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The Implementation of G2B Inter-Organizational Information Systems: A Dialectical Design Perspective

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ABSTRACT

Although the interactions between information technology and the context of government-to-business relations challenge the implementation of information systems, the challenges are currently under-researched. Therefore, this paper analyzes the mutual shaping between technology integration and the context. Based on an empirical study of the deployment of electronic cash registers for value-added tax administration, the analysis explains how government-business dialectics inform the design of relations between institutional, technological and organizational factors. The explanations lead to the argument for a dialectical design perspective on implementation that facilitates a systematic comprehension of (1) the inducements of design; (2) the relationships between the factors as design qualities; (3) the real and perceptual characteristics that define the soundness of the system; and (4) the paradigmatic distinctions between institution-organization design, organization-technology redesign, and functionality design of technology. This perspective leads the conceptualization of implementation in this context, and overcomes the limitations associated with the notable existing perspectives.

Keywords

Implementation, inter-organizational systems, dialectics, design, government, business.

INTRODUCTION

The interactions between information technology (IT) and the public-private context of government-to-business (G2B) inter-organizational relations pose challenges for information systems implementation. This context is imbued with influential parameters such as institutions, organizations, users and their underlying power and political relations (Markus, 1983). The functional and symbolic properties of IT also affect all these influential parameters. Therefore G2B inter-organizational information systems (IOS) implementation is a very challenging endeavor, signifying that if the implementation issues are not well understood and managed, then the challenges may not be well-addressed and cause the failure.

Unfortunately, G2B IOS implementation issues are currently under-researched, and existing knowledge pertaining to them is limited, in the information systems (IS) field.

One of the main reasons behind this gap is that previous IOS research efforts concentrate mostly on business-to-business (B2B) themes such as value chain, value web, and electronic commerce systems implementation. Thus, explicit research attention has not been given to G2B IOS implementation largely because researchers have assumed that businesses and governments may not be different as far as their deployment of IT is concerned. Based on this assumption, over the past two decades, for example, there have been numerous attempts to apply market principles of efficiency to e-government systems. The popular "New Public Management" (NPM) manifesto (e.g. Barzelay, 2000) is a clear testimony to this assumption.

However, G2B IOS, characterized by public-private relations, are paradigmatically different from B2B IOS, which dominates the literature. The institution of G2B relations goes with a bureaucratic mechanism of control as the installed base, which is very real and pervasive around the world. To govern is to exercise various degrees of control and autocracy, and researchers must contend with these factors in IS implementation as a matter of critical necessity because they are intrinsically connected with the dynamics of G2B relations.

The character of this installed base is such that traditional implementation factors such as user-participation, technical support, adequate training, piloting and bridging the design-actuality gap (Heeks, 2002a) have not been adequate to ensure successful implementation of G2B IOS. Because of the nature of both the inter-organizational and public-private contexts, the variation of any of these factors due to the integration of IT will have far-reaching implications beyond people and organization. The implications will be felt in both the existing and emergent relationships between institutional, organizational and technological factors as the technology and public-private context interact. However, an analysis of these relationships is lacking in existing models of IOS implementation because of the oversight of the fact that control is an enduring and pervasive character of the institution of G2B relations.

The oversight of the difference in previous research by many governments who have applied market principles of efficiency has resulted in high failure rates of government IT projects worldwide (Fountain, 2001; Heeks, 2002a). For example, Heeks and Avgerou (2008) have lamented about the myriad eGovernment-for-development project failures in developing countries. Thus, Cordella (2007), for example, has called for a return to the "e-bureaucratic form" of governance where IT should be deployed for effectiveness in delivery of public services, rather than for efficient performance.

In short, G2B IOS implementation, underpinned by the relationship between the technology and the public-private context, is a new conceptualization challenge in IS research. Heeks (2002a) recognizes this challenge and calls for socially-embedded analyses to understand the reasons for IS implementation failure in developing countries and addresses them. Against this backdrop, the problem needs exclusive research attention to especially analyze the relationship between its unique public-private quality and IT so that the institutional, organizational and technological relations that shape implementation can be understood. To this end, this paper seeks to answer the following question: how can the implementation of G2B IOS be understood in terms of interactions between IT and the public-private context?

It answers this question through a study of the implementation of a G2B IOS where handheld computers were adopted and deployed by a public revenue authority to enhance its value-added tax (VAT) collection from private retailers. The system was defined by the functional interrelations between the deployed technology on the one hand, and existing and emergent G2B relationships on the other. The

study covers the analysis of the historicity of the existing relationship prior to the adoption of the technology; of how the history shaped the arrangements designed to deploy the technology successfully; of how the diverse motives of public and private organizations were negotiated to sustain the acceptance and use of the technology; of how and the extent to which the negotiation outcomes were inscribed into the technology; and of how the qualities of the handheld computer shaped the enactment of Inter-Organizational Relationships (IORs) that affected implementation.

The analysis explains how autocracy-participation dialectics between government and business inform the design of relations between institutional, technological and organizational factors. The explanations lead to the argument for a dialectical design perspective on implementation that facilitates a systematic comprehension of (1) the inducements of design; (2) the relationships between the factors as design qualities; (3) the real and perceptual characteristics that define the soundness of an IOS; and (4) the paradigmatic distinctions between institutional-organizational design, organizational-technological redesign, and functionality design of technology. The proposed design perspective is argued to be distinctive because, first, it leads the conceptualization effort in G2B IOS implementation; and, second, it overcomes the limitations of multi-level constructs (Rodon et al., 2008), cultural-historical analysis (Robey and Rodriguez-Diaz, 1989), dialectical hermeneutics (Myers, 1995), and collaborative relationships (Kumar et al., 1998) that are notable existing perspectives on IS implementation.

In the next section, the relevant literature is reviewed followed by the theoretical framework. Then the empirical study is introduced, followed by the methodology and results of the study. The results are then analyzed and the findings are discussed. The paper ends with concluding remarks.

