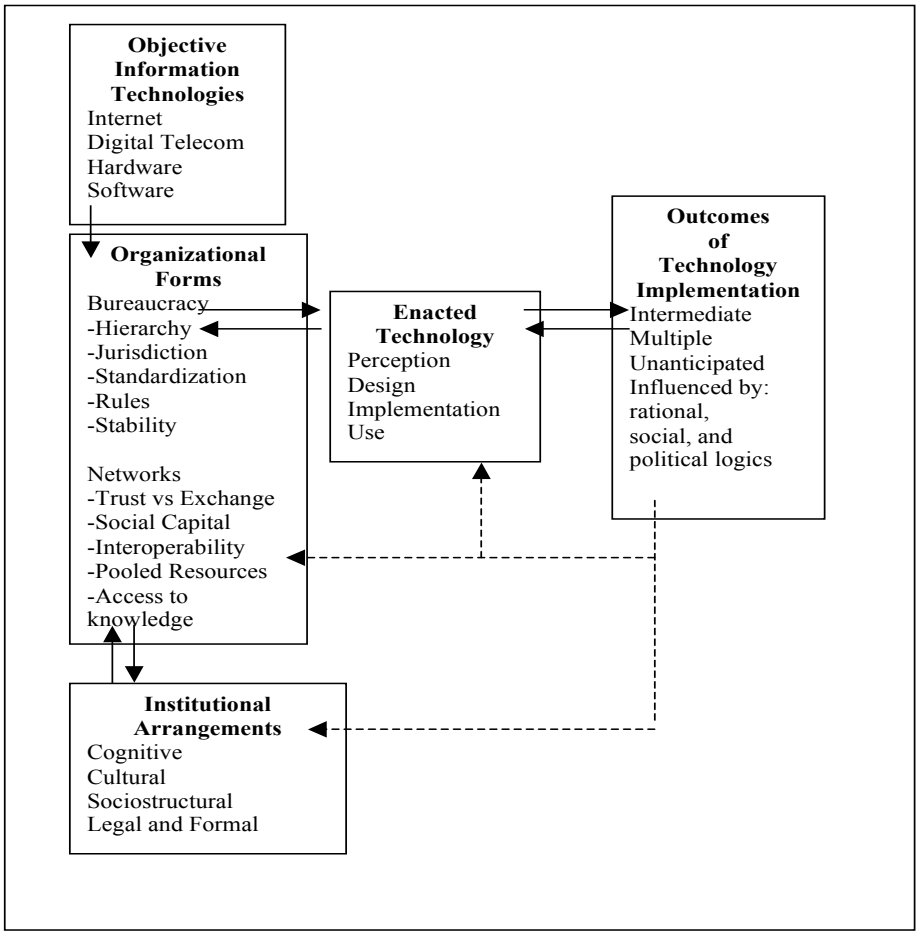

Figure 1. The Technology Enactment Framework (Fountain, 2001)

The objective of this paper is to examine the factors that determine how public sector agencies develop unique ICT strategies and how such strategies in turn affect various e-Gov initiatives. We adapt Fountain's TEF into a theoretical framework for our study (figure 2) that focuses on the various technological, organisational and institutional factors that may affect the long-term direction and scope of ICT related issues in the public sector. The TEF is useful in that it unifies several theories regarding how organisations adopt unique strategies to implement ICT. It draws upon social science theories such as Herbert Simon's 'bounded rationality' as well as neo-institutional and economic sociology perspectives. The TEF also includes a feedback mechanism, implying that there is a perpetual alteration of strategy and organisational change once outcomes are reached.

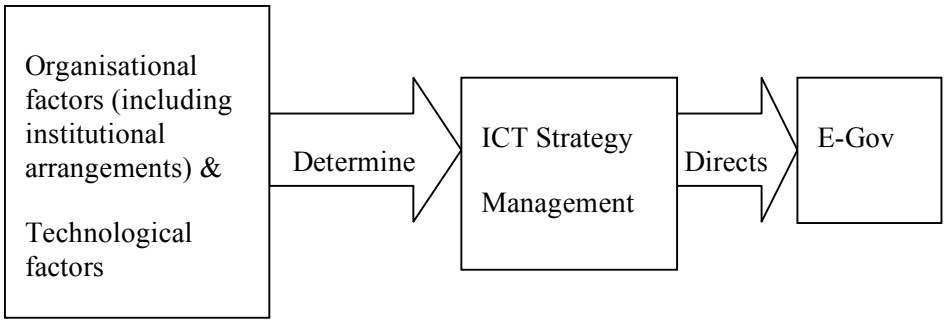

Figure 2. Theoretical Framework - Adapted from Fountain (2001)

3 RESEARCH METHODOLOGY

The case study strategy was adopted for this study because it allows for an analysis of why public agencies adopt unique strategies for ICT implementation and management, and how this directs e-Gov development. A case study approach enables better exploration of the organisational context and processes through the use of interviews, document review and observations.