INFORMATION SYSTEMS IMPLEMENTATION AND CONTEXT

Three main definitions of implementation are spoken of in the information systems literature. The first refers to the concept as the consummation of an IT system (Swanson, 1988). The second includes all the activities involved in the introduction of IT to an organization. This introduction is usually understood as one of the stages of the systems development life-cycle (Pressman, 2000). The third refers to the successful integration and use of IT by an organization that spans the conception of the first idea to successful integration (Lucas Jr, 1990). These definitions indicate that the third is more encompassing because it includes the first and second in it. The third is also more appropriate because it conforms to the systems view of the relationship between IT and organizations that underpin the subject of information systems. Thus, this definition is predominant in the IS implementation literature.

IS implementation bottlenecks have been reported severally in the literature, pointing to issues such as resistance, power and politics, socio-culture, technology design or functionality, and structural configurations of organizations (e.g. Ginzberg, 1981; Kwon and Zmud, 1987; Alavi and Joachimasthaler, 1992; Lapointe and Rivard, 2005; Kim and Kankanhalli, 2009). The reports show two main analytical streams of research: factor and relationships. Earlier research was replete with analysis of the inhibiting or enabling effects of technology and organizational factors (Schewe, 1976). For example, user resistance is reported by early researchers as an inhibiting factor that causes IS failure (Lucas, 1978). The factoral paradigm accords with the positivist research tradition.

The problem with this approach was identified early enough by scholars such as Robey (1979), Kling (1980) and Markus (1983). They rather advocate for analysis of the underlying causes of resistance in terms of relations, processes or interactions between users, technology design and organizational context. This reflects interpretivism, which has continued and increased in prominence in IS research (Walsham, 1995). Implementation explanations based on relationships are witnessed in the increasing

prominence of issues such as culture (Robey and Rodriguez-Diaz, 1989), multi-level constructs (Rodon et al., 2008), and their interrelations with established critical success factors such as technology design and people characteristics. Thus, IS implementation research has evolved from obsession with positivist and reductionist to intepretivist and integrative analysis (Sahay, 1997).

Based on the relationships approach, Rodon and colleagues (2008), for example, used an Actor-Network theoretical framework to analyze an IOS implementation at Barcelona seaport. They concluded that "the dynamic mutual shaping of socio-technical actors throughout the implementation complements existing factor-based models in explaining the evolution and the outcome" (p.106). Markus' (2005) industry-level analysis resonates with the multi-level framework, and both reflect the nature of inter-organizational relationships, which bring an otherwise uncoordinated set of organizations to cooperate equitably. Such organizations have actual and potential conflicting needs, motives, and interests (Teo et al., 1997; Hart and Saunders, 1997). Therefore implementing any IOS between them can be more challenging than for an intra-organizational system (Sutanto et al., 2009).

Because information technologies are essentially digital, they lend themselves for use as standardized mechanisms for addressing conflicts and opportunistic behaviors in IORs. These standards are applied to enhance equity in the transactions between organizations in the relationship (Malone et al., 1987). In particular, the opportunities offered by technologies such as electronic data interchange systems (EDIs), and extended markup language (XML) have led to industry-wide performance advantages for such cooperating organizations (Wigand et al., 2005). These standards usually enforce the legal rules and policies governing organizations that are enacted by macro-level institutions, such as central or local governments. Besides, they are supposed to reduce the costs of transactions between the organizations in an IOR (van der Meer-Kooistra and Vosselman, 2000).

The G2B Context

Although increasing attention is being paid to G2B relationships (e.g. Liu and Tan, 2008; Sambasivan et al., 2010), the trend, unfortunately, is underpinned by both researchers' and practitioners' desire to replicate successful B2B IOS implementations in G2B versions (Ciborra, 2005).

On the one hand, researchers usually make technology determinist assumptions about how IT can reduce information asymmetry in G2B relations (e.g. Liu and Tan, 2008; Bertoletti et al., 2003). However, because of the paradigmatic differences between government and business, asymmetry problems are more pronounced in transactions between public and private organizations. For example, Froessler (2007) reports that an e-customs solution in Europe suffered serious implementation challenges because the public and private domains are each governed by substantially different logics, goals, governance structures, and organizational cultures.

On the other hand, many e-government initiatives have aimed at rationalizing government activities according to efficiency, accountability, decentralization and marketization principles (Heeks, 2002b). These principles have also informed the deployment of IT in government organizations and resulted in implementation challenges because of the enduring effectiveness ethos of public organizations, of how this ethos clashes with IT, which is essentially efficient (Wiredu, 2012), and of problems of moral hazard and adverse selection due to information asymmetry.

According to Avgerou (2001), it is of crucial importance for IS research and practice to associate IT innovation with the context of integration or embeddedness. All IS studies are contextual, and so the IS researcher's field is understood to be the interrelations between IT, organizations and the wider society. Thus, IS challenges and issues are not to be sought within a laboratory setting but within organizations

and society. The implication is that the context of IS research is not just IT innovation, management and exploitation (Earl, 1989; Avison and Fitzgerald, 2006; Galliers, 1999). This limited context led to a focus on systems development processes with the assumption that the organization would provide the requirements for the technology.

However, organizations are undergoing evolution all the time. Therefore, IS research will be limited if any definitive requirements are expected from them. For this reason, the context of IS research should not be the mere technology innovation, but the change of heterogeneous networks of organizations, institutions and people within which it is integrated. It is based on this reasoning that this paper is premised on the assumption that government is paradigmatically different from business.

THEORETICAL FRAMEWORK

In view of the essence of analysis of relationships between factors at multiple levels in IS implementation, and of the differences between government and business ethos, dialectical hermeneutics (Myers, 1994) is adopted as the analytical framework for this study. Dialectical hermeneutics combines Dilthey's pure hermeneutics with critical hermeneutics (Gadamer, 1975; Ricoeur, 1981). Pure hermeneutics stresses that interpretation of historical text and text-analogues such as social, cultural and political action in IS implementation should be according to the author's understanding of their text. However, Bronsema and Keen provide further information on implementation.

> "Implementation is a dynamic process. It includes cognitive and affective components... [P]eople see computers as affecting their sense of self, their jobs and their skills, politics, and organizational relationships ... There are contradictory perceptions of 'fact,' subjective perceptions, and the historical factors that shape the context of the implementation effort" (Bronsema and Keen, 1983, p.37-38).

For this reason, dialectical hermeneutics, informed by critical hermeneutics, goes a step further than pure hermeneutics to include the unintended consequences of action, the structural conflicts within society and organizations, historical change, and even the researcher's own historicity (Orlikowski and Baroudi, 1991).