The case study organisation is a public agency in a city (anonymised and referred to hereafter as the 'City') in the US state of Connecticut. The City is one of the largest urban centres in the state and is growing due to rising housing demand from its proximity to New York City. The City has a basic Internet presence and uses its website as an information repository for different aspects of City governance and services. The rationale for choosing the City as the case study organisation is based on several considerations.

First, at the time of this study, the City's e-Gov programme was identified by the City Hall as requiring 'upgrade'. The leadership had recognised that progress had not been made since initial steps taken in the late 1990s. The City was therefore in the process of a major overhaul of its ICT programme and this presented an opportunity to explore the decision making process at the early stages of development. Since case studies are better suited for samples that represent critical cases, extreme situations, or polar types (Pettigrew, 1990), the City appeared to be an ideal candidate.

Secondly, the elections held in late 2003 resulted in the reelection of the officials from the previous administration. The advantage of this occurrence (as explained by City personnel) was that this presented an opportunity to observe activity during a period of continuity. Finally, a driving force for the further development of e-Gov was the then launch of an area wide technology platform named 'CivicRadar' being implemented throughout southern Connecticut. This provided a means for assessment of public concerns on a regional level. Municipalities involved in this programme thus had an incentive to upgrade their own existing ICT infrastructure to participate more fully and receive the benefits from such an initiative. When this study began, the City had just chosen to participate in this 'CivicRadar' scheme and was actively upgrading its ICT programme.

3.1 Data sources

Data sources for this case study included interviews with City personnel, analysis of the City's website, and citizen feedback. A total of twelve semi-structured interviews were held during February

2004 with various City personnel, including the Mayor's aide (Community Services Director), Tax Collection Office, Voter Registrar's Office, Planning Department, Health Department, Data Processing, and other general staff. Interviews specifically sought responses on the importance attached by the respondents to various technological, organisational and institutional factors identified in the TEF, and which may have affected the City's ICT and e-Gov initiatives..

The second source of data was an analysis of the City website itself. The website analysis was based on a search for content regarding implicit statements on e-Gov as well as any implications from mission statements, format, services and other content. These aspects are assumed to be a form or manifestation of the actual 'outcome' of the enacted technology adopted by the City.

The third source of data was feedback collected by the City authority during December 2003 to February 2004 from citizens and small businesses regarding the website through an online comment form. The aim of including this feedback is to assess the nature of how information is utilised within the organisation to influence decision making regarding e-Gov.

4 RESULTS AND DISCUSSION

The theoretical proposition upon which the findings from the case study are analysed is based on the supposition that organisational (including institutional arrangements) and technological factors predispose an agency in its utilisation of ICT, impacting the outcome which acts as feedback into decision-making. This section examines the key findings from the interviews, website analysis and the analysis of the citizen feedback using the theoretical framework presented above.

4.1 E-Gov Strategy and Planning in the City

Table 1 below presents the triangulation of the case study findings on how the City views the concept of e-Gov. This points to the City's view of e-Gov as being primarily centred on the concept of using the Internet for providing information, with a secondary focus of services provision. Using Ward's (2003) typology of the three stages of ICT utilisation within organisations, this finding places the City in the first tier of Data Processing. The City has not reached the levels of utilising ICT as a tool for (Public) Management Information Systems nor for Strategic Information Systems. With regard to the vision of e-Gov in the future, most answers implied that there was little difference between the current state and future vision of e-Gov. Indeed most individuals tend to see the role of ICT as simply one of automation.

Source	**View of e-Gov**
Interviews	Provide information and services over the internet
Website	Connect the public with information, services and the people of the City
Citizen Feedback	Communicate with City (not as ICT feedback for e-Gov)

Table 1. The City's View of e-Gov

The City, like many of its local government counterparts, shows itself to be in the early stages of e-Gov. The challenge with this stage is that it tends to reinforce the existing paradigm of ICT utilisation. The literature points to the importance of using ICT for strategic innovation and not simply tactical automation (Ward, 2003). Indeed, as pointed out by the Harvard Policy Group (HPG, 2002), the 'enormous potential benefits of IT are often compromised if it is used merely to entrench old work processes and organisations rather than to fundamentally redesign them'.