Therefore, dialectical hermeneutics induces the researcher to understand the subjective meanings for individual actors and the social structures that condition and enable such meanings and are constituted by them (Myers, 1994, p.57). In terms of IS implementation, interpretation should aim at making sense of text-analogues pertaining to different stakeholders and entities that may be incomplete and contradictory. This means that the object of interpretation is to understand how social institutions, the organization(s) and the adoption, deployment and use of the information technology affect implementation.

Dialectical hermeneutics is beneficial to this research because it has enabled a view of the implementation issues in the empirical case as a complex circumstance of government-business tensions and of interactions between the institutional, organizational and technological factors. It also enables an understanding of implementation from diverse perspectives: the sponsors, the deployers and the users.

EMPIRICAL RESEARCH SETTING

The Value-Added Tax (VAT) Service of Ghana has been experiencing challenges in its collection and accounting for taxes since it was established in 1998. Being a government revenue institution responsible for tax administration, the Service believes that these challenges are caused by leakages in tax receipts, cumbersome and inaccessible payment points, poor transactions monitoring and enforcement of tax regulations and sanctions. With the aim to address these challenges, it welcomed, in

2008, "an online communication solution" (an electronic cash register [ECR]) that was proposed by an IT vendor (ABCTelcom, a pseudonym).

The technology was a handheld wireless computer supported by a few servers and running on the existing general system of mobile communication (GSM) and general packet radio services (GPRS) data transmission infrastructure in Ghana. It has a dual subscriber identity module (SIM) card slot, dual antenna, integrated thermo printer, sizeable display, a keypad and an intuitive menu. It would allow for internal GSM reception and battery management complemented by a long-duration battery and a charger. It was light (420 grams) and portable (length of 230 millimeters [mm], breadth of 95 mm, and height of 70 mm).

It was envisaged by the Service that the cash register would provide a closed system that would significantly improve system administration, monitoring, auditing and enforcement of VAT. This system would lead to an increase in the overall payer base. The register would also facilitate easier tax payment by increasing the number of payment points through the introduction of payment partners such as banks and other financial institutions. The traders or users, from a different perspective, thought the register would provide them a transparent view of the VAT system by providing updated schedules of payments, amounts owed, dates due and other relevant payment information.

The register would support real-time as well as store-and-forward transmission of transactions. Therefore, a trader could use it to capture and confirm a sales transaction and issue a receipt in duplicate, one for the customer and the other for the trader. At the same time, the transaction would be transmitted via the data transmission wireless infrastructure to a central database administered by the Service. Because of these capabilities, computer-generated details of trader's transactions (gross sales, net sales, VAT due, etc.) in a month could be known by the Service.

Furthermore, the register would have "a number of functionalities" directly beneficial to the trader and indirectly to the Service. For example, it would provide for electronic filing of returns, and incorporate a Form for online payment (electronic cashiering) of VAT liability. Because of all these reasons, it was expected to increase tax revenue and decrease cost of collection; provide an effective monitoring tool to enhance enforcement; and build historical and statistical data to aid projections, forecasting and policy formulation.

On Thursday May 29, 2008, ABCTelcom presented their proposed solution to some of the Service's staff and representatives of the Ghana Union of Traders Association (GUTA).

METHODOLOGY

The study was informed by an interpretivist epistemology (Walsham, 2006) and critical realist ontology (Mingers, 2004, p.380). The philosophical assumption of interpretivism is that people interpret their worlds according to the subjective meanings they direct towards phenomena. For instance, diverse and inter-subjective meanings are held by organizations in IORs, and are the main reasons why they pursue incongruent goals. Thus it was assumed that the sponsors, adopters, implementers and users of the ECR are human beings or entities who sense their worlds differently according to diverse circumstances. The meanings they held to shape the relationships between institutions, technology and organizations were important sources of understanding and theory development in this research.

In spite of the interpretivist epistemology, this research accommodates critical realism that assumes an objective or independent physical reality. This reality is not socially constructed. For instance, critical realism is applied to the physical distance between the VAT Service and traders that contribute to VAT

administration problems. This point means that such a distance is understood as an objective reality but not a socially-constructed one.

Research design

The research was designed as a case study because it is the most suitable research strategy for research problems in which unclear explanations exist between the phenomenon of interest (IOS implementation) and context (G2B relations) (Yin, 1984). Using this strategy, data were collected from multiple sources to produce qualitative evidence and show the richness of social reality in narratives rather than numbers. The multiple sources were used to check their veracity and dependability and to ensure the credibility of the interpretive approach.

The author collected data from twenty-two meetings of the ECR implementation committee as a participant. These meetings planned and organized the training sessions, and the distribution and deployment of the registers to the traders. Each of these meetings lasted three to four hours; and the proceedings were captured with a voice recorder and by notes-taking.

Many one-to-one conversations were also held with the chairman of the implementation committee before and after the committee's meetings. Others were held on days when meetings had been postponed at the last minute. The chairman was also an Assistant Commissioner and Head of the Information Systems Support Unit of the Service.

The author also collected data from eight out of the ten ECR training sessions held at the headquarters of the VAT Service, three months from the first meeting of the committee. Data from these meetings were captured by only note-taking. Each of these sessions lasted one to three hours, depending on the number of trainees.

Furthermore, ten traders who were using the technology were interviewed face-to-face and individually at their shops. These interviews were only confirmatory because they were used to verify data that had been gathered from the meetings, conversations and training sessions. The interviews went alongside observations of the use of the ECR especially when the interview was paused because of a customer's inquiry and/or purchase of an item. Each of these interviews lasted between one and two hours.

Data Analysis

According to Cresswell's (2007) suggestion, data were analyzed during their collection and afterwards. Based on the dialectical hermeneutics framework, the data were read and re-read to understand the interactions between government and the businesses, and the mutual shaping between the interactions and the newly introduced technology. Having understood the history of autocracy by government and the participation that was induced by the technology, the analysis sought to explain the dynamics of the autocracy-participation dialectics in the relations. It also sought to explain how those dynamics informed the design and re-design of the relations between the institutional basis of the IOR, the organization of it, and the mediating technology. These enabled the identification of instances from the data that highlighted some of these dialectics and design attempts. Being the results of a single case study, there were particular instances of these dialectics and design attempts that happened only once. However, there were recurring instances, which, together with the single ones, were abstracted to conceptualize G2B IOS implementation in terms of the dialectical design of the relationship between the institutional, organizational and technological factors.

RESULTS

According to the implementation committee chairman, the ECR was purchased by the government for the Service. Interestingly, the traders who would be the end-users of the terminal, and the Service's staff, who would provide the accompanying technical and organizational support, were not consulted in the adoption. For example, the chairman, even though he was the Information Systems Support Unit (ISSU) Head, learned about the adoption of the register a few weeks before the first implementation committee meeting.

The implementation committee included four GUTA representatives, who all attended the first presentation, in the thirteen-member ECR implementation committee. The Service was represented on the committee by seven of its staff, and ABCTelcom by two of its staff. Several train-the-trainer sessions were sponsored and run by the Service to teach retailers about how to operate the technology.

The institution of the committee was meant, in part, to create a platform that would allow representatives of VATS and GUTA to negotiate their motives and interests so that the technology could be acceptable to the retailers. On the one hand, the Service knew that retailers are interested in cost and time efficiency, and so promised to use the technology to provide them with enhanced efficiency in areas such as awareness of updated schedules of payments, amounts owed and due dates; electronic filing of returns and online payment of tax liabilities; easy access to payment at banks and other points; modernization of retailer's check-out process; coding of retailers' products into technology to speed up their check-out processes.

On the other hand, the GUTA representatives gave the Service some insights about retailers that the representatives thought would enhance VAT administration by the Service. In one of the committee meetings for instance, they said that the Service should apply "more force" to traders and "stamp your authority because we traders are afraid of you." Besides they made the Service aware that unless they make the tax system fairer or more inclusive of street-side sellers, the problem of mistrust would continue to affect the pilot deployment of the ECR.

The committee's meetings allowed representatives of the key stakeholders to negotiate their motives and interests so that user acceptance of the technology would be achieved. The Service publicly gave the impression that the terminal was for retailers. For example, an advertisement in the *Daily Guide* newspaper on Friday August 28, 2009 (page 16) began with the caption "VAT SERVICE introduces 'ELECTRONIC CASH REGISTERS (ECR)' *FOR* RETAILERS" (italics are author emphasis).

In spite of this participatory and user-advantage showcase, the cash register was really for the Service, as evidenced by the implementation committee's own statement of the purpose of the cash register:

"The online communication solution seeks to:

- Provide a closed system that will significantly improve system administration, monitoring, auditing and enforcement

- Provide a transparent view of VAT system to the trader by providing updated schedules of payments, amounts owed, dates due and other relevant payment information

- Increase the overall taxpayer base through easier and simplified installation of the payment terminals

- Facilitate easier payment of VAT by increasing the number of payment points through the introduction of payment partners, such as banks and other financial institutions."

The terminals were deployed on September 1, 2009, but the main character of the committee's meetings before the deployment of the terminals to traders was the negotiations between the stakeholders. Also, the Service sponsored and ran several train-the-trainer workshops to teach participating retailers how to operate the technology.

However, generally speaking, there was low inscription of the negotiated motives into the register because of the following functionalities and non-functionalities pertaining to it. It could only be used by the retailers to record transactions and issue receipts and to cancel transactions and annul receipts that had been issued earlier. It could also be used by the Service to remotely monitor and track retailers' transactions. However, it could not be used by retailers to view updated schedules of payments, amounts owed, and due dates and to file returns and online payment of VAT liabilities. Although their check-out processes were perceived by both VATS and retailers to be modernized, the easy access to payment points (banks, etc.) that was promised was not implemented.

The emergent relations between the Service and GUTA that were induced by the register can be understood in terms of its design, source and cost, and functionality. Firstly, the low inscription of retailers' motives and interests into the technology speaks of design properties that were skewed towards the interests of the Service. For this reason, the retailers perceived the proximal ECR as an emissary or spying agent of the Service. Thus, the design properties induced a re-enforcement of the existing autocracy that was used by the Service to control their relations.

Secondly, the source, cost and ownership of the ECR was not communicated by the Service clearly to GUTA, and hence, to the retailers. The GUTA representatives wondered about the people and processes behind the adoption of the technology. Their wondering, especially after the deployment of the technology to the retailers and the ensuing challenges, induced them to perceive the technology's adoption as a unilateral decision by the Service. However, the source or adoption problem was not as serious to the GUTA representatives as the cost and ownership of the ECR.

The cost of each terminal was not communicated by the Service to GUTA or the retailers. Besides, there was no policy existing or instituted by the implementation committee to guide the ownership of, and hence, technical support for the technology. The GUTA representatives kept asking questions about the cost and ownership of the technology throughout the pilot deployment period. The Service could not give clear answers to their questions, and therefore, worsened the retailers' mistrust in the Service.

Thirdly, the GUTA perceived the Service as unserious due to the terminal's incapacity to re-print receipts; to frequent mobile communication network failures (sometimes for days); to the terminal's incapacity to help the retailer to know/check his or her stock levels to the retailer's inadequate access to the database which was known as "e-core"; and to the terminal's low battery life.

Two staff members from each outfield office of VATS were identified and tasked with the responsibility of facilitating the distribution of the terminals. They were also responsible for supervising and monitoring the progress of the implementation on the ground. Referred to as "anchor staff," they provided situational reports, after the deployment of the terminal, to the committee at its weekly meetings.

The pilot implementation ended about May 2010, and it was characterized by the following statement by the Committee:

"Nine months into piloting the following results and observations have been made:

a) Increase in VAT collections via ECR for pilot period was 58.7%, which figure is above normal projected increase;

b) There was a marked improvement in compliance level;

c) One thousand, eight hundred and ninety-one (1,891) terminals were released (to VAT Service) for the pilot program. One hundred and nine (109) terminals were retained by [ABCTelcom], meant as backup replacement of faulty equipment. The breakdown of terminals released is:

- Ninety-one (91) terminals were configured for training and distributed among the seven outfield offices

- One thousand eight hundred (1,800) terminals configured for traders. One thousand two hundred and eight (1,208) of these were actively in use by traders, while five hundred and ninety two (592) were inactive (some, yet to be released by the LVOs [Local VAT Offices] to the traders concerned)."