It became apparent from the interviews that the City did not have a formal procedure to initiate, determine or implement new technologies. It was suggested that departments often avoided becoming

engaged in the planning process due to a fear of added responsibility to an already busy agenda. This led to planning and decision-making being handled on an ad-hoc basis by three individuals - the heads of the Data Processing, Permitting, and Health departments. Each of these individuals had shown the initiative and interest to develop web-enabled projects within their own departments, and this had led to these three forming an unofficial 'steering committee' to direct most of the ICT activity within the City government. The approach that had evolved over the last several years is for these three to consult with one another and then deal with the Mayor's office on decisions requiring more comprehensive considerations (e.g., budgeting or staffing).

Analysing the City's website showed that little information with regard to the City's e-Gov strategy and planning process was available on the site. Of the 120 citizen feedback messages received during December 2003 to February 2004, 20% dealt with general comments on the website, 50% were questions about current capabilities (mostly related to tax-returns), and 30% were recommendations for improvements (mostly concerned with tax issues and other information provision). Interviews with the staff of the Mayor's office revealed that the information from this feedback tool is viewed simply as an extension to the telephone calls received from the public. The aspect considered most useful from this tool is the ability to transmit messages to their appropriate contact in a more efficient manner. Although a significant percentage of this feedback is directly related to the ICT programme, this percentage is simply sent to the ICT department rather than reviewed and discussed by others. This signifies that while public issues raised may be handled properly, issues regarding e-Gov are not readily assimilated and therefore not fed back into the planning process for e-Gov.

4.2 Organisational Factors

We attempted to elicit feedback from respondents in terms of the significance they attached to various organisational factors, which in their view influenced the City's ICT and e-Gov programmes. Several respondents identified a strong cultural gap between two groups of employees within the City government structure - unionised employees and political appointees. Several employees also pointed out the existence of 'small networks' within the overall bureaucracy, and that these were often informal and existed outside the organisational structure, based on two factors - the relationships from cross-functional activity, and floor plan. The cross-functional activities among several of the departments had led to a working relationship not only between the heads of departments, but also among staff. The floor plan was also identified as an issue in developing these informal networks. The east side of the first floor had an open plan that housed the Health, Planning and Permitting departments. This facilitated staff interaction and they attributed this to creating an atmosphere of collaboration.

Some staff felt that departments which were 'off-site', such as the Public Works and the Fire departments, had very little in common with the departments housed within City Hall. One official reported that these off-site departments tended to act independently from the others, and only interacted at higher levels directly with the Mayor's office. These offices had developed their own structures and protocols that did not reflect the culture found within the departments housed in City Hall. This was expected to impact their ability to coordinate functions with other departments, hampering the networked environment necessary for e-Gov. One respondent highlighted the difficulty of even simple cross-agency networking by pointing to various challenges faced by the Permitting department in its attempt to co-ordinate data sharing with other related department.

The predominant organisational factors affecting the City identified through the three methods of data collection are:

Source	Organisational Factors
Interviews	Bureaucratic Structure (with some informal networks)
	Organisational Culture (union vs. non-union)
Website	No information available
Citizen Feedback	Secondary information on *handling* feedback indicates hierarchical structure

Table 2. The City's Critical Organisational Factors

The triangulation of this information relies heavily on the findings from the interviews, since the website did not offer information on this issue, and the manner in which citizen feedback was handled provided only a secondary look into this issue (since it did not deal with it directly). This leads to the conclusion that from an organisational point of view, the most prominent variable defining the organisation is the existing bureaucracy. Every interviewee showed recognition of this predominantly strong bureaucratic and hierarchical culture throughout the City government.

4.3 Technological Factors

The aim was to identify the range of issues regarding the perceptions, uses and outcomes of technology within City Hall. First, we explored the actual existing technology at use in the City. We found that most employees were only aware of technologies with which they are in direct contact, such as MS Office, Internet and email.

Second, we attempted to capture sentiment on the enactment of this technology, with regards to the perceptions of what the technology accomplishes. Several of individuals were able to identify determinants of unique approaches to technology within City government. For instance, over half the respondents reported that age was the greatest determinant of technology usage, and that the older employees tended to resist changes in technology while younger ones embraced them. According to two respondents, those who worked with routine tasks tended to avoid changes in technology, while those who performed multi-faceted tasks participated more readily in new technologies. Three respondents stated that technology was utilised differently among the departments depending on the extent of overlap between their functions. For example, the Tax department did not coordinate activities with any other department. It had a lower dependence on technology than the Planning department, which coordinated activities of the Health, Public Works, and Permitting departments among others.