In spite of these observations, the nationwide implementation of the cash register has not happened yet. The implementation was fraught with many challenges both technical and non-technical. The following two sets of notes of different officers' field reports, taken at different implementation committee meetings, are excerpts of some of these challenges:

Officer 1:

- 106 terminals taken

- on the ground the terminals are being accepted but with challenges on how to use them

- on-site training through demonstrations going on

- about 80% of the 106 terminals delivered

- one of the problems is with the codes in the manual – exemption codes are needed and should be activated in the network

- another challenge is to do with stock. The terminal helps them to sell but not facilitating their knowledge of stock levels

- some terminals wrongly given to suppliers who conduct very few transactions even in 3 *months. They should be re-configured and given to retailers*

Chairman (responding): *We should find a way to input the range of items into the device (and their prices) to help traders recall what they've sold and also to know their stock levels*

GUTA member: *prices should not be imputed because we bargain with customers*

Officer: *the codes are not extensive (or detailed) enough e.g. OMO [a detergent] is common in the market but soap is rather coded.*

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Officer 2:

- *334 given out, 6 returned = 368 distributed*

- *some traders are actually lobbying others not to accept the ECRs*

- *some field officers harass some traders*

- *the availability of unregistered traders is becoming a problem for the registered traders to charge VAT because it makes their products more expensive*

- *suggested solutions:*
    - *every trader should be registered for fairness*
    - *there should be sufficient public education*

GUTA member: *shops which trade by bargaining will have problems with the use of the ECR.*

Many of the terminals were not used at all or were used only occasionally. Some outfield reporters said that many traders had returned their terminals to the Local VAT Offices, while the general frequency of use was decreasing.

"The rate of return of the machines by the traders is very high. Very frequent returns. The slightest problems cause them to return them."

"Those who are using them are not doing so as they used to do a few months back."

Other officers, having monitored the use of the terminals online, reported that many terminals were inactive – that is, not being used. For example it was reported of one of the districts that out of 416 terminals distributed to traders, 96 were inactive.

DESIGN OF INSTITUTIONAL, ORGANIZATIONAL AND TECHNOLOGICAL INTERRELATIONS

Although the results indicate that the implementation of the system was characterized by common factors of failure such as low user participation, poor technical support, incapacity in features and some harm to users, they are not sufficient because they are factorial. Besides, a factor like low user participation has historical connotations and consequences that goes beyond end-user acceptance. Therefore, the following analysis does not necessarily preclude these alternative factorial explanations of G2B IOS implementation problems, but it goes beyond them.

Three main types of design are discernible from the analysis of the interrelations between the institutional, organizational and technological factors. The designs were discerned by unearthing the inducements and consequences as far as the reality of the computer-mediated IOS was concerned. Thus, the technology design is traced to the institutional context of the relationship between the government and traders. This factor is followed by how the designed technology induced a re-design of the organization of the relationship, and then by how the latter further induced a re-design of the technology. The design and re-designs are analyzed to tease out the role of the existing and emergent relationships in shaping the implementation of the system.

Institutional Design of Technology

The government's procurement of the cash register and the low involvement of both VAT Service staff and traders are traceable to a history of autocracy and mistrust. The retailer does not trust the government because he or she is suspicious of the government's tendency to collect more taxes from them. Conversely, the government is suspicious of the retailer's tendency to under-declare taxes or avoid its payment altogether. The retailers' mistrust was evidenced by the May 1995 countrywide demonstrations they held in protest against the government's replacement of the sales tax with the VAT scheme. They merely suspected that it was the government's ploy to collect more taxes from them. The demonstrators were attacked by pro-government militia. The government then withdrew the VAT, revised it slightly, and re-introduced it in 1998 without any demonstrations.

These episodes, to date, constitute a major cause of the retailer's mistrust. Other causes, reported by the GUTA representatives on the ECR implementation committee, are firstly, what the retailers, who have been registered for the tax, believe to be an unfair system that taxes them and leave the unregistered ones untaxed. The problem is that the taxation causes the registered retailer to sell at higher prices from a less exposed store while the unregistered one, selling openly along the street, sells at lower prices. Secondly, they reported that they had heard from some retailers that some VAT field officers' "mishandled" them because the officers believed that they were defaulters.

The government also does not trust the retailer, and, therefore, uses autocracy to govern or control their relationship and transactions. The mistrust comes from the suspicion that the retailer has the tendency to hide and falsify transactions information to gain tax advantage. Because of this mistrust, and of the government's own ineffective systems to monitor and audit retailers' transactions, it has set strict tax laws that allow it to apply heavy sanctions to those that default in tax declarations and payments.

Tax legislation is a bureaucratic mechanism of control that is heavily informed the design of the technology. Although, the design was undertaken by the vendors, the government's procurement of the technology signifies its endorsement of the control functions inscribed into it. The design is traceable to the enduring character of autocracy in G2B relations, especially in tax administration. The enduring character reflects the interplay between the regulative, normative and cultural-cognitive institutional elements.

An "*institution* represents a social order or pattern that has attained a certain state or property; *institutionalization* denotes the process of such attainment" (Jepperson, 1991, p.145). Institutions are, therefore, chronically reproduced social patterns or standardized interaction sequences (Berger and Luckmann, 1967). These patterns arise from individual or collective mobilizations but they do not persist by them. Rather, they are sustained and supported by routine reproductive actions.

The government's acquisition of the ECR for VAT administration speaks of both a regulative and normative action traceable to the character of African public bureaucracy. Bureaucracy in general is an institution in its own right because it has acquired its own momentum and has its own norms of good practice in modern organization (Weber, 1947). African Public bureaucracy in particular reflects the standardized social patterns from the chieftaincy institution that regulates society by autocracy in a normal fashion.

Autocracy, in Ghanaian public organizations, is therefore understood as its regulative and normative element. This element translates into processes whereby public organizations relate with subordinate organizations in a dictatorial manner. This process is witnessed in the government's design of the ECR to reflect the regulative regime of technology (Kallinikos, 2009), which is an ordering achieved through the bureaucratic social structure and the culture of autocracy deemed as a rationalized action scheme. Design of autocratic IT systems is a common and persistent feature of many government IT projects in Ghana and Africa, despite many failures (Heeks, 2002a).

The acquisition also speaks of a mimetic action traceable to modes and methods of IT adoption in other developing countries. The factors that explain this type of adoption are the low consultation, inadequate scientific studies on the feasibility and applicability of IT projects in developing countries (Avgerou, 2008), and the assumed developmental potential of IT through substitution of traditional processes with IT (Avgerou, 2010). These factors are the core assumptions of the NPM manifesto, which says, for example, that the marketization of the state leads to economic growth and social progress (Gilhooly, 2005; Zheng, 2009; UNDP, 2001; Ciborra, 2005).

These factors combine to create a culture of imitation among many governments around the world, including the Ghana government. Therefore, IT innovation assumptions and uncertainty indicate the cultural-cognitive elements of the institutional environment of Ghanaian public organizations such as the VAT Service. These elements are the causes of the mimetic action in which governments adopt IT by imitating other governments. Thus, the technology design of the ECR is understood as an instance of these mimetic actions caused by these cultural-cognitive elements of the Service's institutional environments.

Technology-induced Redesign of Organization

However, the Service's invitation of the GUTA representatives to join the implementation committee indicates its adoption of a more participatory approach to the implementation. It is clear that it was mindful that its past relationship with retailers was unhealthy and could undermine retailers' acceptance of the register. This invitation and their participation were an expression of the authority of the Service according to the legislation that instituted the VAT scheme. Thus, although automation of aspects of VAT administration is not mentioned specifically in the legislation, the Service has the authority to adopt the ECR for this purpose. Interestingly, in so doing, it was trading some of its power, as given to it in the legislation, to the retailers. The participation by their representatives subjected this automated aspect of VAT administration to debate because there was now room for the two parties in this relationship to negotiate their responsibilities.

Altogether, the actual arrangements for implementation of this new socio-technical system were representing a drift from the normative distribution of influence and domain stipulated by the legislation (Raelin, 1980). The organizational dimension of these arrangements were the negotiation of motives and interests, which ran through the entire implementation period – in committee meetings, in the training of users, and in user resistance.

There is no doubt that this orientation towards a more participatory implementation approach was induced by the Service's concern over the ECR's successful adoption by retailers. The adoption concerns were accentuated by the terminal's deployment in retailers' shops and its use by them – away from the Service and proximal to the retailer. It was aware of the increased risk of the moral hazard problem where private companies, having better knowledge about their operations, hide and falsify information given to tax authorities so that they can gain tax advantages (Liu and Tan, 2008).

Because of its knowledge of the moral hazard history on the part of retailers, the Service was apprehensive that the terminal could be appropriated by retailers to increase the moral hazard problem. Information technologies, especially mobile computers, are usually appropriated by their users beyond the stipulated usage. The portability of the technology, its proximity to the user, and "absence" of the controlling authority together induce its personalization by the user who takes advantage of these circumstances to adapt it to satisfy private motives (Wiredu and Sørensen, 2006).

Thus, the technology design and deployment induced an organizational-level revision of the legal-political institutional design of the inter-organizational relationship that existed prior to the adoption of the technology. However, this revision was confined only to the implementation committee formation, end-user training and the setting up of a help-desk support office for all the 2,000 terminals that were deployed. Thus, there was inadequate internal re-structuring of the Service to match the required significant organizational-level revision of the IOR. Inadequate re-structuring was due to the maintenance of the mandate-level of such a legal-political relationship. According to Raelin (1980), this mismatch is an instance of network distribution imbalance between the institutional-level and revised

organizational-level where there is little correspondence between the actual and normative distribution of influence (i.e., power and authority) and domain (i.e., allocation of resources) (see Figure 1).

Organization-induced Redesign of Technology

The mandate that was left intact was actually inscribed into the register. However, the outcomes of the negotiation of motives and interests by the two parties were not adequately inscribed. Thus, the ECR terminal was redesigned to serve more of the interests of the Service and less of those of the retailers. In spite of the promise by the Service to redesign the technology to represent the new participatory approach, it rather represented the autocratic approach. Electronic autocracies are designed in information technologies by a party in an IOR to guard against the other party's performance ambiguity and incongruent goals (Ouchi, 1980; Malone et al., 1987). They follow the traditional bureaucratic aim to reduce the cost of transactions in accordance with the principles of new public management (Heeks, 2002b).
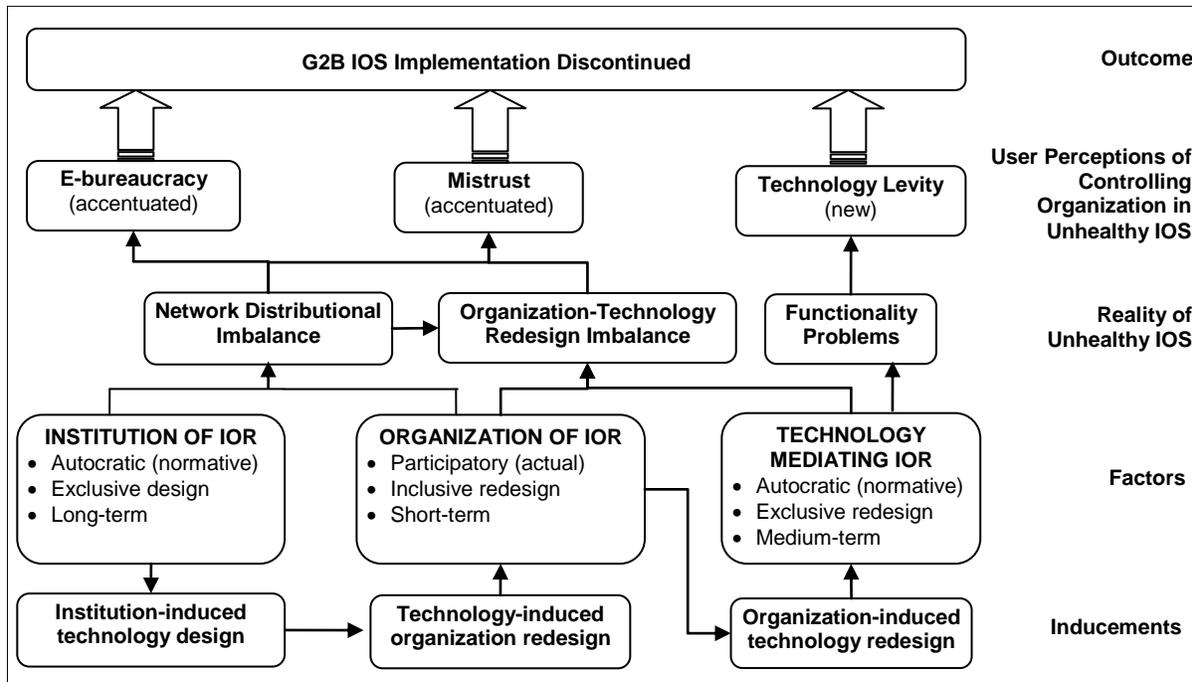
Figure 1: Analysis of How Entity Relations Affected the IOS Implementation