Third, we investigated the technology outcomes by looking into how this enactment plays out in the organisation. Most respondents reported differences in outcomes in terms of the various approaches taken by different departments. Several respondents identified other departments as 'behind the curve'. Others were not able to make clear distinctions in how the use of technology differed among departments.

With regard to technology outcomes, one department that represented a polar type regarding dissatisfaction was the Tax department. They stated that the arrangement of using a third party to collect tax payments, billing and fees had created more work for the staff. It had also complicated the flow of information so that the incidence of errors had greatly increased. Personnel reported that they preferred the previous era of entering figures manually. One tax assessor was quoted as saying the manual system worked 'just fine'.

Another example of technology outcomes is the initiative called 'One-Stop-Shopping', implemented in the Planning department by staff responsible for Permits. One-Stop-Shopping aimed to provide a single point of entry to access data regarding geographic information, tax assessor information, and permit applications that would be useful for extensions or new construction. The success of this programme in shortening turnaround, increased efficiencies and positive public feedback can be seen as a technology outcome that could act to reinforce this type of ICT implementation. On the other

hand, staff also reported as a challenge the lack of support from other departments providing associated information. The Planning department had undertaken this project independently, and had quickly recognised the shortcomings of its aims due to lack of interdepartmental coordination. This aspect led to a further lack of incentives and interest in participating in future programmes of a similar nature.

Interview responses also showed that although the department of Data Processing was 'responsible for the planning, design, operation and programming of all Data Processing Systems of the City and all of its departments, boards, agencies and commissions', in reality the department functioned more like a 'support centre'.

Source	**Technology Factors**
Interviews	Objective Technology (focus on automation within City Hall)
	Enactment (dependent on age, tasks and functions of staff member)
	Unanticipated outcome (coordination challenges, within and without City Hall)
Website	Description of technology used for Permit departments One-Stop-Shopping
Citizen Feedback	Public requests for technology upgrades for services (especially tax payment)

Table 3. The City's Critical Technological Factors

Table 3 triangulates the technological factors affecting the City and shows an overall focus on automation, enacted through determinants such as age and function, and realised in outcomes that create both positive reinforcement and challenges.

5 ICT ST RATEGY AND IMPLICATIONS FOR E-GOV

According to the theoretical proposition on which this study is based (figure 2), both organisational and technological factors help determine the approach to ICT strategy. In the context of the public sector, this may mean bureaucratic structures that maintain logics of standardisation, rules and control, and which act to perpetuate a given paradigm of technology utilisation. The case study findings point to an established bureaucratic organisational structure within the City. This structure maintains the logic of standardisation and control, which in turn preserves the manner in which ICT is utilised throughout the agency. We pointed out earlier that the City did not have a formal procedure to initiate, determine or implement new technologies, and that these steps were handled in an *ad-hoc* manner.

According to the TEF, activities within bureaucratic, vertical structures are inherently prohibitive of the type of horizontal networks that would encourage organisational change. This stifles strategic decision-making and the transition towards a virtual government. Our case organisation exhibits this pattern at the local government level as well. The findings from the case study reveal that the distinction of activities within City Hall impedes the cross-agency network formation necessary for effective ICT implementation and e-Gov development.

Findings from the literature also generally corroborate this proposition within the government environment. Allen *et al*. (2004) point out that hierarchical organisations are limited in their ability to develop systems that employ ICT strategically. Much of the literature from the 'reinventing government' school of thought, such as Linden (1994) similarly find that the organisational paradigm of structure by function rather than outcome impedes the networking essential for e-Gov to be successful. Although Caldow (2000) prescribes the use of the Internet as a means to overlay an ICT-based citizen interface, this does not diminish the fact that underlying structural impediments will inhibit the activity necessary to establish this electronic interface.

According to Fountain (2001), public managers of ICT tend to base decisions on securing their power base rather than technological efficiencies, and that public agencies have logics of bureaucratic politics

that conflict with technological advancement and rationalisation. Our findings deal only indirectly with this proposition. It appears that the level of technological advancement has not reached the threshold above which tradeoffs exist. The one incidental point related to this proposition was found in feedback from the head of the Tax department. When discussing e-Gov for the future, speculation led to a vision of future efficiencies that would reduce the need for staffing. Although not overtly expressed, this fear may be an underlying factor in the findings that this department is facing coordination challenges with the third party fee collection service.