However, the Service, in redesigning the terminal for the electronic autocracy function, had automatically redesigned it as a transaction-specific asset (Zaheer and Venkatraman, 1995). Such an asset requires control mechanisms that will safeguard it so that it does not become an object of opportunistic behavior. The Service's redesign of the terminal to function as an electronic autocracy mechanism and its low inscription of retailers' interests suggests that it wanted to use the technology as the self-same control mechanism to safeguard its own asset-specificity.

However, it is almost impossible for an information technology, which is its self-same guardian against opportunistic use, to function adequately if it has many other functionalities that increase the risk of external interference (Kallinikos, 2005). Autonomic computing, which seems to be an extreme form of such self-control and self-regulation, is underpinned by a philosophy of such risk reduction. The

Service, orienting towards this philosophy, disabled the network and telephone ports on the terminal to reduce external interference, for instance.

In general, it ensured that the terminal's interface with the reality of retail transactions processing, which is external to the inscribed functions, occurred along strictly prescribed procedures as witnessed in the precise input requirements and development of specific skills profiles in the ECR training sessions. These were meant to ensure the reproduction of the terminal's operations and the exclusion of undesired interferences so that self-control of the technology's asset-specificity could be achieved.

Thus, the organizational preference to continue operating an autocracy mechanism, in accordance with the mandate of this legal-political IOR, induced an electronic autocracy instead of the electronic network that was promised. The low inscription of retailers' interests in the re-design, which epitomized their exclusion, was very consistent with the safeguarding motive and very desirable by the Service. However, compared with the redesign of the organization of the IOR, it was a departure from the retailers' expectations. In short, there was a redesign imbalance between technology and organization (see Figure 1).

The network distribution and organization-technology redesign imbalances that preceded the deployment of the terminals were unfavorable antecedents for retailers' use of the technology. When they began using them for transactions, they experienced these imbalances. Thus, the IOR, during the use of the terminal was characterized by an electronic autocracy and the retailers' perception of the Service as untrustworthy. The imbalances had accentuated autocracy and mistrust. Furthermore, the technical or functionality problems that arose during use induced the retailers to perceive the Service as unserious. These three characteristics resulted in an IOR that appeared to be in a worse state than the pre-ECR days.

Autocracy-Participation Dialectics

Figure 1 suggests that there are significant dialectics between the normative autocracy in the public-private relationship and emergent user participation in the technology itself and in its use. The case shows that autocracy dominated in the dialectics because it is an enduring and pervasive character of the institution and organization of the IOR and of the technology mediating it. The institution of the legal-political mandate in the G2B relationship led to the inscription of autocracy into the technology; and the technology, in turn, enhanced autocracy in the relationship.

However, although participation was a fleeting and limited character of the IOR organization, it was supposed to be an enduring character of the use of the technology. In this case, business participation in the use of the technology was not in harmony with the government's autocracy inscribed into it. The resolution of such disharmony, either by autocratizing technology use or democratizing the technology, organization and institution, would have led to implementation success. That is to say, either full autocracy or full democracy underpinning the institution, organization, technology and technology use would ensure implementation success (Figure 2).
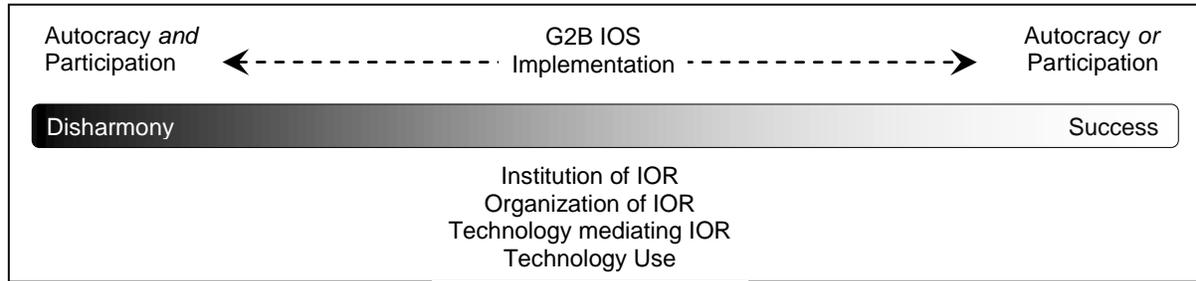
Figure 2: G2B IOS Implementation as a Function of Autocracy-Participation Dialectics

Thus, in the case, participation would have characterized the relationship if the traders' interests were inscribed into the technology. In that scenario, their participation would extend beyond the mere use of the technology to the inscriptions in the technology. However, greater and more enduring participation in the technology would not manifest until there was enduring and pervasive participation in the organization and institution of the IOR. This scenario would have increased the chance of implementation success, but it is an unlikely scenario in circumstances, such as those of this case, where autocracy characterizes the institution of the relationship.

In such circumstances, the chances of implementation success will increase if full autocracy is applied to all the four entities. For example, the use of the technology can be enforced by applying the legal-political mandate underlying the institution of the IOR to it. In the empirical case, the traders would be more obliged to use the technology, and this would have resulted in a more successful implementation than what was witnessed.