Our findings also lend credence to the TEF proposition that simple approaches to ICT implementation are more successful than attempting to introduce sweeping changes. Indeed as Ward (2003) argued, implementing technology to simply automate data processing is more successful than attempts to realign the organisation based on principles of ICT. This pushes public agencies to adopt conservative approaches in moving towards a web-enabled organisation. The e-Gov approach seen in the City was primarily focused on information provision. Clearly, the lack of any formal planning and strategy for ICT implementation has led to the simplest level of ICT utilisation as outlined by Ward (2003). Discussions with City staff involved in ICT initiatives recognised that all new changes in technology have been met with resistance throughout the agency. However, for the City the issue was not advanced technology versus more simple ones, but rather the introduction of any new technology. This links in with prior research into the risk-aversion tendencies of public bureaucracies that manifests itself in the selective process through which difficult decisions are avoided and simpler, less threatening ones are accepted and dealt with (Allen *et al,.*2004; Douglas, 1986).

Unique cultural and historical backgrounds embedded within each public agency can create misalignment as networks are formed. This undermines the e-Gov process and the attempt to create 'seamless' government entities. The institutional factors highlighted by Fountain (2001) include cognitive, cultural, socio-structural, and legal/formal considerations. In the case study, these factors are made manifest more at what Allen, *et al.* (2004) refer to as the 'micro-level' or at the level of individual personnel issues. One widely recognised factor was that younger staff in the early stages of their career adapted more easily to technology than their older counterparts. This creates a dichotomy and a tension between the two groups. Another factor was the nature of the task performed by each staff. Several also recognised that personnel who performed routine tasks were less receptive to ICT changes than those who perform multi-faceted tasks. Lastly, the nature of the functions of each department was a factor in how ICT was viewed. In the case organisation, departments that have unique functions with little or no overlap with other departments tend to develop their own in-house methods of information flow. This has created an independence among several of the departments, stifling agency-wide technology changes. Thus while the TEF correctly predicts the challenges of intra-departmental coordination with ICT, it does not address adequately some other issues that appear more at the individual personnel level. Although these issues appear to be minor, they act collectively to produce trends which affect the agency at the departmental level.

Institutional considerations play an important role in the underlying rationale for adopting policies and practices of ICT. This reflects the underlying basis of the TEF in that unique aspects of the culture and background within any given public sector organisation should be identified and understood as part of the effort in implementing ICT. The case study supports this proposition in elucidating the nature of the culture and background of the City government. The institutional considerations identified by TEF - cognitive, cultural, socio-structural, legal and formal - have been shown to be the underlying factors in the way ICT strategy is managed and technology is enacted upon. The City has very distinct, embedded institutional factors that have shown to impact the enactment of ICT. Quite simply, City's approach to ICT can be described as one of Data Processing. This view is perpetuated by the department's position in City Hall as simply a support centre. This 'mental model' has in turn affected the ICT management strategy and its outcome of e-Gov.

6 CONCLUSIONS

This paper explored how public agencies adopt unique strategies to develop and utilise ICT, and how this directs the development of e-Gov. Using the TEF, we analysed the findings from a case study of the e-Gov initiatives in a US city. The analysis showed that organisational factors, including institutional arrangements, (such as culture and structure) and technological factors (including actual technologies and the enactment of those technologies) determined the state of ICT strategic management. This form of management strategy is embedded within the organisation, and it impacts decision-making and expectations throughout the organisation.

The findings from the City case study pointed to a public agency possessing a bureaucratic and hierarchical structure together with the technological focus of simple data automation. This steers the agency into adopting a management style of ICT strategy that is informal, lacking clear direction, and focused on automation and information provision. This view of ICT is embedded within the organisation and it establishes the paradigm by which ICT decisions are made at all levels within the agency.

The case has also shown that the nature of ICT strategic management paradigm within a public agency impacts the direction of its e-Gov development. This is due to the nature of both the organisation and the e-Gov programme itself. Firstly, organisations that have a type of ICT strategic management that is not conducive to a networked environment will not be successful at establishing the coordination necessary for setting up an ICT-enabled agency. Secondly, the nature of e-Gov itself requires the adoption of a more advanced form of ICT strategy, similar to strategic information systems in the private sector. However, many public agencies adopt ICT strategies based on simple principles of data automation. Therefore any attempt to develop a successful e-Gov programme will be inherently difficult.

Finally, this study also demonstrates the usefulness of the TEF as an analytical tool with regard to ICT utilisation, by helping to highlight the organisational and technological factors defining the institutional milieu in the City. It also helped to highlight the pattern that these factors would produce with regards to ICT strategy management, and in turn the approach to e-Gov taken by the public agency.

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