DISCUSSION

How can the implementation of G2B IOS be understood in terms of interactions between IT and the public-private context? The preceding analysis explains how the autocracy-participation dialectics in the interactions shapes the design of the relations between institutional, organizational and technological entities of the IOR. The design dynamic can, therefore, be described as dialectical in allusion to the autocracy-participation tensions in G2B IORs. Hence, dialectical design is being proffered as a perspective with the following peculiar functions.

Firstly, by facilitating the explanations of the relationships between these entities, it provides a systematic comprehension of how imbalances in network distribution and redesign of the organization-technology relationships are induced. As such, the causal relations between the entities and inducements have been clearly laid out. In the lay out, the various design states of technology and organization are explained in terms of the entities that induced those states.

Secondly, the perspective facilitates the comprehension of the dialectic relationships between the entities as design qualities of the IOS. For instance, in the empirical case, it explains the imbalance between the autocratic institutional structure and participatory organizational interaction as a design quality of the IOS. Therefore, it draws attention to G2B IOS implementation as a direct function of the institutional-organizational relationship redesign. Consequently, the perspective provides a dialectic-based distinction between G2B and other types of IORs because the relationship redesign is essentially a negotiation of autocracy-participatory conflicts between government and business. In other words, the successful implementation requires revisions of institutional- and organizational-level designs in the face of the reality that institutional-level autocracy is at odds with the high degrees of participation offered by IT.

Thirdly, it is an important perspective for comprehending the real characteristics that define the soundness of the IOS. It facilitates the understanding of the dialectics as characteristics of the system which, as the empirical case shows, define its soundness. These dialectics help to demystify the perceptions of accentuated mistrust and the government agency's panoptical role. For instance, it explains organization-technology imbalance as the hidden cause of accentuated mistrust that undermined the implementation of the IOS. Furthermore, by these imbalances, perceptions of mistrust and of the panopticon, contributing to the unhealthy state of the IOS, cannot be attributed solely to deliberate strategizing but also to emergent strategizing. This implies that successful implementation will require both deliberate and emergent strategizing to balance the network distribution and the organization-technology design.

Fourthly, it highlights distinctions between designs according to network distribution imbalance, to organization-technology redesign imbalance, and to functionality problems. Thus, in comprehending the types of redesign challenges in an implementation effort, this function guides the researcher or implementer to approach the challenges systematically and separately. The case shows, for example, that organizational-technology imbalance requires a redesign of the technology according to usability requirements as expressed by the retailers while the functionality problems require a redesign according to functionality requirements.

These reasons point to the fact that the perspective includes collaborative relationships (Kumar et al., 1998), multi-level constructs (Rodon et al., 2008), and cultural-historical explanations (Robey and Rodriguez-Diaz, 1989), which are the notable existing relations-based or interactionist perspectives on IS implementation. Each of these perspectives, as they have been espoused in the literature, is limited. For instance, Kumar and his colleagues' collaborative relationships presented as the "third rationality of IS" look only within the IOR and overlook its institutional and cultural-historical aspects. Rodon's multi-level constructs do not incorporate the cultural-historical viewpoint. Likewise, Robey and Rodriguez-Diaz's cultural-historical perspective does not necessarily account for the institutional- or industry-level effects in their organizational-level analysis of IS implementation, nor is it contextualized to G2B IORs.

However, the dialectical design perspective addresses these limitations because it incorporates analysis of collaborative relationships in terms of the inclusive or participatory redesign of the bureaucratic design at the institutional level. It reflects multi-level explanations of IOS implementation. It incorporates cultural-historical analysis in terms of the degree to which the designs and redesigns reflect historical modes of engagement and of technology use. It is also pertinent to the G2B IOR context.

This perspective is also a distinctive contribution because it leads the conceptualization of G2B IOS implementation in terms of the specific explanations of how the interactions between IT and public-private relations shape implementation. Existing notable works on implementation with contexts close to G2B IOS pertain to general e-government research (e.g. Ciborra, 2005). Even in the research, there is inadequate reference to the peculiar challenges of dialectics and design in their explanations. This leaves the IS field bereft of ideas on how to implement IOS in the face of public-private relations and IT mediation. However, this paper takes an original step in leading the conceptualization of G2B IOS implementation.

Implications

Firstly, dialectical design is a framework for analyzing the discordant nature of G2B IORs that stems from the autocracy-participation tensions between government and businesses. For example, it leads the

researcher or manager to understand the IOR as an institution designed by a legal-political mandate to coerce two otherwise uncooperative parties into cooperation. Furthermore, it is also the most suitable facility for analyzing the cooperative redesign at the organizational level in terms of their negotiations, all at the same time.

Secondly, it facilitates analysis of the appropriable nature of ITs that mediate G2B IOSs because of their susceptibility to user appropriation. User appropriation stems from the usual difference between the government's (or government agency's) design of the technology and the business' adaptation or redesign of it to serve personal motives. The perspective will help in the analysis of the institution-induced technology design in terms of the degree to which existing aspects of the legal-political mandate are displaced by the design properties of the mediating IT. The perspective is also the most suitable facility for analyzing the degree to which users have adapted the technology to further their personal interests. Higher levels of adaptation can be traced to the network distribution and/or organization-technology design imbalance.

Thirdly, the dialectical design perspective will encourage managers to approach G2B IOS implementation more proactively than the existing models that encourage a reactive approach. Design is an innovative endeavor that involves positive practice and intervention. Thus, rather than a reactive approach to network distribution and organization-technology imbalances, which are design qualities of the system, the manager, by this function, can take a proactive approach to design the institutional, organizational and technological entities so that conflicts can be managed optimally.

CONCLUSION

This paper has explained G2B IOS implementation in terms of dialectical design pertaining to multiple interrelations between institutional, organizational and technological entities. It shows that autocratic-participation dialectics and the consequent design of these entities are pervasive and influential concepts in the interrelations between them. Based on the analysis, the paper argues for a dialectical design perspective on implementation, which facilitates a systematic comprehension of the causes of institution-organization and organization-technology redesign disparities; of the relationships between the entities as design qualities of the IOS; of the real and perceptual characteristics that define the soundness of an IOS; and of the paradigmatic distinctions between institution-organization design, organization-technology redesign, and functionality design of technology. The proposed perspective is argued to be distinctive because it leads the conceptualization of G2B IOS implementation, it integrates the notable existing perspectives, and it proffers the most suitable framework for analyzing the significance of government in implementation.

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